JEWEL RANGE CLUB

THE PROFESSION
OF
HOME MAKING

A CONDENSED HOME-STUDY COURSE

ON DOMESTIC SCIENCE; THE PRACTICAL APPLICATION OF THE MOST RECENT ADVANCES IN THE ARTS AND SCIENCES TO THE HOME INDUSTRIES

PREPARED BY TEACHERS OF RECOGNIZED AUTHORITY

FOR HOME-MAKERS, MOTHERS, TEACHERS, PHYSICIANS, NURSES, DIETITIANS, PROFESSIONAL HOME MANAGERS, AND ALL INTERESTED IN HOME, HEALTH AND ECONOMY

CHICAGO
AMERICAN SCHOOL OF HOME ECONOMICS
1911

INTRODUCTION

HOME-MAKING as now taught in many schools and colleges takes rank as a profession as truly as any occupation. It is the *greatest* of the professions—greatest in numbers and greatest in its effect on the individual and on society. The profession of home-making has added as much to every day housekeeping as scientific farming has to that of past generations.

The correspondence courses of the American School of Home Economics were prepared to carry this new profession to everyone in reach of the mails. With the co-operation of prominent teachers, the best courses in home economics and domestic science were condensed into clear and practical lessons, especially adapted to home study. The enrollment of over 7,000 members in the School and their appreciation of great practical benefits and interest of the course indicates the wide demand for such teaching and its value.

The present volume is made up of some of the most popular and helpful lessons of the Course, including the regular "Test Questions" and Programs for Class Study. It is a comprehensive reference work for every day use, but it is much more—it is a carefully prepared home-study Course, put into book form after being tested by use, revised and supplemented. It is published at a popular price to enable progressive home-makers to manage their homes more easily, to save on household expenses, to keep up to date and to make the daily routine of housekeeping an interesting profession instead of deadening drudgery. That it may serve as an inspiration to many and be the means of extending even more widely this movement for the conservation and improvement of the American home is the hope of the School.

AMERICAN SCHOOL OF HOME ECONOMICS.

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We Believe—

THAT right living should be the fourth "R" in education.

THAT home-making should be regarded as a profession.

THAT health is the duty and business of the individual; illness of the physician.

THAT most illness results from carelessness, ignorance, or intemperance of some kind.

THAT as many lives are cut short by unhealthful food and diet as through strong drink.

THAT on the home foundation is built all that is good in state or individual.

THAT the upbringing of children demands more study than the raising of chickens.

THAT the spending of money is as important as the earning of the money.

THAT economy does not mean spending a small amount, but in getting the largest returns for the money expended.

THAT the home-maker should be as alert to make progress in her life-work as the business or professional man.

THAT the most profitable, the most interesting study for women is the home, for in it center all the issues of life.

THAT the study of home problems may be made of no less cultural value than the study of art or literature and of much more immediate value.

—American School of Home Economics

CHEMISTRY OF THE HOUSEHOLD

A Day's Chemistry

BEING an outline of the simplest and most evident chemical changes suggested by a day's work at home and a description of the various chemical substances of interest to the housewife.

WATER

The morning bath will introduce us agreeably to the wonderful chemical substance, water, and with this substance we will begin our study of a day's chemistry. The water for the house may come from the town supply, from wells, cisterns, or springs. It may be "surface water," from pond, lake, or stream, or it may be "ground water," from wells or deep springs. Cistern water is, of course, rain water. Water is present in many substances where we might not suspect it. All living things contain a large percentage of water. Of an athlete weighing 150 pounds, all but about 42 pounds is water. Wood, meat, vegetables, fruit, when dried, weigh from 50 to 98 per cent less. Many natural and artificial substances owe their crystalline form to

Its Occurrence

water and when heated, give off this "water of crystallization" and crumble to powder. Common washing soda shows this effect, when exposed to the air, and soon gives off so much water that its crystalline character is lost.

Natural Water

All water found in nature is more or less impure, that is, it contains substances in solution. It dissolves air and takes substances from the soil and rocks over which it runs. Often it comes in contact with animal and vegetable substances and dissolves something from them. Near dwellings the water in streams, ponds, and wells is very likely to become contaminated. Decaying substances give rise to materials easily dissolved in water, which may travel for a considerable distance under ground, so that the drainage from the house or barn is frequently carried to near-by streams or wells, making their waters quite unfit to drink. Fig. 1.

The following experiment will illustrate that air is dissolved in water.

Experiment. Place a tumbler of fresh well-water or tap-water in a warm place. After a time, bubbles will be seen collecting on the sides of the glass. This is air which was dissolved in the water. As the water grows warm, it cannot hold so much air in solution and some of it separates.

Distilled Water

Most of the impurities in water are less easily converted into vapor than the water itself; hence, when the water is boiled, they stay behind while the water "boils away". Water from almost any source can be made pure and clear by distillation. Distilled water is prepared in an apparatus known as a still. See Fig. 2. A still consists of a boiler, A, and a condenser. In the condenser, a coil of tube, D, usually made of pure

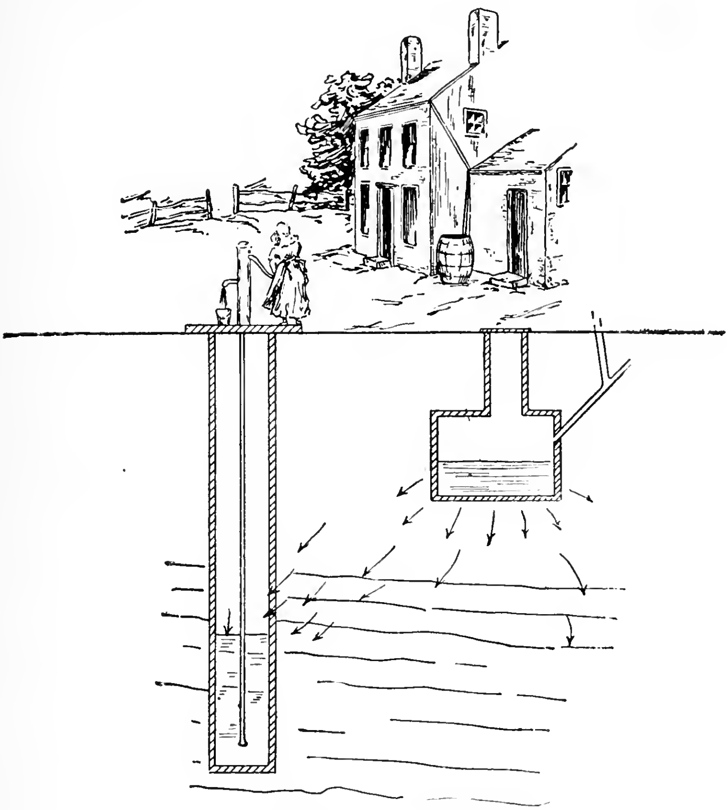


FIG. 1. WELL, CONTAMINATED BY HOUSE DRAINAGE.

tin, is surrounded by cold water which continually runs through the apparatus. The steam, admitted at the upper end of the coil, is condensed by the low temperature and distilled water is collected at the lower end. In the laboratory, distilled water is often made in the glass apparatus shown in Fig. 3.

Distilled water has a flat taste, because air and other dissolved substances which give water its taste have been removed. It will again dissolve the air on being poured several times from one vessel into another.

Rain Water

Rain is water which has been evaporated from the surfaces of natural bodies of water, oceans, lakes, and from the land, and is practically free from mineral matter, but contains dissolved gases.

The vapor, cooled at the low temperatures of the upper levels of air, falls as rain. The first fall of any

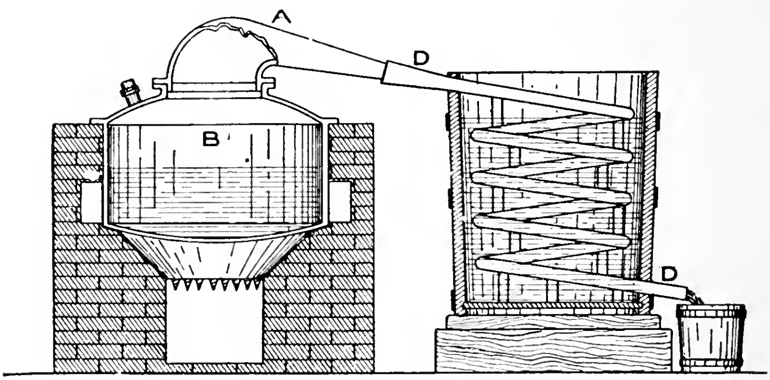


FIG. 2. A STILL.
A, Gooseneck; B, Boiler; D, Condensing Coil.

shower is mixed with impurities which have been washed from the air. Among these may be carbon dioxide, ammonia, and carbon in the form of soot and creosote. It is these last impurities which cause the almost indelible stain left when rain water stands upon window-sills or other finished woods.

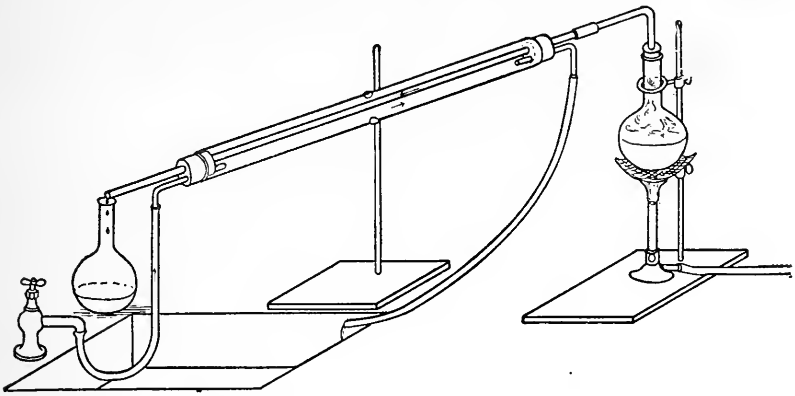


Fig. 3. Making Distilled Water in the Laboratory.

Solubility

Water is a nearly universal solvent. It dissolves more substances and these in larger quantities than any other liquid. At a given temperature, water will dissolve only a certain proportion of the various salts and other soluble substances. When the water will take up no more, the solution is said to be *saturated.* Increasing the temperature generally increases the dissolving power of water for solids and liquids. The reverse is usually true for gases.

When a saturated solution of a solid is cooled, crystals are frequently formed, many having beautiful shapes. Examples are shown in Fig. 4.

Experiment. In an earthen-ware or enameled dish dissolve as much alum as possible in a little boiling water. Pour the solution into a shallow dish or saucer, and set it away for a day or more where it will be undisturbed. Beautiful, clear, six-sided crystals will form in the dish. If strings are hung in the solution, the crystals will form upon them. Rock candy crystals are made from cane sugar syrup in this way.

The experiment may be repeated, using washing soda instead of alum.

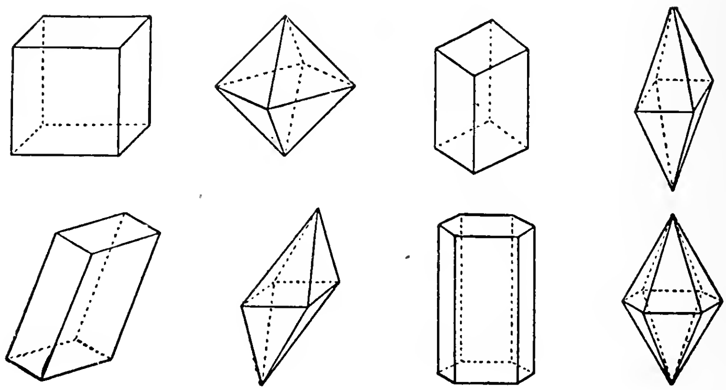


FIG. 4. SHAPES OF CRYSTALS.

Effect of Water on Metals

Silver, copper, and tin are not perceptibly dissolved in pure water, but when combined with acid substances, the compounds formed are soluble. These compounds of a metal with an acid are called salts. The salts of copper, zinc, and lead are poisonous. Copper, brass, (an alloy of copper with zinc) tin, solder, and iron are metals easily affected by acids, so that cooking utensils made of these materials should not be used with acid substances like lemon and vinegar.

Lead pipes are much used in plumbing, and as a rule no evil results follow, since ordinary drinking water acts under most circumstances only very slightly upon lead. The pipes are soon coated with a layer of carbonate and sulphate of lead, which is insoluble and prevents any further action. Water from new lead pipes, or pipes not kept constantly full, or from a hot-water system in which lead is used, should never be used for drinking or cooking because of danger from poisoning. Pure distilled water, or rain water, affects lead more than ordinary ground water. **Effect of Water on Lead**

Rain water absorbs more or less carbon dioxide gas from the air and soaking into the soil often comes in contact with magnesia in the rocks and with limestone. Water containing this gas will dissolve these mineral substances making what is known as "hard" water, a very different substance from the original rain water which is "soft." This subject will be discussed when the chemistry of the laundry is explained. **Hard Water**

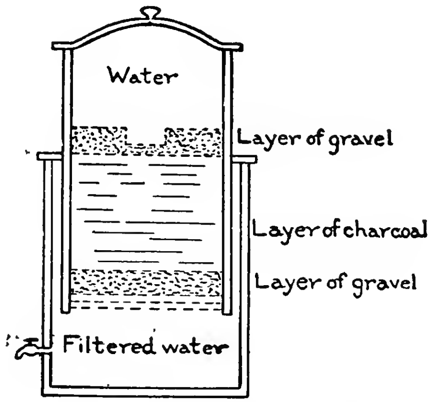


FIG. 5. A WATER FILTER.

Ordinary water for drinking purposes is often filtered. Filtration will remove small particles suspended in the water, but has no effect on substances dissolved in it. **Filtering**

The small charcoal or sand filters will not remove the minute living forms called micro-organisms or germs, some of which are the cause of disease. A filter of porous stone or procelain, in which the water filters slowly, is more effective. A good filter is shown in Figure 5.

Water which has strained or filtered through several feet of earth is often much improved, but the earth filter itself may become contaminated after a while and more harm than good result. A thick layer of sand and rock, however, removes germs effectively, and consequently water from deep driven wells is safe.

Composition of Water

Water was long considered an elementary or simple substance, but towards the end of the last century it was found to consist of two quite different substances so intimately joined together that the identity of each is lost. If we pass an electric current through water in the proper way, we see a gas rising in bubbles from the end of the wire by which the current enters and a like appearance at the wire by which the current leaves the water. The two gases have evidently come from the water and are the substances out of which it is made for the water begins to disappear. By placing an inverted glass filled with water over each wire, the gases are easily collected. See Fig. 6. When one bottle is *full* of gas, the other will be only *half full;* and on decomposing the whole of a given amount of water, this proportion holds true.

If we test these gases, we shall find them quite different. The bottle which is full contains a gas called hydrogen. There is evidently twice as much of this by volume in water as of the other gas which is called oxygen. These two gases were tied together by what is known as *chemical force,* but the electric current separated them and gave us an opportunity to make the acquaintance of each by itself. We would hardly suppose this clear, colorless liquid to be composed of such material. On decomposing pure water from any

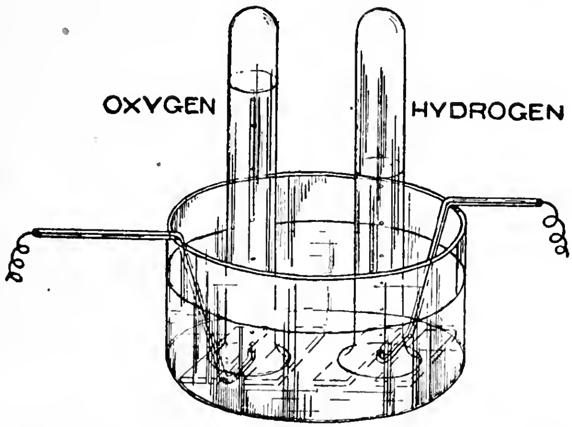


Fig. 6. Decomposing Water Into Oxygen and Hydrogen Gas.

source, the proportion of oxygen to hydrogen is always the same, and in fact, all *chemical compounds* have a *certain composition* which never varies under any condition.

Hydrogen

The name hydrogen comes from two Greek words, meaning *water* and *to produce.* Hydrogen is interesting as being the lightest common substance. It is an invisible gas like air, but unlike air will burn. If a lighted candle be placed in a bottle of hydrogen, the flame will be at once extinguished, though the hydrogen will take fire at the mouth of the bottle. Fig. 7. Hydrogen will unite with other substances besides oxygen; that is, it will join with other substances by chemical force. It forms a part of most animal and vegetable substances.

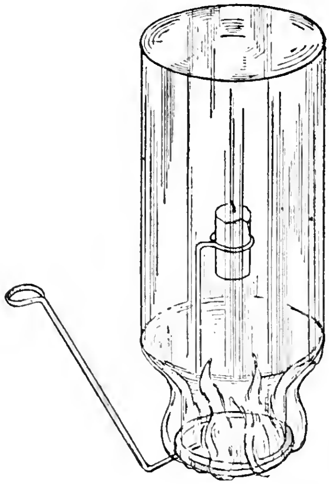


Fig. 7. Hydrogen Will Burn in Air.

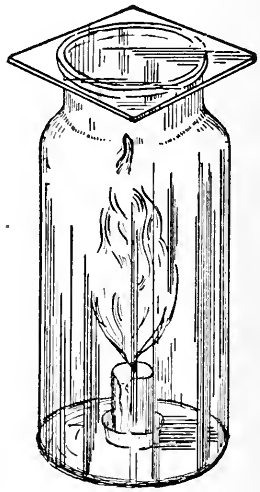


Fig. 8. A Candle Burns Vigorously in Oxygen.

Oxygen

Oxygen, as well as hydrogen, is a tasteless, colorless, odorless gas. The weight of a given volume is sixteen times that of the same volume of hydrogen. It is very abundant and the most important substance to mankind. Should we test this gas with a lighted candle, as we did the hydrogen, we would find that the oxygen would not give a flame, but that the candle would burn far more vigorously. Fig. 8.

When substances burn in oxygen they really unite with it chemically, forming new substances called *oxides.* Water is hydrogen united with oxygen and its chemical name might therefore be oxide of hydrogen.

Effect of Heating Water

When water is heated in an open vessel, evaporation from the surface of the liquid is more rapid as the temperature increases. Soon vapor is formed on the sides and bottom of the vessel and bubbles begin to rise which are at once condensed by the cooler parts of the liquid, thus making the familiar "singing" noise. Finally the liquid becomes so hot that the bubbles reach the surface without condensing, and then the water boils and goes off into the air as steam, an invisible gas. This occupies the small space between the spout of the tea-kettle and the cloud of vapor which is commonly called steam, but is really finely divided drops of water. A cubic inch of water makes about a cubic foot of steam.

Boiling Point

The temperature at which pure water begins to boil at sea level is 212° Fahrenheit (or 100° Centigrade) and this temperature remains the same while the boiling continues. Increasing the heat simply increases the violence of the boiling. The steam given off is of the same temperature as the boiling liquid. Most pure liquids have a definite boiling point; ether boils at 100° F, alcohol at 173° F, turpentine at 315° F.

When the pressure of the atmosphere on the surface of the liquid is less than at the sea level, as on a mountain, where there is not so much air above pressing down on the surface of the liquid, the temperature of boiling is less. For example, the boiling point of water in Denver, Colorado, is about 202° F, and on the top of some of the mountains in the Himalayas, 180° F. People living in high mountain regions have difficulty in cooking with water or steam.

Increasing the pressure on the surface of the liquid, on the other hand, raises the boiling point. This is seen when water boils in a confined space, as in a steam boiler. Under five pounds pressure of steam, water boils at about 227° F and at 100 pounds pressure, at 337° F.

An increase in the boiling point of water is caused by dissolved substances. A very strong solution of common salt boils at about 226° F, and a solution of sugar—syrup or molasses—boils at an increasing temperature as the water is lost.

The temperature at which a syrup boils, is a measure of its thickness or density. In many modern cookery books temperature tests are given for boiling sugar in making confections, which vary from 215° for a thin syrup, up to 350° for caramel. In making maple sugar a "sugar thermometer" is often placed in the boiling syrup. At a given temperature, which is higher for sugar cakes than for soft sugar, the proper concentration is reached.

Latent Heat

Considerable heat is absorbed by the process of boiling. It requires 966 times as much heat to change a pound of water at the boiling point into steam as it does to raise it one degree Fahrenheit. The heat which is used to change the state of the water without changing its temperature is called *latent heat* from the Latin word, meaning hidden. The "hidden heat" is given out again when the steam is condensed. This same quantity of heat is absorbed when the water evaporates slowly; hence the great cooling effect of large bodies of water.

Freezing

When water is cooled it shrinks slightly until the temperature of 39° F is reached. On further cooling it to the freezing point, 32° F (or 0° Centigrade) it increases in volume, so that ice takes up more space than the same weight of water and consequently floats. If this were not so, lakes and streams would freeze solid in winter and it is doubtful if they would melt completely during the summer in the northern part of the United States.

To melt ice, 144 times as much heat is required to change the ice at 32° F into water at 32° F, as to raise the temperature of the same quantity of water one degree Fahrenheit. This is the *latent heat of melting* and the same amount of heat is given out when water freezes. Water thus serves as the great temperature regulator for the earth, for by evaporating, much of the heat of summer is absorbed, and before freezing, a great deal of heat must be given out and absorbed.

Heat Absorption

Water has a much greater capacity of absorbing heat than any other common substance. For example, one pound of water will absorb ten times as much heat in being raised one degree as a pound of iron. The greater absorbing capacity of water for heat explains why a kettle of fat heats up so much faster than the same weight of water under like conditions; for the fat requires only one-third as much heat to raise it, say, to 200° F, as does the water.

THE ATMOSPHERE

When we leave the sleeping room, we open the windows to admit air. We may with advantage treat our lungs to an air bath by standing at the open window or by going out of doors for a few minutes to take in five or ten deep breaths. Next, perhaps, we shall use drafts of air to help us make a fire in the range or in a fire place.

Air as a Substance

Air is a real substance. It can be weighed. The air in a room 15 feet by 20 feet by 10 feet high weighs 210 pounds, and would fill ten ordinary water pails if liquified. Air will expand and may be compressed like other gases and it has been liquefied by intense cold and pressure. It requires considerable force to move it. When a bottle is full of air, no more can be poured in. Our houses are full of air all the time. It pervades all things—the cells and tissues of our bodies are full of air.

Wood and some metals even contain a little. In breathing we take a little from the room, but it is immediately replaced by expired air, which is impure. Were there no exits for this air, no pure air could enter the house, and we should die of slow suffocation. The better built the house the quicker the suffocation. Fortunately no house is air tight. Air does pass out through the walls and cracks, and comes in around doors and windows, but unless there is a great difference in the temperature indoors and out, this fresh air is neither sufficient to replace the bad air nor to dilute it beyond harm. Therefore in ordinary weather, the air of all rooms must be often and completely changed either by special systems of ventilation or by intelligent action in the opening of doors and windows.

Air Pressure

The atmosphere surrounds the earth to a depth of fifty miles or more. The effect of gravity of the earth on this mass is to produce a pressure or weight of air on all things. This pressure is about fifteen pounds on each square inch, but we do not notice it, for the pressure is the same on all sides of us and the internal pressure in the cells of our bodies balances the external pressure of the atmosphere.

If it were not for the pressure of the air, we could not drink lemonade through a straw or pump a pail of water. When we exhaust part of the air by suction, we remove part of the pressure over the liquid in the straw and the air pressure on the surface in the glass forces the liquid up the straw. The same principle applies in a pump—the air is partially taken off the top of the water in the pipe, and then the pressure outside forces the water up in the pipe and by a proper valve arrangement, it is made to run into the pail. See Fig. 9.

The pressure of the atmosphere at the sea level is sufficient to force water up into a vacuum about 34 feet vertically; but owing to mechanical imperfections of pumps, the practical limit is 27 or 28 feet rise between the surface of the water and the valve of the pump. It is customary to use a force pump if water is to be raised to a height above this. Fig. 10.

Unlike water, air is not the result of a chemical union of two unlike simple gases. Nevertheless, air contains more than one substance. It is made up chiefly of two gases simply mixed together, and each exhibits its own characteristics to some extent.

Composition of Air

Pure air consists of oxygen, which we have found constitutes one-third of water, and of nitrogen (and argon). The oxygen forms about a fifth and the nitrogen four-fifths of the air. Besides these, several other gases are found in small but varying quantities.

To the oxygen gas is due the power of air to support combustion (fire) and life. Oxygen unites chemically with most other substances, and were the air all oxygen, the combustible part of the earth would soon be consumed by its own fires. Fortunately four-fifths of the air is a gas that has little power of combination and this nitrogen serves to dilute the oxygen and to weaken its force, much as water would dilute and weaken a strong and powerful chemical.

Nitrogen

The most marked characteristic of nitrogen is its sluggishness or inertness. Nitrogen, like oxygen, is a tasteless, odorless, colorless gas. It is fourteen times as heavy as hydrogen. Though nitrogen from the air unites with other elements with difficulty, it is found in all living tissues, both animal and vegetable, and when these decompose the familiar substance, ammonia, is formed. This is a compound of hydrogen and nitrogen.

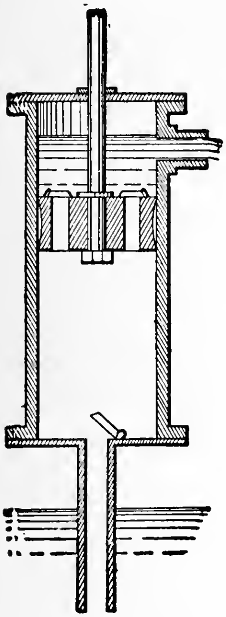


Fig. 9. Suction Pump.

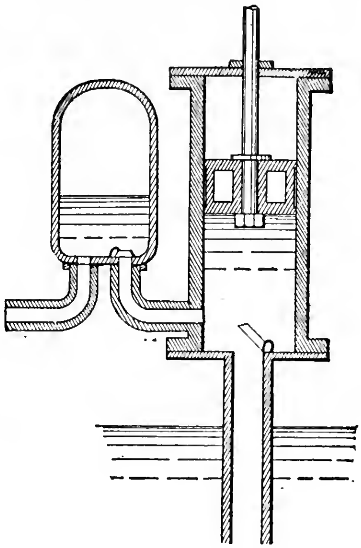


Fig. 10. Force Pump.

Carbon dioxide is always present in the atmosphere. This is one of the countless combinations of carbon, the element present in all animal and vegetable materials. Carbon is nearly pure in the form of charcoal. Soot, graphite or the black lead of lead pencils, and the **Carbon** diamond are other forms. Carbon unites very readily with oxygen and the gas formed by their chemical union is called carbon dioxide because it contains two parts of oxygen to one of carbon. Wood, coal, gas—almost everything that will burn in the air—and even our own bodies contain carbon, though we would not suspect its presence because it is combined with other substances and has merged its own character in those of the substances of which it forms a part. All our food contains carbon in its combinations.

Carbon Dioxide

When we breathe we take into our bodies the oxygen of the air. This oxygen is needed by the various organs and is carried in the blood from the lungs to all parts of the body. During the circulation the oxygen is taken up by the cells and replaced by carbon dioxide. This is brought back by the blood to the lungs and breathed out. If we remain long in a closed room, a portion of the oxygen of the air in the room and of the substance of our bodies is changed into carbon dioxide, which is unfit to breathe. This is the reason for the special need of ventilation in the sleeping room.

Water Vapor

Water in the form of vapor is constantly passing off into the air from the surface of bodies of water, from vegetation, and from animal organisms, as invisible vapor. The amount of water vapor present in the air is very variable. Warm air will hold more vapor than cold air. Ordinarily on a pleasant day, the atmosphere holds between 60 per cent and 70 per cent of the possible amount of water vapor.

When the air is saturated or at the dew point, a slight lowering of the temperature causes the vapor to condense. That air will absorb only a certain amount of moisture explains why a draft of air is necessary when drying clothes within doors and why the washing drys slowly on a damp day. **Dew Point**

The presence of vapor in the air is shown by bringing a pitcher of ice water into a warm room. The air against the cold surface of the pitcher is cooled until the dew point is reached, when it deposits part of its moisture. Any person who wears glasses knows the effect of such condensation in going into a warm room from out of doors on a cold day. That the air exhaled contains water may be shown by breathing upon any bright, cold surface.

The discomfort we feel in a crowded room is largely due to the excess of moisture resulting from the breathing and perspiration of so many persons. The danger of going from a crowded reception or "tea" into the open air is also due to it. Crowded rooms become very warm, the air soon becomes saturated with vapor and cannot take away the perspiration from our bodies. Our clothes thus become moist and the skin tender. When we go into the colder, drier air, clothes and skin suddenly give up their load of moisture. Evaporation absorbs heat; the heat is taken from our bodies and a chill results. There is much to learn concerning the ventilation of rooms for social purposes. **How a Chill is Produced**

Argon The air also contains a very small amount of a gas called argon. This was discovered in 1894. It resembles nitrogen so closely that it long escaped detection. Several other gases are present in minute quantities.

COMBUSTION

Very likely a fire must be built in the cook stove. In order that chemical combination may take place, the conditions must be right. The stove is so constructed that a current of air can pass from under the grate through the fire box, and funnel, to the chimney, and we must arrange that this air current shall not be unduly obstructed, for fuel will not burn without oxygen.

Kindling Point Substances differ greatly as to the ease or difficulty with which they may be made to burn, or in chemical terms, with which they may be made to unite with oxygen. The temperature to which a substance must be heated before it will take fire is called the kindling point. We therefore place light materials, like shavings, pitch-pine chips, or paper on the grate, twisting the paper and arranging all in such a way that oxygen has free access to a large surface; upon this we place small sticks of wood, piling them across each other for the same reason, and on this, in turn, hard wood or coal. The large stick of wood or the coal cannot be kindled with a match, but the paper or shavings can, and these in burning will heat the wood until it takes fire which then will kindle the coal.

Chemistry of a Match

To kindle the fire, we unthinkingly light a match. The burning of the match repeats the same principle we have described. The match is made by dipping the ends of small sticks of wood into melted sulphur, a substance more easily kindled than wood. When the sulphur is dried, the match is tipped with a preparation of phosphorus. Phosphorus has such a low kindling temperature that friction of the match against any rough surface heats it sufficiently to set it on fire. In burning, this sets fire to the sulphur and this, in turn, kindles the wood. Paraffine now has replaced sulphur.

Products of Combustion

The products (substances formed) of the burning match are oxide of phosphorus, oxide of sulphur, and carbon dioxide and water from the carbon and hydrogen of the wood. As our coal fire burns, we have two different oxides of carbon formed—carbon monoxide composed of one part carbon and one part oxygen, and carbon dioxide having two parts oxygen to one of carbon. The carbon monoxide formed in the lower part of the fire rises through the burning coals, takes up more oxygen at the top of the fire and forms carbon dioxide. The blue flames seen over a hard coal fire are caused by carbon monoxide burning. Carbon dioxide does not burn, since in this form the carbon holds as much oxygen as possible. The drafts and dampers so regulate the supply of oxygen that the fire may burn rapidly or slowly and that the harmful products of combustion may be carried out of the house by way of the chimney.

Carbon Monoxide

Constant Composition of the Air

It might be thought that with the millions of human beings and animals and countless fires constantly using oxygen and giving off carbon dioxide, that the atmosphere would soon consist of a large proportion of carbon dioxide. Nature has wonderfully provided for this. Carbon dioxide, which is the waste matter of animals, is one of the foods of plants. Thus the trees of the forest and the shrubs and plants of the garden are continually taking in the carbon dioxide and giving out pure oxygen, so that the carbon dioxide is kept at about three or four parts in 10,000 of air.

As has been said, wood consists mainly of the substances, carbon, oxygen, hydrogen, and nitrogen, together with other substances in small amounts. The growing tree has taken these simple substances from the air and earth and stored them up in a complex form as wood.

Elements

The chemist calls the simple substances out of which different things are made, elements. Carbon, oxygen, nitrogen, sulphur, phosphorus, silver, gold, copper, iron, lead, tin, mercury, zinc, aluminum are the chemical elements familiar to most people. When the wood is burned, or *oxidized*, its elements are made into new combinations, but in the burning no substance is *destroyed*. Some of the new products are invisible, it is true, but that they exist may be proved in many ways.

One of the fundamental laws of chemistry is the Law of Conservation of Matter (substance). This may be stated as follows: The weight of all the products made in a chemical action is exactly equal to the weight of all the substances used. That is, the weight of the dry wood plus the weight of the oxygen required to burn it, equals the combined weight of carbon dioxide, water, and ashes produced. Matter can neither be destroyed nor created — it can only be changed or transformed. Scientists have reason to believe that there is just the same amount of oxygen, nitrogen, sulphur, iron and of all the other elements in the universe at the present moment as there was at the beginning of things.

Conservation of Matter.

A familiar form of nearly pure carbon is charcoal. It is made by heating wood for a time with a very small amount of air. The volatile parts of the wood are driven off, leaving the carbon. The old fashioned method of making charcoal is shown in Fig. 11, where the burning of part of the wood gave the heat necessary for the making of the charcoal. At the present time, most charcoal is made by the destructive distillation of hard wood in iron stills; the products being charcoal, crude wood alcohol, crude acetic acid, together with gas and wood tar, which last are burned to give the heat for the process.

Charcoal

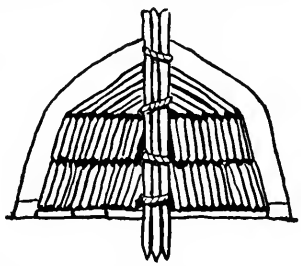


Fig. 11. Charcoal Kiln.

Charcoal is a porous substance and has the power of absorbing into its pores gases and even particles of coloring matter. A few pieces of charcoal added to the water in which flowers are standing, or plants growing, help to keep the water sweet by absorbing the impurities. Boneblack, a very finely powdered animal charcoal, is used to decolorize liquids. If it is mixed with a dark syrup, for instance, and the mixture violently shaken, the color will be absorbed and filtration will give a nearly colorless syrup.

Coal Coal is formed in almost every country on the earth, but the United States has the largest amount. It was originally wood and other carbonaceous material, once a part of living organism at a date of perhaps millions of years ago. During these years, the earth's crust has been subjected to slow upheavals and depressions, so that in some places, what was originally at the surface has been covered with thousands of feet of earthy matter, or possibly by the ocean. Under enormous pressure, the plants have been subjected to heat from the earth's interior. This is destructive distillation on the largest scale.

Graphite In the making of coal if this distillation is complete, a substance called graphite is obtained. Graphite is the black lead used in lead pencils and in stove polish. It is a shiny, black mineral with a slippery feeling and is nearly 100 per cent carbon. If the distillation is less complete, hard coal, called anthracite containing about 90 per cent carbon, results. If still less perfect, soft or bituminous coal, having varying percentages of carbon, is formed.

Where the process goes on under water, peat is found. This is partially formed coal, but little distilled and contains only about 40 per cent carbon. **Peat**

Besides carbon, these substances are made up of gases composed of carbon and hydrogen, called *hydro-carbons.* These gases give the yellowish and orange flames in a coal fire. Pure carbon does not burn with flame—it merely glows. Anthracite coal contains only from 3 to 4 per cent of volatile matter, but bituminous coal may have 30 to 40 per cent of these hydro-carbon gases.

Coke is made by the destructive distillation of soft coal. Like charcoal, it is chiefly carbon, but contains more mineral matter (ash). The coke obtained as a bi-product in the manufacture of coal gas is rather soft, but when coke is made as the principal product, it is hard and brittle. Coke makes a very hot fire without flame, but does not last as well as hard coal. The ash should be allowed to accumulate in the grate when burning it. Many consider it an improvement over soft coal for household use and it might be used to advantage more than it is. **Coke**

Graphite is so hard and compact that it cannot be burned. Anthracite ignites with some difficulty and then burns slowly with intense heat.

Bituminous coal ignites readily and burns well when there is sufficient draft. The "coking" variety cakes over on top and the fire must be broken up to allow the air to penetrate the fire. Soft coal should be put on the fire in small amounts as otherwise the hydro- **Coking Coal** carbon gases escape unburned and thus much heat value is lost. Smoke is made up of finely divided particles of carbon and is always an indication of incomplete combustion and, therefore, loss.

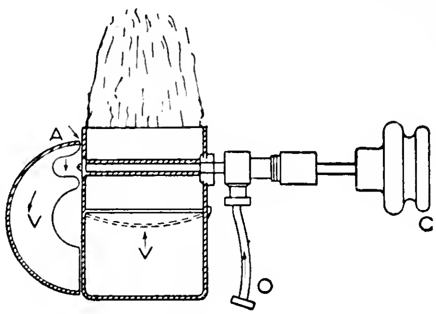


Fig. 12. Burner of a Blue Flame Oil Stove.

Oil from tank (not shown) is forced up O, is vaporized in passing through the straight tube, mixes with air at A, and burns with a blue flame at the top.

Kerosene Kerosene and gasoline are also important fuels. Gas will be taken up under the subject of light. Petroleum is an oily liquid found in many places in large quantities, particularly in Pennsylvania and Ohio. It is made up almost entirely of compounds of carbon and hydrogen (hydro-carbons).

When the crude petroleum from the Pennsylvania district is purified by distillation and other processes, the main product is kerosene. The lighter and more volatile products are gasoline, naphtha, and benzine —all three having much the same composition. Gasoline is the most volatile. Among the heavier products are various lubricating oils, vaseline, and paraffin.

In order to burn, kerosene must be vaporized. In the new blue flame oil stoves, various devices are employed to vaporize the oil. In Fig. 12 the oil passes through a tube heated by the flame, where it is changed to vapor which is mixed automatically with air and is then burned. Sometimes an alcohol flame is used to start this process, but the flame of the burning oil itself continues it. A slight pressure of air is maintained in the oil reservoir to give a constant small jet of oil to be vaporized. In other styles of stoves, the oil is fed automatically by gravity to a hollow ring, when it becomes heated to the point that it gives vapor. The vapor mixes with air and burns with a blue flame. Fig. 13. **Blue Flame Oil Stoves**

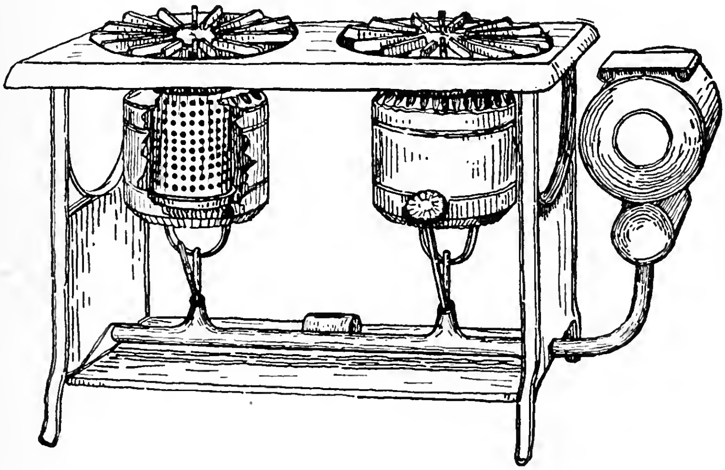


Fig. 13. Blue Flame Oil Stove, Showing Oil Reservoir and Lighting Ring.

Gasoline is burned on much the same principle as kerosene. It vaporizes much more easily and the pressure for the flow of the gasoline is furnished usually by having the tank a few feet above the burner. **Gasoline**

Flash Point The measure of safety of kerosene is the temperature at which it will give off an inflammable gas. This is called the *flash point* and is determined by heating the oil slowly and observing the temperature at which a flash can be produced by applying a lighted taper to the surface of the oil. Below the flash point, there is no danger of explosion from oil. Most states in the United States have a legal flash point, or a fire test, below which standard kerosene cannot be sold. The flash point of good kerosene is 120° F. The *fire test* is the temperature at which the oil will take fire and *burn* when a light is applied. This is about 30° F higher than the flash point. The ordinary temperature of the room is above the flash point of gasoline, naphtha, benzine, etc. In other words, these substances are constantly giving out an inflammable vapor.

Fuel Value A comparison of the heating value of the various fuels will be of interest. Practical tests of the amount of steam produced in a steam boiler have shown that one cord of ordinary wood is approximately equal to one-half ton of coal; a gallon of oil (or gasoline) is equal to about twelve pounds of coal; 1,000 cubic feet of coal gas is equal to 50 or 60 pounds of coal, or about four and one-half gallons of oil. Hard coal has a little higher fuel value than soft coal, because the combustion is commonly more perfect. Coke is nearly equal to hard coal by weight, but is much more bulky. It is usually sold by measure. A bushel of coke weighs 40 pounds, of anthracite 67 pounds, and of soft coal 76 pounds. Damp wood is a much poorer fuel than dry wood, because so much heat is absorbed and wasted in changing the water into steam.

The heat given off by a fuel is not the only point to be considered. In the cook stove, but a small portion of the heat given off by the solid fuel can be used for cooking, as most of it is radiated into the room or carried up the chimney. In the gas or oil stove, the flame may be applied exactly where it is wanted, so that the proportion of heat which can be used is much greater. Moreover, the flame can be shut off instantly when wanted no longer and all expense stopped. On the other hand, the range usually serves to heat the water of the hot water system, incinerate garbage, and in winter helps to heat the house.

FOOD

Having the fire well under way the housekeeper turns her attention to the breakfast. A great variety of chemical actions may here be considered. In the first place, why must we "eat to live?"

Why We Must Eat

Wherever there is life, there is chemical change; and as a rule a certain degree of heat is necessary in order that chemical change may occur. Vegetation does not begin in the colder climates until the air becomes warmed by the heat of the spring. When the cold of winter comes upon the land vegetation ceases.

Since many animals live in temperatures in which plants would die, it is evident that they must have some

Combustion in the Body

source of heat in themselves. This is found in the union of the oxygen of the air breathed with carbonaceous matter eaten as food and the formation of carbon dioxide and water, just as in the combustion of wood or coal. Only instead of this union taking place in one spot and so rapidly as to be accompanied by light, as in the case of fire, it takes place slowly and continuously in each living cell. Nevertheless, the chemical reaction seems to be identical.

Vital Temperature

The heat of the human body must be maintained at 98.5° F—the vital temperature—the temperature necessary for the best performance of the normal functions. Any continued variation from this degree of heat indicates disease. Especially important is it that there be no considerable *lowering* of this temperature, for a fall of one degree is dangerous, since in that case the chemical changes necessary to the body cannot be carried out.

Air as Food

The slow combustion or oxidation of the carbon and hydrogen of food cannot take place without an abundance of oxygen; hence the diet of the animal must include fresh air—a point not always considered.

The amount of oxygen taken in by the body daily is equal to the sum of all the other food elements.

Except water, two-thirds of these foods consists of some form of starch or sugar—the socalled *carbohydrates,* in which the hydrogen and oxygen are found in the same proportion as in water.

The power to do *mechanical work* comes from the combustion of fuel. The body is a living machine capable of doing work, raising weights, pulling loads, and the like. The animal body also requires fuel in order to do such work as thinking, talking, even worrying. For the present, then, we will say that food is necessary, (1) to preserve the vital temperature and (2) to enable the body-machine to do its work. **The Body a Machine**

Fruit Suppose we begin our breakfast with fruit, say, an orange or a banana. Fruits are especially rich in sugars and these are composed of carbon, hydrogen, and oxygen. If sugar is placed upon a stove, it will melt and steam (water) will pass off into the air, leaving the black charcoal (carbon) on the stove. Moreover, sugars burn easily and fiercely. We shall get both heat and energy from our fruit. Within the body it will be changed into water and carbon dioxide. Fruits contain a large percentage of water; but the banana is capable of giving more energy and heat than the orange, because it has much less water and more sugar. Fruit loses in drying a large portion of its water, so that dried fruits contain a larger percentage of food materials than fresh fruits. For instance, raisins are 60 per cent grape sugar.

Cellulose Fruits consist of a loose net-work of a woody material holding the soft pulp and this woody fibre, called cellulose, is practically indigestible. Cooking softens this, making cooked fruits easier to digest.

SUGARS AND STARCHES.

At breakfast some sugar from the sugar bowl may be added to the fruit. Many people add sugar to the oatmeal or other cereal eaten, although it is often held by teachers of dietetics that this is not a good place to use it, for proper cooking and thorough mastication of the cereal will bring out a rich sweetness due to changes explained later. Country boys know how sweet a morsel is made by chewing raw grains, especially wheat. Possibly a glass of milk is taken at breakfast and this contains another kind of sugar—milk sugar—in about 5 per cent. Coffee and tea are usually sweetened, so that a considerable part of the breakfast may be of this class of foods—a quickly burning material giving heat and energy.

Cane Sugar

There are several different sugars recognized by chemists; these are cane sugar or *sucrose,* grape sugar or *glucose,* milk sugar or *lactose,* and fruit sugar or *levulose.* Cane sugar is obtained from the juices of many plants, notably sugar beets, sugar cane, the palm, and as maple sugar from the rock-maple trees. Molasses and brown sugar are obtained during the manufacture of white sugar from sugar cane. Cane sugar is composed of carbon, hydrogen, and oxygen in the proportion of twelve parts of carbon to eleven parts of water. When sugar is heated it is chemically changed, more or less, according to the degree of heat and the rapidity with which it parts with its water.

Heating it gradually, we obtain first straw colored barley sugar, then brown caramel, and finally black carbon.

Grape Sugar

Grape sugar is found in honey and in all ripe fruits. It consists of carbon, hydrogen, and oxygen in somewhat different proportions from what they occur in cane sugar. It appears on the outside of dried fruits, such as raisins. It is only two-fifths as sweet as cane sugar. Large quantities are manufactured from corn starch.

Milk Sugar

Milk sugar is similar to cane sugar in composition. It is obtained from the whey of milk. It is hard and gritty and not very sweet to taste. When milk sours, it is because this sugar is fermented and changed into lactic acid. The acid causes the milk to curdie.

Fruit Sugar

Fruit sugar or levulose occurs with glucose (grape sugar) in fruits. It is about as sweet as cane sugar but it does not crystallize.

A marked characteristic of all sugars is their solubility and all but the last are crystalline substances, that is, will form crystals.

Starch

At breakfast bread, toast, or some cereal like oatmeal or wheat, usually follows the fruit course. These foods are prepared from grains (seeds) and contain much nutriment in a condensed form. They supply the body with starch and some nitrogenous food. But the body cannot use starch as such. It must be changed into a form of sugar called *starch sugar,* or maltose. While we are following Mr. Glad-stone's rule and chewing each mouthful of our toast twenty-five times, we will consider what starch is like and how it is made available for use.

Source of Starch

Starch is found in greater or less abundance in all plants and is laid up in large quantities in the seeds of many species. See Fig. 14. Rice is nearly pure starch; wheat and the other cereals contain sixty to seventy per cent of it. Some tubers, such as potatoes, contain it although in less quantity—ten to twenty per cent.

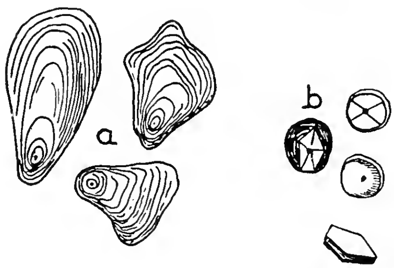


Fig. 14. Starch Much Magnified. a, Potato Starch; b, Corn Starch.

It is formed by means of the living plant-cell and the sun's rays, from the carbon dioxide and water contained in the air and it is the end of the plant-life — the stored energy of the summer. It is prepared and stored by the parent for the food for the young plant until the latter can start its own starch factories.

Starch in its common forms is insoluble in water. It dissolves partially in boiling water, forming a transparent jelly when cooled, as every housekeeper knows. The cellulose which occurs in various forms in the shells and skins of fruits, in their membraneous partitions, and in cell walls, is an allied substance.

DIGESTION

Digestion of Starch

Digestion is primarily synonymous with solution. All solid food materials must become practically soluble before they can pass through the walls of the digestive system. Starch and like materials must be transformed into soluble substances before absorption can take place. Cane-sugar, though soluble, has to undergo chemical change before it can be absorbed. By these changes it is converted into grape and fruit sugars. These and milk sugar are taken directly or with little change into the circulation. To this fact is due a large part of the great nutritive value of the dried fruits, as raisins, dates, and figs, and the advantage of milk-sugar over cane-sugar for children or invalids.

Under certain conditions—weakened digestive power or excess of sugar—cane-sugar may remain so long in the stomach before the change takes place that fermentation sets in and a "sour stomach" results. This is one of the dangers of too much candy.

The chemical transformations of starch and sugar have been very carefully and scientifically studied with reference to brewing and wine-making. Several of the operations concerned necessitate great precision in respect to temperature and length of time, and these operations bear a close resemblance to the process of bread-making by means of yeast.

Starch Conversion

There are two distinct means known to the chemist by which starch is changed to sugar. One is by the use of acid and heat, which changes the starch into sugar, but can go no farther. The other is by the use of a class of substances called ferments, some of which have the power of changing starch into sugar, and others of changing the sugar into alcohol and carbon dioxide. These ferments are very important in all vegetable and animal life. Some are formed by small plants like yeast, which is often present in the air. Fig. 15.

Ferments

Among the well known ferments is one formed in sprouting grain, which is called diastase or starch converter, and under the influence of warmth, changes the starch into a sugar. The starch first takes up water; then under the influence of the ferment, is changed into maltose, a form of sugar which is easily soluble in water. A similar process is carried on in the preparation of the malted foods on the market.

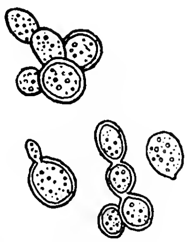


Fig. 15.
Yeast Highly Magnified.

Conversion in the Body

The same cycle of chemical changes goes on in the human body when starchy substances are taken as food. Such food is moistened with saliva and warmed in the mouth, becoming well mixed through mastication. It thereby becomes impregnated with *ptyalin,* a ferment in the saliva, which can change starch into sugar, as can the diastase of the malt. The mass then passes into the stomach and the change, once begun, goes on. In the intestines the sugar formed is absorbed into the circulatory system and by the life processes, is oxidized, that is, united with more oxygen and changed finally into carbon dioxide and water, from which it was made by the help of plant life and sun light.

Digestion of Starch

No starch is utilized in the human system as starch. It must undergo transformation before it can be absorbed. Therefore, starchy foods must not be given to children before the secretion of the starch converting ferments has begun, nor to any one in any disease where the normal action of the glands secreting these ferments is interrupted. Whatever starch passes out of the stomach unchanged, meets with a very active converter in the intestinal juice. If grains of starch escape these two agents, they leave the system in the same form as that in which they entered it.

COOKING

Early man, probably, lived much like the beasts, taking his food in a raw state. Civilized man requires much of the raw material to be changed by the action of heat into substances more palatable and already partly digested.

Cooking of Starch

The chemistry of cooking the raw materials is very simple. It is in the mixing of incongruous materials in one dish or one meal that complications arise.

The cooking of starch, as rice, farina, etc., requires little explanation. The starch grains are prepared by the plant to keep during a season of cold or drought and are very close and compact; they need to be swollen and distended by moisture in order that the chemical change may take place readily. Starch grains may increase to twenty-five times their bulk by absorbing water.

The cooking of the potato and other starch-containing vegetables, although largely a physical or mechanical process is very necessary as a preparation for the chemical actions of digestion; for raw starch has been shown to require a far longer time and more digestive power than cooked starch. Change takes place slowly, even with thorough mastication, unless the starch is swollen and heated, and, in case the intestinal secretion is disturbed, the starch may not become converted at all.

Bread Our breakfast will undoubtedly contain bread. Bread of some kind has been used by mankind from the first dawn of civilization. During the earlier stages it consisted chiefly of powdered meal and water baked in the sun or on hot stones. This kind of bread had the same characteristics as the modern sea-biscuit, crackers, and hoe cakes, as far as digestibility was concerned. It had great density; it was difficult to masticate; and the starch in it presented but little more surface to the digestive fluids than that in the hard compact grain, the seed of the plant.

Experience must have taught the semi-civilized man that a light porous loaf was more digestible than a dense one. Probably some dough was accidentally left exposed; yeast plants settled upon it from the air;

fermentation set in, and the possibility of porous bread was thus suggested.

Ideal Bread

A light, spongy, crisp bread with a sweet, pleasant taste, is not only aesthetically but chemically considered the best form in which starch can be presented to the digestive organs. The porous condition is desired in order that as large a surface as possible may be presented to the action of the chemical converter, the ptyalin of the saliva, and later to other digestive ferments. There is also better aeration during the process of mastication.

Leaven or Yeast

Very early in the history of the human race, leavened bread seems to have been used. This was made by allowing flour and water to stand in a warm place until fermentation had well set in. A portion of this dough was used to start the process anew in fresh portions of flour and water. This kind of bread had to be made with great care, for germs different from yeast might get in, forming lactic acid—the acid of sour milk—and other substances unpleasant to the taste and harmful to the digestion.

A sponge made from perfectly pure yeast and kept pure may stand for a long time after it is ready for the oven and still show no signs of sourness.

On account of the disagreeable taste of leaven and because of the possibility that the dough might reach the stage of putrid fermentation, chemists and physicians sought for some other means of rendering the bread light and porous. The search began almost as soon as chemistry was worthy the name of a science, and one of the early patents bears the date 1873. Much time and thought have been devoted to the perfecting of unfermented bread; but since the process of beer-making has been universally introduced, yeast has been readily obtained, and is an effectual means of giving to the bread a porous character and a pleasant taste. Since the chemistry of the yeast fermentation has been better understood, a change of opinions has come about, and nearly all scientific and medical men now recommend fermented bread, if well baked.

Chemistry of Bread-Making

The chemical reactions concerned in bread-making are similar to those in beer-making. To the flour and warmed water is added yeast, a microscopic plant, capable of causing the alcoholic fermentation. The yeast begins to act at once, but slowly; more rapidly if sugar has been added and the dough is a semi-fluid. Without the addition of sugar no change is evident to the eye for some hours, as the fermentation of starch to sugar by the diastase present gives no gaseous products. The sugar is decomposed by the yeast plant into alcohol and the gas, carbon dioxide; the latter product makes itself known by the swelling of the whole mass and the bubbles which appear on the surface.

It is the carbon dioxide, which causes the sponge-like condition of the loaf by reason of the peculiar tenacity of the gluten, one of the constituents of wheat. It is a well-known fact that no other kind of grain will make so light a bread as wheat. It is the right proportion of gluten (a nitrogenous substance to be considered later) which enables the light loaf to be made of wheat flour.

The production of carbon dioxide is the end of the *chemical* process. The rest is purely mechanical.

The baking of the loaf has for its object to kill the ferment, to heat the starch sufficiently to render it easily soluble, to expand the carbon dioxide and drive off the alcohol, to stiffen the gluten, and to make chemical changes which shall give a pleasant flavor to the crust. The oven must be hot enough to raise the temperature of the *inside* of the loaf to 212° F, or the bacteria will not all be killed. A pound loaf, four inches by four inches by nine inches long, may be baked three-quarters of an hour in an oven where the temperature is 400° F, or for an hour and a half, when the temperature during the time does not rise above 350° F. Quick baking gives a white loaf, because the starch has undergone but little change. The long, slow baking gives a yellow tint, with the desirable nutty flavor, and crisp crust. Different flavors in bread are supposed to be caused by the different varieties of yeast used or by bacteria, which are present in all doughs, as ordinarily prepared. **Object of Baking**

The brown coloration of the crust, which gives a peculiar flavor to the loaf, is caused by the formation of substances analogous to dextrine and caramel, due to the high heat to which the starch is subjected. **The Crust**

One hundred pounds of flour are said to make from 126 to 150 pounds of bread. This increase of weight is due to the incorporation of water, possibly by a chemical union, as the water does not dry out of a loaf, as it does out of a sponge. The bread seems moist when first taken from the oven, and dry after standing some hours, but the weight will be found to be nearly the same. It is this probable chemical change which makes the difference, to delicate stomachs, between fresh bread and stale. A thick loaf is best when eaten after it is twenty-four hours old, although it is said to be "done" when ten hours have passed. Thin biscuit do not show the same ill effects when eaten hot.

The bread must be well baked in any case, in order that the process of fermentation may be stopped. If this be stopped and the mastication be thorough, so that the bread when swallowed is in finely divided portions instead of in a mass or ball, the digestibility of fresh and stale bread is about the same.

Water Bread

The expansion of water or ice into more than seventeen hundred times its volume of steam is sometimes taken advantage of in making snow-bread, water-gems, etc. It plays a part in the lightening of pastry and crackers.

Air, at 70 degrees, doubles its volume at a temperature of 560 degrees F, so that if air is entangled in a mass of dough, it gives a certain lightness when the whole is baked. This is the cause of the sponginess of cakes made with eggs. The viscous albumen or "white of egg" catches the air and holds it, even when it is expanded, unless the oven is too hot, when the sudden expansion is liable to burst the bubbles and the cake falls.

FATS

If cream instead of milk is used on the cereal or in the coffee, this with the butter on the bread, will add a considerable amount of another important food, fat. Fats form a large class of food stuffs which include the animal fats like cream, butter, suet, lard, cod liver oil and tallow, and vegetable fats like olive and cotton-seed oils, etc. Within the animal body ail fats are liquids, being held in little cells which make up the fatty tissue.

Digestion of Fats

The digestion of fats is probably something like a process of soap making. With the intestinal fluids, the bile especially, the fats form an emulsion in which the globules are finely divided, and in some way are rendered capable of passing through the membranes into the circulatory system. The change, if any, does not destroy the properties of the fatty matters.

If we define cooking as the application of heat, then whatever we do to fats in the line of cooking is liable to hinder rather than help digestibility.

Cooking of Fats

Fats may be heated to a temperature far above that of boiling water without showing any change; but there comes a point, different for each fat, where reactions take place, the products of which irritate the mucous membranes and therefore interfere with digestion. It is the volatile products of such decomposition which cause the familiar action upon the eyes and throat during the process of frying, and also, the tell-tale odors throughout the house. The indigestibility of fatty foods, or foods cooked in fat, is due to these harmful substances produced by too high temperature.

Composition of Fats

Many fats are solid at ordinary temperatures, while others are always liquids, but all fatty materials have a similar composition. When pure they contain only carbon, hydrogen, and oxygen. They differ from starch and sugar in the proportion of oxygen to the carbon and hydrogen, there being very little oxygen relatively in fats, hence more must be taken from the air for their combustion. If persons eat much fat they must have more fresh air to burn it. A person confined to the house needs to be careful what fats, and how much, are taken.

Heat from Fats

One pound of starch requires one and two-tenths pounds of oxygen, while one pound of suet requires about three pounds of oxygen for perfect combustion. This combustion of oxygen with the large amount of hydrogen, as well as with the carbon, results in a greater quantity of heat from fat, pound for pound, than can be obtained from starch or sugar. Experiments indicate that the fats yield more than twice as much heat as the carbohydrates; hence people in Arctic regions use large amounts of fat and everywhere the diet of winter may safely contain more fat than that of summer.

Both fats and carbohydrates are the sources of the energy or work done by the body as well as the heat to keep up the vital temperature and they must be increased in proportion as the mechanical work of the body increases. A man breaking stone needs more fat or starch than the student. If a quantity is taken at any one time greater than the body needs for immediate work, the surplus will be deposited as fat, and this will be drawn in case of a lack in the future supply of either; it is like a bank account.

Food a Source of Energy

NITROGENOUS FOODS

The animal body is more than a machine. It requires fuel to enable it not only to work but also to live, even without working. A part of the food eaten must go to maintain the body, for while the inanimate machine is sent periodically to the repair-shop, the living machine must do its own repairing, day by day and minute by minute.

The adult animal lives, repairs waste, and does work; while the young animal does all these and more —it grows. For growth and repairs something else is needed beside starch and fat.

Nitrogen Necessary

The muscles are the instruments of motion, and they must be nourished in order that they may have power. The nourishment is carried to them by the blood in which, as well as in muscular tissue, there is found a food element which we have not heretofore considered, namely, nitrogen. It has been proved that the use of the muscles and the brain sets free certain nitrogenous compounds which pass out of the system as such, and this loss must be supplied by the use of some kind of food which contains nitrogen. Starch and fat do not contain this element; therefore they cannot furnish it to the blood.

The American breakfast will probably include meat, fish, or eggs. These are examples of the nitrogenous food-stuffs. Nitrogenous food compounds are sometimes classed together under the name of proteins. These may be divided into proteids, gelatinoids, and extractives.

Proteids

The proteids all resemble albumin, which is found nearly pure in the white of an egg. These in some form are never absent from animal and vegetable organisms. They are most abundant in animal flesh and in the blood. Other common articles of diet belonging to this group in addition to albumin, are the curd of milk (casein), the lean of animal flesh and fish and gluten of wheat, and the legumin of peas and beans. The proteids are the most important nitrogenous food materials. They build up and repair the muscles, tendons, cartilage, bones, and skin and supply the albumin of the blood and other fluids of the body.

Gelatinoids

The animal skeleton—horns, bones, cartilage, connective tissues, etc.—contains nitrogenous compounds which are converted by boiling into substances that form with water a jelly-like mass. These are known as the gelatinoids and are so named because of their resemblance to gelatin. Although somewhat similar to the proteids in composition they are not thought to be true flesh formers. However, they do help out the proteids in some unknown way.

Collagen

The chief constituent of the connective tissues of meats is *collagen*. This is insoluble in cold water, but in hot water becomes soluble and yields gelatin. Collagen swells when heated and when treated with dilute acids. Steak increases in bulk when placed over the coals, and tough meat is rendered tender by soaking in vinegar. Meat a few days old is tough, for the collagen is dry and hard. In time it becomes softened by acids which are secreted by bacteria either in or on the meat; the meat thus becomes tender and easily masticated. Tannic acid has the opposite effect upon collagen, hardening and shrinking it. This effect is taken advantage of in tanning, and is the disadvantage of *boiled* tea as a beverage, since tea always contains a little of this tannic acid when freshly made and much more if the tea is boiled.

Extractives

The last class of nitrogenous compounds are the extractives, so called because they are readily extracted by water from meat where they principally occur. The proteins of this class are thought to have little value as food, but they give the flavor to meats, etc., and are therefore of great importance. They are stimulants, somewhat of the nature of caffein of coffee and the thein of tea.

COOKING OF NITROGENOUS FOOD-STUFFS.

Cooking should render nitrogenous food more soluble because here, as in every case, digestibility means solubility. Egg albumin is soluble in cold water, but coagulates at about 160° F. At this point it is tender, jelly-like, and easily digested, while at a higher temperature it becomes tough, hard and dissolves with difficulty. Therefore, when the white of egg (albumin), the curd of milk (casein), or the gluten of wheat are hardened by heat, a much longer time is required to effect solution.

Albumin

As previously stated, egg albumin is tender and jelly-like when heated from 160° F to 180° F. This fact should never be forgotten in the cooking of eggs. Raw eggs are easily digested and are rich in nutriment; when heated just enough to coagulate the albumin or "the white," their digestibility is not materially lessened; but when *boiled,* the albumin is rendered much less soluble.

In frying eggs, the fat often reaches a temperature of 300° or over—far above that at which the albumin becomes tough, hard, and well-nigh insoluble.

There is much albumin in the blood, therefore the juices of meat extracted in cold water form a weak albuminous solution. If this be heated to the right temperature the albumin is coagulated and forms the "scum" which many a cook skims off and throws away. In doing this she wastes a portion of the nutriment.

Experiments on the digestibility of gluten have proved that a high temperature largely decreases its solubility. Subjected to artificial digestion for the same length of time, nearly two and one-half times as much nitrogen was dissolved from the raw gluten as from that which had been baked. **Gluten**

When gluten is combined with starch, as in the cereals, the difficulties of correct cooking are many, for the heat which increases the digestibility of the starch decreases that of the gluten.

Experiment. The gluten in wheat flour may be obtained as follows: Place half a cupful of flour in a muslin bag and knead under water. The starch will work out through the bag. After a time all the starch may be so separated. A brown, elastic, stringy mass remains in the muslin. This is gluten, the nitrogenous part of the flour.

The same principle of cooking applies to casein of milk, although to a less extent. There seems to be no doubt that boiling decreases its solubility, and consequently, its digestibility for persons of delicate digestive power. **Casein**

The nitrogenous substances of meat consist of soluble albumin, chiefly in the blood and juices, the albuminoids of the fibres, the gelatinoids of the connecting tissues, and the extractives. The cooking should soften and loosen the connective tissue, so that the little bundle of fibre which contains the nutriment may fall apart easily when brought in contact with the **Meat** teeth. Any process which toughens and hardens the meat should be avoided.

When it is desired to retain the juices within the meat or fish, it should be placed in boiling water so that the albumin of the surface may be hardened and prevent the escape of the albumin of the interior. The temperature should then be lowered and kept between 160 and 180 degrees during the time needed for the complete breaking down of the connective tissues.

Broth and Soup

When the nutriment is to be used in broths, stews, or soups, the meat should be placed in cold water, heating very slowly and the temperature not allowed to rise above 180° F until the extraction is complete. The extracted meat still retains the greater part of its original proteid substances. It is tasteless and uninviting, but when combined with vegetables and flavoring materials may be made into a palatable and nutritious food.

Effect of Temperature on Meat

Experiment. To show the effect of water at different temperatures upon raw meat, place a bit of lean meat about as large as the finger in a glass of cold water and let it stand an hour. The water becomes red, and the meat grows white. Pour off this water and boil it. A scum rises to the surface. The albumin dissolved has been rendered insoluble by heat.

Put a bit of raw meat into boiling water, and boil it hard several minutes. The meat is toughened by the process. The outside of the meat is hardened first, and very little of the nutriment dissolves in the water.

Put the meat into cold water and bring the temperature slowly to the boiling point; then allow it to simmer gently for some time. The meat is tender, and some of the nutriment is in the water. This is the method employed in making a stew. A little fat which is always present even between the fibre of the lean meat will be melted out and rise to the top of the water.

Digestion of Proteids

We have seen that the ferment in the saliva changed the starch into a sugar. The ferment in the gastric juice, pepsin, with the help of an acid (principally hydrochloric acid) changes the albuminoids into peptones in the stomach. This change is completed in the intestines. The peptones are soluble in water and are absorbed into the blood.

SUMMARY OF THE EFFECTS OF COOKING

The object of all cooking is to make the food-stuffs more palatable or more digestible, or both combined. In general, the starchy foods are rendered more digestible by cooking; the albuminous and fatty foods less digestible. The appetite of civilized man craves and custom encourages the putting together of raw materials of such diverse chemical composition that the processes of cooking are also made complex.

Bread—the staff of life—requires a high degree of heat to kill the plant-life, and long baking to prepare the starch for solution; while, by the same process, the gluten is made less soluble. Fats, alone, are easily digested, but in the ordinary method of frying, they not only may become decomposed themselves, and therefore injurious; but they also prevent the necessary action of heat, or of the digestive ferments upon the starchy materials with which the fats are mixed.

The effects of cooking upon the solubility of the three important food-principles may be broadly stated thus:

Effect on Solubility

Starchy foods are made more soluble by long cooking at moderate temperatures or by heat high enough to change a portion of the starch to dextrine, as in the brown crust of bread.

Nitrogenous foods. The animal and vegetable albumins are made less soluble by heat; the gelatinoids more soluble.

Fats are readily absorbed in their natural condition, but are decomposed at very high temperatures and their products become irritants.

MINERAL MATTER

The remaining ingredient of the food of our breakfast to be considered is the mineral matter which constitutes the ash when food-products are burned. There is only 5 or 6 per cent of mineral elements in our bodies, but these materials are necessary to life and health. They are found chiefly in the bones and teeth, but are present also in the flesh, blood, and other fluids. Phosphate of calcium forms the principal mineral part of the bones.

Common Salt

The food we eat contains a small amount of mineral matter which forms the ashes when food is burned.

This mineral matter gives the body the mineral salts which it needs; but in addition to this, most people desire and eat a considerable quantity of common salt every day. The amount eaten is far in excess of the sodium and chlorine the body requires, though sodium is an important constituent of many of the fluids of the body, and chlorine is found in hydrochloric acid of the gastric juice, the digestive fluid of the stomach. A great diversity of opinion exists as to the desirability of much salt in the diet, but the balance of evidence indicates that a liberal amount of salt is not harmful, but rather beneficial.

Experiment. To show the mineral part of bones, place a moderate sized bone on a hot coal fire for half an hour or longer.

To show the gelatinoids of bones, place a small bone in a shallow dish and cover with strong vinegar or weak hydrochloric acid (muriatic acid) and let stand over night or longer. The acid will dissolve out the phosphate of calcium leaving the animal matter.

Flavor Production

Coffee, an important part of the breakfast to most people, introduces an important feature of the chemistry of cooking—the production of the proper flavor. The chemical changes involved are too subtile for explanation here—indeed many are not understood. The change in the coffee berry by roasting is a familiar illustration. The heat of the fire causes the breaking up of a substance existing in the berry, and the formation of several new ones. If the heat is not sufficient, the right odor will not be given; if it is too great, the aroma will be dissipated into the air, or the compound will be destroyed.

Broiling steak is another illustration—a few seconds too long, a few degrees too hot, and the delicate morsel becomes an irritating mass. The chemistry of flavor-producing is the application of heat to the food material in such a way as to bring about the right changes and *only* these. Flavors in addition to the pleasure they give to eating have the advantage of stimulating the flow of digestive fluids and making digestion more easy.

DECAY

The clearing away of the breakfast introduces to the housekeeper two important problems:—(1) the preservation of the remaining food from decay; (2) the proper cleaning of the articles used during the meal and its preparation.

Decay is caused by minute vegetable organisms known as moulds and bacteria. Both are present in the air either as the plants themselves or as their spores, the reproductive cells, ready to grow whenever they fall upon suitable soil. When these grow upon animal or vegetable substances, a variety of new compounds are formed, many of them taking oxygen from the air, so that finally the carbon becomes carbon dioxide, the hydrogen is oxydized to form water, and the other elements in their turn also become oxides, so that the decaying substance is utterly destroyed and new substances made in its place. When organic substances are protected from the action of these living plants, decay will not ensue.

The old idea was that oxygen caused decay, but many experiments disprove this. Oxygen alone does not produce this result, but oxygen with "germs" will do so. These "germs" develop much more slowly in the cold, so that food is placed in the refrigerator or in a cool place and away from the dust. **Decay Not Caused by Oxygen Alone**

The problems introduced by these living plants, their life history and their work, as well as the methods of prevention and care against their ravages, belong rather to household bacteriology than to chemistry. We are ready therefore to pass on to our next problem, that of cleaning.

CHEMISTRY OF THE HOUSEHOLD.

PART I.

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. *Do not copy answers from the lesson paper.* Use your own words, so that your instructor may know that you understand the subject. Read the lesson paper a number of times before attempting to answer the questions.

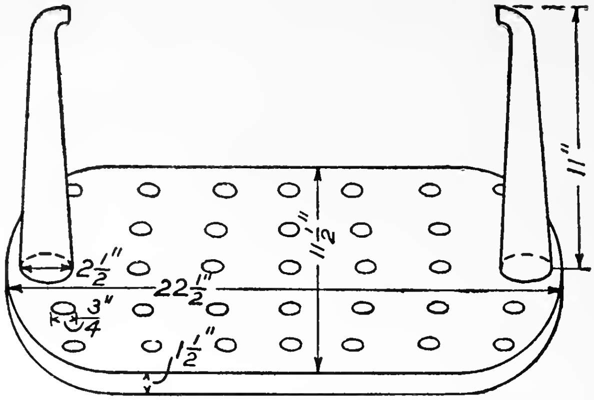
---

1. What do you understand a "chemical element" to be? Name all that you have ever seen.
2. What is a "saturated solution?"

   Name the substances usually found in the house which are soluble in water.
3. What causes atmospheric pressure? Explain some effects of it.
4. Why must the diet of animals include fresh air?
5. Explain the effect of cooking on starch. (b) On fats. (c) On proteids.
6. What are the products of combustion in burning coal or wood?
7. What is meant by "conservation of matter?"
8. How can the boiling point of water be raised? How may it be lowered?

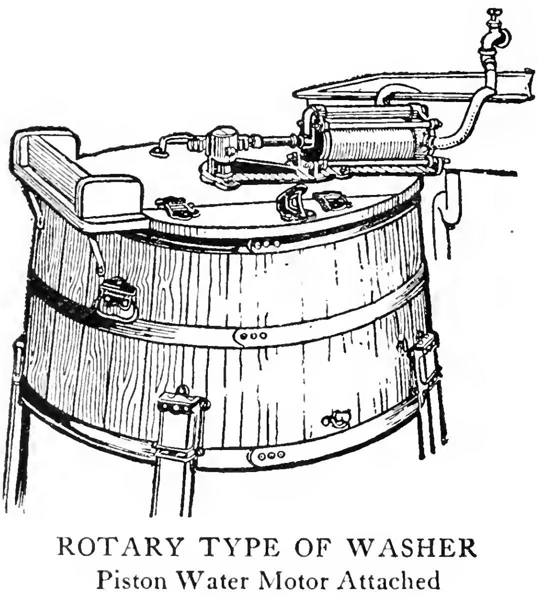
9. What is meant when it is said that a chemical substance always has the same composition?
10. What is "latent heat?"
11. What can you say of the composition of meat?
12. Explain the physical and chemical changes which starch must undergo before it is absorbed into the circulation.
13. What can you say of the chemistry of bread-making?
14. Why is distilled water pure?
15. Explain the composition of water.
16. Describe the chemistry of a sulphur match.
17. How is charcoal prepared? How is coke made?
18. Why does the proportion of carbon dioxide in the atmosphere not increase?
19. In what different ways is food used in the body?
20. Do you understand all parts of this lesson paper? If not, what part is not clear?

NOTE.—After completing the test sign your full name.

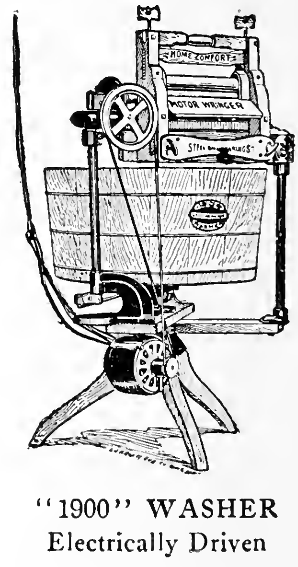


A MECHANICAL WASHING DEVICE

Made to fit in the bottom of a wash boiler. The formation of steam forces the hot, soapy water up the spouts, over and through the clothes.



ROTARY TYPE OF WASHER
Piston Water Motor Attached



"1900" WASHER
Electrically Driven

CHEMISTRY OF THE HOUSEHOLD

A Day's Chemistry

PART II.

CLEANING

The cleaning of the dishes, silver, cutlery, and linen introduces a great variety of chemical problems. The subject of the chemistry of cleaning may well include with the daily task of dishwashing, the equally important ones of house cleaning and laundry work.

The various processes of housework give rise to many volatile substances, such as the vapor of water or fat. If not carried out of the house in their vaporous state these cool and settle upon all exposed surfaces, whether walls, furniture, or fabrics. This thin film entangles and holds the dust, clouding and soiling with a layer more or less visible everything within the house. The fires and lights give out smoky deposits of incomplete combustion. The dishes are soiled with waste from all kinds of foods—starch, grease, albumin, milk, gums, or gelatines and the juices of fruits.

Dust *alone* might be removed from most surfaces with a damp or even with a dry cloth, or from fabrics by vigorous shaking or brushing; but usually the greasy or sugary deposits must first be broken up and the dust thus set free. This must be accomplished without harm to the material which is dirty.

Cleaning, then, involves two processes: (1) the greasy or gummy film must be broken up, that the entangled dust and dirt may be set free; (2) the dust must be removed by mechanical means.

We will have occasion to use alkalis for cleaning and acids for removing stains and it will be well to consider what is meant by the terms, acid, alkali, and salt.

An Acid

An acid is a substance with an acid or sour taste and having the property of changing certain vegetable colors. A substance much used in testing for acids is *litmus,* a kind of fungus, giving a blue solution in water. Paper soaked in litmus solution and dried is known as test paper or litmus paper. It can be bought at any druggist's. This paper is turned red by the presence of any acid, even in the most minute quantity. An acid will cause effervescence with a carbonate like cooking soda or washing soda.

An Alkali

An alkali is a substance often having a soapy taste, a slippery feeling if strong, and the property of turning red litmus, blue.

Alkalies will neutralize the effects of acids. If an acid be added very carefully to an alkaline solution, there comes a point where the mixture will change the color of litmus in *neither* direction. The solution is neither acid nor alkaline, and is said to be *neutral.* If we make a weak solution of the acid sold at the drug stores as muriatic acid, and add to this very carefully a weak solution of caustic soda, until the solution is neutral, we shall find that the neutral solution will taste like table salt. In fact, we have made common salt in this way.

A chemical salt is a substance obtained by neutralizing an acid with an alkali or otherwise—a substance that is usually neutral and will turn the color of neither red nor blue litmus paper. **A Salt**

All acids contain the element hydrogen, which can often be driven out and replaced by a metal placed in the acid. If we drop a bit of zinc into some muriatic acid, tiny bubbles of hydrogen begin to escape. The zinc joins the remainder of the acid, making a new substance. This new substance is the metallic salt, called muriate (or chloride) of zinc. Muriatic acid is also called hydrochloric acid. Thus a salt results from neutralizing an acid with a metal. If oxide of zinc, a white powder, has been used in place of the metal, the same salt, chloride of zinc, would have been made; but no hydrogen gas would have come off, for the hydrogen of the acid would unite with oxygen of the oxide and form water.

Grease or fats, called oils when liquid at ordinary temperature, are chemical compounds made of carbon, oxygen, and hydrogen combined in many different ways, but all contain an ingredient of an acid nature known to the chemist as a fatty acid. The fatty acid base is combined with glycerine in the common fats. **Fats and Oils**

Strong alkaline substances will break up fats into their parts and combine with the fatty acid, thus making soap.

Alkali Metals

The elements which form strong alkalis are the "alkali metals." The common elements of this group are sodium and potassium. There is also ammonium which is not an element, but a combination of nitrogen and hydrogen; it acts, however, like an alkali metal.

When an element unites with water in a certain way it is called a hydrate or hydroxide. The hydrate of ammonium—aqua ammonia or ammonia—is known as the "Volatile alkali" because it evaporates so easily. It is valuable for use in all cleansing operations—in the kitchen, the laundry, the bath, in the washing of delicate fabrics, and in other cases where its property of evaporation, without leaving any residue to attack the fabric or to absorb anything from the air, is invaluable.

Caustic Soda and Caustic Potash

The hydrates of potassium and sodium are called caustic potash and caustic soda, respectively, or the caustic alkalis or "lyes" because they "burn" animal tissues. These combine readily with fats to form compounds which we call soaps.

Most of the fats are soluble in turpentine, ether, chloroform, naphtha, or kerosene, and somewhat in alcohol. That is, the fats are dissolved unchanged, just as salt is taken up by water. These form solvents for greases more or less valuable according to conditions.

If the housekeeper's problem were the simple one of removing the grease alone, she would solve it by the free use of one of the solvents or by some of the strong alkalis. This is what the painter does when he is called to repaint or to refinish; but the housewife wishes to preserve the finish or the fabric while she removes the dirt. She must, then, choose those materials which will dissolve or unite with the grease without injury to the article cleaned.

Soap

Soap is by all odds the safest and most useful cleaning agent. It is made from most of the common animal and vegetable fats and oils, as tallow, suet, lard, cotton seed oil and cocoanut oil, chemically combined with caustic soda or caustic potash. Castile soap is supposed to be made from olive oil. Rosin soap forms a part of all common yellow soap. It lessens the cost and makes a good soap for rough work. Silicate of soda is sometimes added to cheap soaps. It has some cleansing action, but must be regarded as an adulterant.

Good soaps are nearly neutral substances because the alkali has been neutralized by the fatty acid. The coarser grades may contain more or less free alkali. All soaps are slightly decomposed when dissolved in water. The freed fatty acid produces the milkiness seen when a cake of soap is placed in perfectly pure water.

Action of Soap

The cleaning action of soaps consists chiefly in forming emulsions with oily or greasy substances. Cream is an example of a very perfect emulsion. Its fat is in the shape of very finely divided globules and because of the whey which surrounds them, the cream can be mixed with a very large quantity of water and show no sign of greasiness. When the whey is separated as in churning, the globules of fat come together and butter is formed. An emulsion is not a true solution, for the particles of fat can be separated by proper means from the liquid.

The soap makes an emulsion with the oily or greasy substances holding the dirt, so that both may be washed away by the water. A certain proportion of free alkali in soap helps the action, but it has a corrosive effect on many materials. Soap will form emulsions with many other materials besides fats and oils; so while water is a very general solvent, soap and water will take up many additional substances.

Kinds of Soap

The housekeeper may be familiar with two kinds of soap: hard soaps and soft soaps. Caustic soda makes the hard soaps and caustic potash makes the soft soaps.

Caustic potash is derived from wood ashes and a few generations ago soft soap was the only laundry soap used. Wood ashes were plenty when wood fires were universal. Soda-ash was at that time derived from sea weeds, and therefore uncommon inland. Early in the century a French manufacturer, Leblanc, discovered a process of making soda-ash from sodium chloride or common salt. This quite reversed the condition of the two alkalis, for now soda-ash is much more common, and the manufacture of soap on a large scale really began then. Soda-ash is now the cheapest form of alkali. Caustic soda is made from soda-ash.

Soda-Ash

The terms, soda-ash, and pot-ash have been used; these substances in chemical terms are respectively the carbonate of sodium and the carbonate of potassium. They are chemical compounds made up of carbonic acid and two metals—sodium and potassium. When the carbon dioxide, which we have seen is formed by the combustion of carbon, is added to water, carbonic acid results. This is a very weak acid and when it is combined with the very strongly alkaline elements, sodium or potassium, the result is an alkaline substance. Soda-ash and potash (sometimes called pearl-ash) are called alkalis, but they are not nearly so powerful as the hydrates of sodium and potassium which are commonly called caustic soda and caustic potash.

Washing Soda

When soda-ash, which is a white powder, is dissolved in hot water and the solution is cooled, crystals of the common washing soda are formed. This substance is also called "sal soda" and "soda crystals." The crystals contain about 65 per cent of water and when exposed to the air, lose some of this water and crumble to the white powder, soda-ash. The powder is, therefore, stronger than the original crystals.

Washing soda should never be used in a solid form, but should be dissolved in a separate dish, and the solution used with judgment. A satisfactory amount is about two ounces of the dry soda to a large tub of water, and well dissolved before the clothes are put in. Nearly all of the "washing compounds" on the market depend upon the washing soda for their efficiency, and sometimes they contain nothing else.

Borax

Borax is a useful alkali, milder than washing soda, but effective as a cleaner, disinfectant, and bleacher. It is more expensive than either of the others described, and because of its weaker alkaline action, more of it must be used to produce a given result. It is much less irritating to the skin and less injurious to fabrics than soda, so for some uses its additional cost may be justified. Caustic potash or "lye" is too strong an alkali to use on fabrics, but is valuable to put down the kitchen sink drain to free it from grease. The soap made in the drain will be washed out by water. Solid washing soda may be used for the same purpose.

Hard Water

In the laundry the composition of water is important. Water for domestic use is either hard or soft, according as it contains a greater or less quantity of certain soluble salts—usually compounds of lime or magnesia, which have been taken up by the water while passing through the soil.

Temporary Hardness

When the hardness is caused by calcium carbonate (carbonate of *lime*) it is called "temporary" hardness, because it may be overcome by boiling. The excess of carbon dioxide is driven off and the carbonate of lime separates out. The same separation is accomplished by the addition of sal soda, borax, or ammonia.

Permanent Hardness

When the hardness is due to the sulphates and chlorides of magnesia or lime, it cannot be removed by boiling. It is then known as "permanent" hardness. Public water supplies are sometimes softened before delivery to the consumer by the addition of slaked lime, which absorbs the carbon dioxide, and the previously dissolved carbonate separates out.

Soft water is needed in laundry work both for cleanness and economy, and water not naturally soft should be softened by boiling or by the addition of the before mentioned substances.

Soap and Hard Water

When soap is added to the hard water, it is decomposed by the water, and the new compound formed by the union of the lime and magnesia with the fatty acid of the soap is insoluble, and therefore settles upon any article with which it comes in contact. Until all the lime has been taken out, there will be no action between the soap and the dirt. Therefore, large quantities of soap must be wasted. It has been estimated that each grain of carbonate of lime per gallon causes an increased expenditure of two ounces of soap per 100 gallons, and that the increased expense for soap in a household of five persons where such hard water is used might amount to five or ten dollars yearly.

This "lime soap," although insoluble in water, will dissolve readily in kerosene or naphtha, for which reason, kerosene will be found very effective for cleaning bowls or the bath tub when the surface has become coated from the use of hard water and soap.

Cooking with Hard Water

Hard waters produce certain undesirable effects in cooking processes. The cooking of beans and similar vegetables should soften the cellulose and break up the compact grains of starch. It is difficult to cook vegetables in hard water, for the legumin of the vegetable forms an insoluble compound with the lime or magnesia of the water, and the cellulose is softened with great difficulty. Hard water does not readily extract the flavor from tea and coffee, and therefore much more of either must be used to get the desired strength.

Dish Washing

During this discussion of cleansing agents, let us hope that the breakfast dishes have been soaking in water, after having carefully scraped or "scrapped" so as to save soap in washing and to keep the water as clean as possible. Plenty of hot water and soap with clean, dry towels is the secret of quick and easy work. If the hard water is used, it may be softened for the soap is doing no good unless there is a strong suds.

To save the appearance of the hands, use a good white soap, free from alkali, and soften the water with borax.

Glass, silver ware, china and kitchen ware take their turn. All should be rinsed in hot water to remove the soap and heat the dishes so that they will drain nearly dry and thus make wiping easy. In the dish washing machine used in large hotels and restaurants, the dishes are simply washed with soapy water and rinsed in very hot water while in such a position that they drain perfectly. They dry completely and require no wiping. Fig. 16.

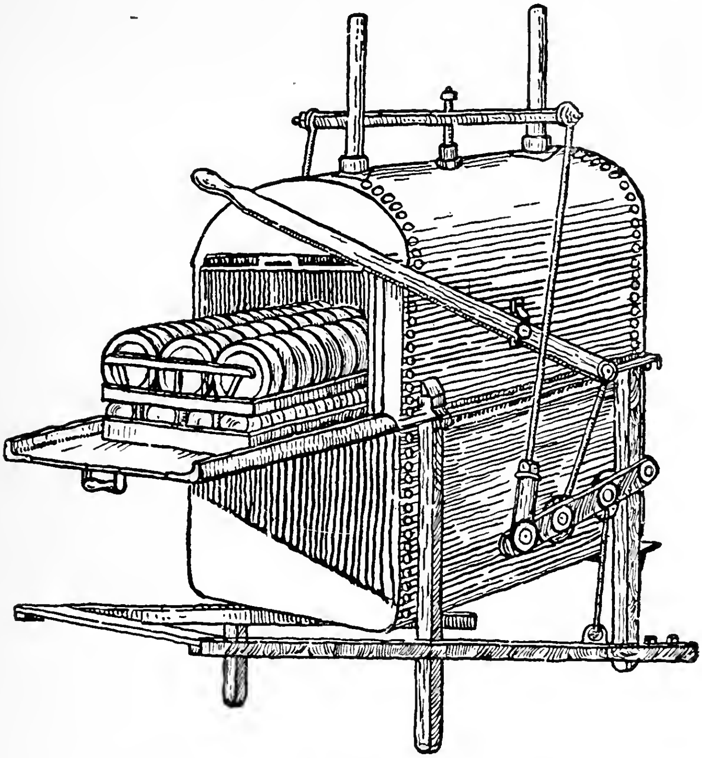


Fig. 16. Dish Washing Machine Used in Large Hotels and Restaurants.

Experiment. Wash a plate and dip it in very hot water, then place it so that all parts will drain. Observe if it dries completely. See if you can wash the dishes in this manner with very little wiping and if time would thus be saved.

CHEMISTRY OF THE LAUNDRY

If the morning happens to be Monday, the washing is probably in progress in the average American family. The mistress should understand the chemical principles involved and every detail of the work, in order that the best results may be secured, and that the clothes may not be harmed.

Structure of Fibres

The fibres of cotton, silk, and wool vary greatly in their structure and a knowledge of this structure as shown under the microscope, may guide to proper methods of treatment. Fig. 17.

Cotton

The fibres of cotton, though tubular, become much flattened during the process of manufacture, and under the microscope, show a characteristic twist, with the ends gradually tapering to a point. It is this twist, which makes them capable of being made into a firm, hard thread.

Wool

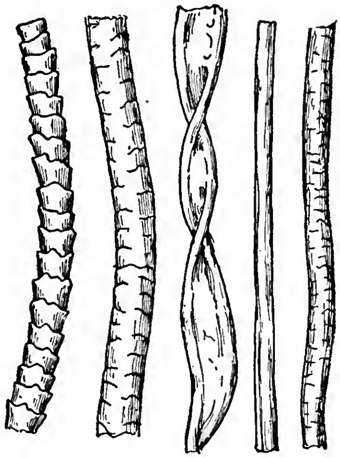
The wool fibre, like human hair, is marked by transverse divisions, and these divisions are serrated. These teeth become curled, knotted or tangled together by rubbing, by very hot water, or by strong alkalies. This causes shrinking, which should be prevented. When the two fibres are mixed, there is less opportunity for the little teeth to become entangled and therefore there is less shrinkage.

Linen

Linen fibres are much like cotton, with slight notches or joints along the walls. These notches serve to hold the fibres closely together, and enable them to be felted to form paper. Linen, then, will shrink, though not so much as wool, for the fibres are more wiry and the teeth much shorter.

Silk fibres are perfectly smooth and when rubbed, simply slide over each other. This produces a slight shrinkage in the width of woven fabrics. **Silk**

Cotton and wool differ greatly in their resistance to the treatment of chemicals. Cotton is very little affected by a solution of the alkalies, when the cloth is well rinsed. If the alkali is not removed completely, however, it becomes very concentrated when the cloth dries, and as it generally acts for a long time, the fibre may be weakened or "tendered."



A B C D E

Fig. 17. Textile Fibres Much Magnified.
a, Wool; b, Mohair; C, Cotton; d, Silk; e, Linen.

Cold dilute solutions of the acids have no very great effect on cotton, provided always that they are completely washed out. Strong or hot solutions of acids have a very decided deleterious action, and even a very minute quantity of acid *dried* on the goods tenders the fibre badly. **Chemical Action on Fibres**

Wool resists the acids well, but is much harmed by the action of the alkalies. A warm solution of caustic soda or caustic potash will dissolve wool quickly and completely. The carbonates, like washing soda, have not such a decided effect, but they make the wool harsh and less flexible.

Linen resembles cotton and silk is much like wool in the resistance to chemical action, but the linen is more affected by the alkalies than cotton and silk is more acted on by acids than wool.

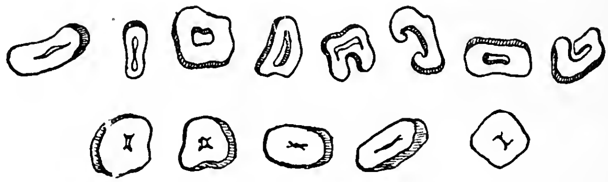


Fig. 18. Sections of Ordinary and Mercerized Cotton Fibres.

Mercerization

That cotton fibre is not seriously affected by alkalies is shown by the process of mercerization. In this process, patented by Mercer in 1852, the cotton threads are treated with a strong solution of caustic soda while under tension. The fibres lose their twisted and hollow shape and become more rod-like and nearly solid, as shown in Fig. 18. The threads have a tendency to shrink considerably, but are prevented by the tension. This and the method of manipulation gives the mercerized fabric the characteristic gloss somewhat resembling silk.

Soaking

In laundering, the best practice seems to be to soak the white clothes at least, in cold water or in luke-warm suds. The badly soiled portions may be soaped and rolled tightly to keep the soap where it is most needed. The water should be well softened, and a very little extra washing soda solution may be added. The soaking loosens the dirt and saves much rubbing and hence wear on the clothes. It is probable that the cleansing wears out the articles which make up the weekly wash more than the actual use they receive.

After washing the clothes, they may be wrung out and put into a boiler of cold water, which is then heated and boiled briskly for a little while. Whether to boil, or not to boil the clothes depends largely upon the purity of the materials used. If there is any iron in the water, or elsewhere, it is sure to be deposited on the goods, thus producing yellowness. Soap may be added to the clothes in the boiler, or borax may be used, allowing a tablespoonful to every gallon of water. The borax serves as a bleacher and as an aid in the disinfection of the clothes. One great advantage of boiling is the additional disinfection which this insures. **Boiling**

After washing, the clothes should be thoroughly rinsed. They cannot be clean otherwise and proper rinsing is essential to successful washing. The more thoroughly the wash water is removed between rinsings, the less number of rinsings will be required to give the same results. **Rinsing**

Bluing is frequently added to the last rinsing water to counteract, or cover up, any yellowness. A light blue appears to the eye whiter than a light yellow. **Bluing**

The color is, however, gray in comparison with white. Most of the liquid bluing now on the market contains Prussian Blue, a compound of iron. This compound is decomposed by soap and alkalies, when the goods are next washed, making a slight yellow stain of iron on the cloth. Frequent repetitions of this action may give a distinctly yellow shade to the white goods. The indigo blue used a generation or more ago did not have this objection. It is said that white goods which have never been blued, never require bluing.

Stains

Stains and all special deposits should be removed before the goods are treated with soap or soda, as these frequently set the stains. Hot water will spread any grease and also set many stains, so the clothes when not soaked, should be wet thoroughly in cold or luke-warm water before washing.

Washing Colored Goods

Colored goods and prints require more delicate treatment than white goods. If they are soaked, the water should be cold and contain very little soap and no soda. Only dissolved soap should be used in washing them, and this should be of good quality, free from alkali. They should be dried with the wrong side out and in the shade, for direct sunlight fades colors about twenty times as much as reflected light.

Washing Woolens

All wool goods require the greatest care in washing. The different waters used should be of the same temperature and never too hot to be borne comfortably by the hand.

The soap used should be in the form of a thin soap solution. No soap should be rubbed on the fabric and only a good, white soap, free from rosin, is allowable. Make each water slightly soapy and leave a very little in the fabric at the end, to furnish a dressing as nearly like the original as possible.

Soap Solution

Many persons prefer ammonia or borax in place of the soap. For pure white flannel, borax gives the best satisfaction on account of its bleaching quality. Whatever alkali is chosen, care should be exercised in the quantity taken. Only enough should be used to make the water very soft.

Brushing Woolens

The fibres of wool collect much dust upon their tooth-like projections and this should be thoroughly brushed or shaken off before the fabric is put into water. All friction should be by squeezing, not by rubbing. Wool should not be wrung by hand. Either run the fabric smoothly through a wringer or squeeze the water out, that the fibres may not be twisted. Wool may be well dried by rolling the article tightly in a thick dry towel or sheet and squeezing the whole till all moisture is absorbed. Wool should not be allowed to freeze, for the teeth will become knotted and hard. Above all, the drying should be accomplished quickly, and in short, the less time that is taken in washing, rinsing, and drying, the less will be the shrinkage and the better will be the result.

Starching

Some of the clothes are starched. This in addition to making them stiffer and giving them a better appearance helps to keep them clean longer. Practically all the household starch on the market is corn starch, although in the textile industries and large laundries, wheat, potato and rice starches are used. Corn starch has the greatest stiffening effect, but wheat starch and rice starch penetrate better and give a more flexible finish.

Cooked Starch

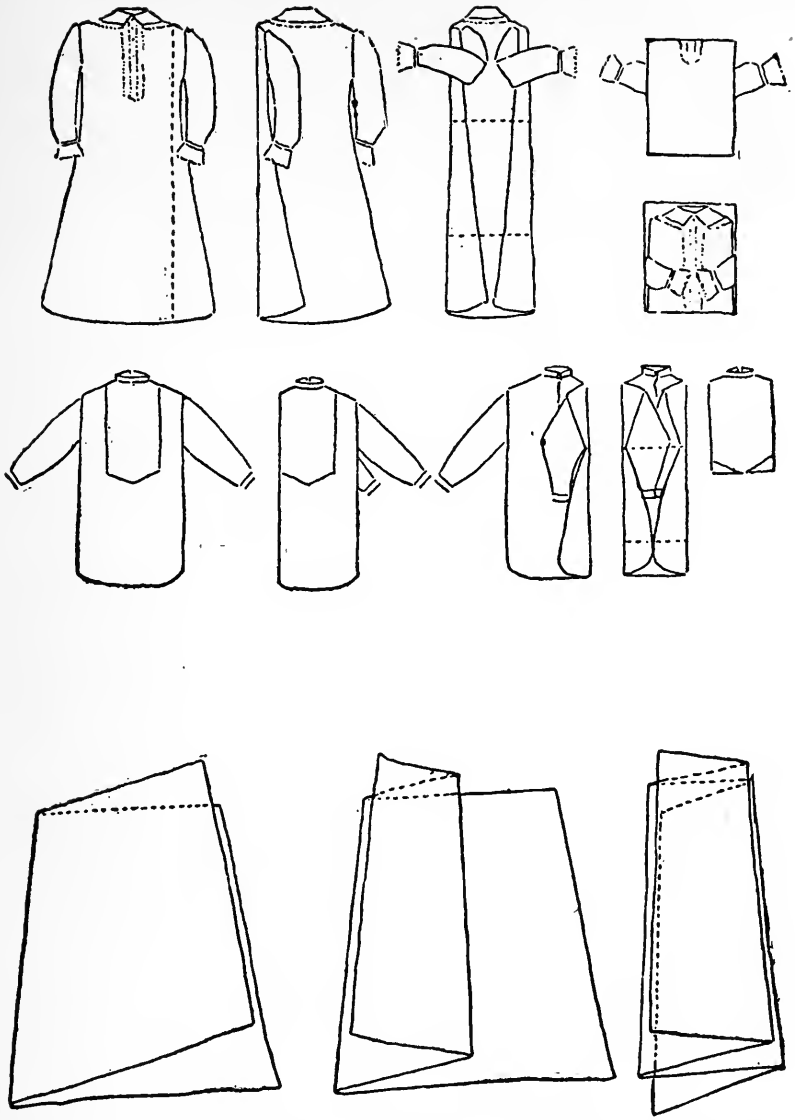
To make cooked starch for ordinary work, wet ¼ cup with ¼ cup of water and pour on one quart of boiling water. Boil thoroughly till clear. Use double the quantity of starch for stiff starching. Borax may be added—½ to 1 level tablespoon to a quart—to increase the gloss and penetrability and to prevent the iron from sticking. Lard, wax or paraffine is sometimes cooked with the starch for the same purpose—¼ tablespoon to a quart.

Uncooked Starch

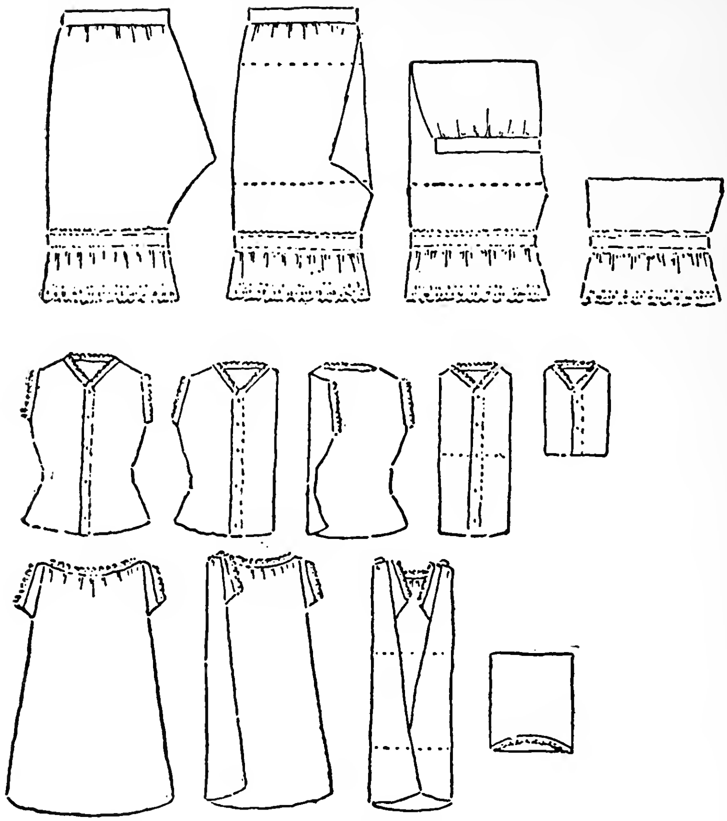
For very stiff starching, as for collars, the thick paste should be rubbed thoroughly into the goods and the excess wiped off with a damp cloth, after which the goods is dried before a fire.

The prepared starches, to be used cold, contain borax. This may just as well be added to cheaper preparations. As the uncooked starch depends upon the heat of the iron to swell and stiffen it, a hotter iron is required than with boiled starch.

For producing an ecru shade in curtains, coffee is sometimes added in quantity to give the desired color. A solution of gum arabic is sometimes used to stiffen



A METHOD OF FOLDING DRESSES, SHIRTS AND SHEETS
OR TABLE CLOTHS



METHOD OF FOLDING UNDERCLOTHES

ORDER OF IRONING

Night Dresses:
1—embroidery, 2—sleeves, 3—yoke, 4—body.

Drawers:
1—trimming, 2—tucks, 3—body, 4—band.

Skirts:
1—ruffle, 2—hem, 3—body.

Shirt Waists:
1—cuff, 2—collar band, 3—sleeves, 4—yoke, 5—back, 6—front.

(From "The Laundry," by Flora Rose: Bulletin of the Cornell Reading Course for Farmers' Wives, Ithaca, N. Y.)

dark colored clothes which would show the white color of the starch.

THE REMOVAL OF STAIN

Whenever possible, stains should be removed when fresh. If the staining substance is allowed to dry on the cloth, its removal is always more difficult, and sometimes a neglected spot or stain cannot be removed without damage to the cloth.

Grease Spots

The nature of the spot must be known before the best substance to dissolve and remove it can be chosen. To remove grease spots, solvents of grease should be chosen, though we may remove such spots sometimes by causing the grease to form an emulsion with soap and thus be removed, or the grease may be made into a soap with ammonia or washing soda and thus dissolved and removed in water. The first of the three methods is, as a rule, the best. Grease will dissolve readily in benzine, naphtha, gasoline, kerosene, ether, and chloroform and somewhat in turpentine and hot alcohol. Ether and chloroform are the best solvents, but they are more expensive and not much more effective than naphtha.

Precautions

Caution! All of the solvents for grease are inflammable and some are explosive, so that they should never be used near a fire or light. Work with them should be done in the day time and preferably out of doors.

In applying any of these solvents to grease spots in fabrics, a cloth should be placed underneath the stain to absorb the excess of liquid containing the dissolved grease. The spot should be rubbed from the outside towards the center until dry. This will tend to distribute the solvent and prevent the formation of a ring where the liquid stops. It is well to apply the solvent on the wrong side of the fabric. Old spots of any kind may require long treatment. For this a little lard may be rubbed into the spot and left for some time, then the whole may be dissolved by naphtha or washed out with soap or ammonia.

Absorbents

Spots of grease on carpet or heavy material may be treated with absorbents. Heat will assist by melting the grease. Fresh grease spots may often be removed by placing over the spot a clean piece of blotting paper and pressing the spot with a warm iron. French chalk or whiting may be moistened with naphtha and spread over the spot. When all is dry, brush off the absorbent. The absorption method may be used in many other cases, moistening with cleansing agent which will not harm the material treated.

Bluing Stains

Bluing spots may frequently be removed by soaking in strong ammonia water. Alcohol or ammonia will remove grass stains, and an old remedy is to smear the stains with molasses before the article goes into the wash. The acids in the molasses seem to have the desired effect on the grass stains.

Fresh stains of coffee, tea or fruit may be removed by hot water. Stretch the stained part over an earthen dish and pour boiling water upon the stain until it disappears. It is some times better to sprinkle the stain with borax and soak in cold water before applying the hot water. Old, neglected stains of coffee, fruits, cocoa, etc., will have to be treated with some bleaching agent. In many cases, it is not possible to remove them without severely damaging the cloth. **Coffee and Fruit Stains**

Mildew causes a spot of a totally different character from any we have considered. It is a true mold, and like all plants, requires warmth and moisture for its growth. When this necessary moisture is furnished by any cloth in a warm place, the mildew grows upon the fibres. During the first stage of its growth, the mold may be removed, but in time, it destroys the fibres. **Mildew**

Strong soapsuds, a layer of soft soap, and pulverized chalk, or one of chalk and salt, are all effective if, in addition, the moistened cloth be subjected to strong sunlight, which kills the plant and bleaches the fibres. Bleaching powder or Javelle water may be tried in cases of advanced growth, but success cannot be assured.

Some of the animal and vegetable oils may be taken out by soap and *cold* water or dissolved in naphtha, chloroform, ether, etc. Mineral oil stains are not soluble in any alkaline or acid solutions. Kerosene will **Vaseline Stains** evaporate in time. Vaseline stains should be soaked in kerosene before water and soap touch them.

Paint

Paints consist mainly of oils and some colored earth. Spots of paint, then, must be treated with something that will take out the oil, leaving the insoluble coloring matter to be brushed off. Turpentine is most generally useful.

Spots of varnish or pitch may be dissolved by the use of the same solvents as paint. Alcohol is also one of the best solvents here.

Spots made by food substances are greasy, sugary, or acid in their nature. Whatever takes out the grease will generally remove the substance united with it, as the blood in meat juices. Sugar is dissolved by hot water, so sticky spots are best removed with this.

Ink Spots

Ink spots are perhaps the worst that can be encountered, because of the great uncertainty of the composition of inks of the present day. When the character of an enemy is known, it is a comparatively simple matter to choose the weapons to be used against him, but an unknown enemy must be experimented upon and conquest is uncertain.

Indelible Ink

Indelible inks formerly owed their permanence to silver nitrate. Now many are made from aniline black solutions and are scarcely affected by any chemicals. The silver nitrate inks become dark in the sun by a photographic process. Many silver salts, and some salts of other metals, change in color in a bright light.

Silver nitrate inks may be removed by bleaching powder solutions. The chlorine in this replaces the nitric acid forming white silver chloride. This will darken if not at once removed, but will dissolve in strong ammonia water or a solution of hyposulphite of soda. This last salt, much used by photographers, commonly called "hypo," will often dissolve the stain of indelible ink without the use of the bleaching fluid and is less harmful to the fibres. Some inks contain carbon in the form of lamp black which is not affected by any chemicals which can be used.

Writing Ink

The old fashioned black ink is a compound called the gallo-tannate of iron. It is made by adding a solution of sulphate of iron to a water solution of nut galls. A little gum solution is added to make the ink of better consistency. This kind of ink is removed by the addition of a warm solution of oxalic acid or muriatic acid drop by drop, and this finally well rinsed out. Of course some materials will be injured by the acids, so this method must be used with caution. Lemon juice and salt will sometimes remove the spot and is safe. Cover the spot with salt, wet with lemon juice, and spread in the sun. Bleaching powder solution and acid will frequently destroy any ink stain of long standing which acids alone will not affect.

Some ink stains are removed when fresh by clear, cold, or tepid water—skimmed milk is safe and often effective. If the stain is allowed to soak in the milk until the milk sours, the result is often better. Sometimes the ink will dissolve out if a piece of ice is laid on the spot and blotting paper under it. The blotting paper absorbs the water and should be often changed.

Ink on Carpets Ink on heavy materials like carpets and draperies may be treated with some absorbent to keep the ink from spreading. Bits of blotting paper, cotton batting, meal, flour, sawdust, etc., may be used and removed as long as any ink is absorbed, then go over the spot repeatedly with a lemon freshly cut, and finally rinse with cold or tepid water. If an ink stain has worked through varnish into the wood, turpentine will usually remove the spot.

Colored Inks Of late colored inks are generally prepared from aniline colors. These are made from substances produced in the distillation of coal tar. The colors are soluble in water, and by dissolving them and adding to the mixture some thickening substance, different colored inks are produced. They are rather difficult to remove successfully, but bleaching powder solution will frequently destroy them.

Iron Rust The red iron-rust spots must be treated with acid. These are the results of oxidation—the union of the oxygen of the air with the iron in the presence of moisture. The oxide formed is deposited upon the fabric which furnishes the moisture. Ordinary "tin" utensils are made from iron coated with tin, which soon wears off, so no moist fabric should be left long in tin unless the surface is entire.

Iron-rust is, then, an insoluble oxide of iron. The chloride of iron is soluble and so hydrochloric acid is used to remove the rust. The best method of applying the acid is as follows: Fill an earthen dish two-thirds full of hot water and stretch the stained cloth over this. Have near two other dishes with clear water in one and ammonia water in the other. The steam from the hot water will furnish the heat and moisture favorable for chemical action. Drop a little hydrochloric (muriatic) acid on the stain with a medi- Removing Rust

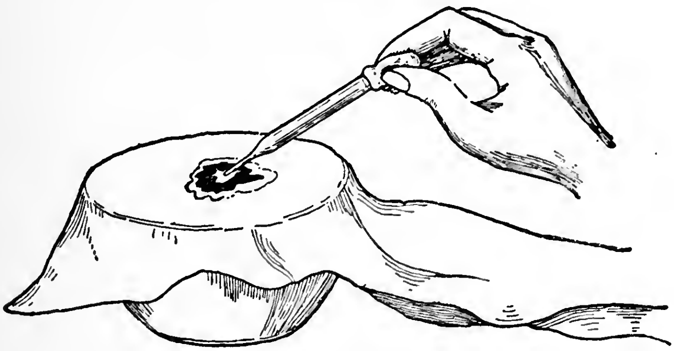


FIG. 19. REMOVING IRON RUST STAIN.

cine dropper. Fig. 19. Let it act a moment, then lower the cloth into the hot water. Repeat till the stain disappears. Rinse carefully in the clear water and, finally, immerse in the ammonia water, that any excess of acid may be neutralized and the fabric protected.

Salt and lemon juice are often sufficient for a slight stain, probably because a little hydrochloric acid is formed from their union. Salt and Lemon Juice

Ink stains on colored goods are often impossible to take out without also removing part of the dye. The ink must be washed out in cold water *before* it dries; any slight stain remaining can, perhaps, be removed with a weak acid like lemon juice without harming the color.

BLEACHING

When the clothes are washed, the mistress likes to have them hang out of doors where the air and sunshine can dry them. She is glad when the white articles can be spread on the grass, knowing that they will be made whiter by Nature's bleaching agent. The sunlight is the chief agent in this bleaching and the articles are laid flat on the grass so that the rays of light will strike in a more perpendicular direction. There are also other devices for bleaching, among which are the fumes of burning sulphur, chloride of lime (bleaching powder) and Javelle water.

Originally all bleaching of linen and cotton was done out of doors by the action of oxygen, water, and sunlight. In these days of great factories, this process is impossible for lack of space; but various artificial bleaching stuffs have been discovered whose action is satisfactory if skilfully used.

Bleaching Powder

Chlorine is a gas which has remarkable readiness to combine with other bodies. It is even more energetic than oxygen. By its action upon them, chlorine destroys the greater number of coloring substances. Because of its harmful action upon the human body, chlorine gas itself cannot be used in factories or in the household, but the compound which chlorine forms with lime (oxide of calcium) known as *chloride of lime* or *bleaching powder,* is safe and effective.

Action of Chlorine

The principal coloring matters are composed chiefly of the elements carbon and hydrogen and some of the metals. If a substance which makes new combination with the elements present is brought in contact with these colors, the new compounds thus produced may be colorless. The element chlorine does just this. It can be set free from chloride of lime by weak acids, and will dissolve very readily in water when so set free. By dipping colored cloth into a weak solution of chloride of lime and acid, many colors and stains are at once destroyed. But the energy of the chlorine is not stopped by this process. Having destroyed the color, the bleaching powder attacks the fibres of the goods, unless the cloth is at once placed in some solution which can neutralize the bleaching powder. There are several such easily obtained and used. The use of bleaching powder in the household is frequently of dubious success for lack of this precaution. Ammonia water will perform this action satisfactorily, since the harmless soluble salt, ammonium chloride, is formed; hypo-sulphite of soda is also effective.

Chloride of Lime

Chloride of lime loses strength rapidly if exposed in an open vessel. It absorbs water and carbon dioxide from the air, grows damp and the chlorine gas escapes.

In using bleaching powder, mix one or two teaspoonfuls with a pint of cold water in an earthenware dish. The effective part of the powder will be dissolved, so let the mixture settle, or strain off the liquid through a cloth. Add a little vinegar or a few drops of acetic acid to the nearly clear solution and use at once.

Javelle Water

Javelle water is also used as a bleaching agent. It is very like bleaching powder, except that soda replaces the lime. It is prepared by dissolving one pound of washing soda in a quart of hot water and adding one quarter of a pound of chloride of lime also dissolved in a quart of hot water. Let the mixture settle, pour off the clear liquid and bottle it for use. It will keep for some time. The dregs may be used to scour the kitchen floor or to disinfect waste pipes. This is very useful in removing stains on white cloth, but the addition of some solution to neutralize the action is always necessary, just as with bleaching powder. The best substance to use for this is hypo-sulphite of soda, the "hypo" used in photography, which is quite harmless to the cloth.

Sulphur Dioxide Bleaching

Chlorine cannot be used in bleaching fabrics of animal fibre such as wool and silk; it leaves them yellow rather than white. For these the fumes of burning sulphur, or these fumes dissolved in water must be used. No special means of destroying the excess of sulphur fumes is required. These fumes are a compound of sulphur and the oxygen of the air and familiar to every one, in the acid fumes from a burning "sulphur match." The article to be bleached must be *wet,* and then hung in some enclosed space above a piece of burning sulphur. The sulphur candles, to be had at any druggist's, are convenient for this use. Fig. 20. The fumes have great affinity for oxygen, that is, unite with it easily, and take it from the coloring stuffs, converting them into colorless ones. This method of bleaching is sometimes not permanent.

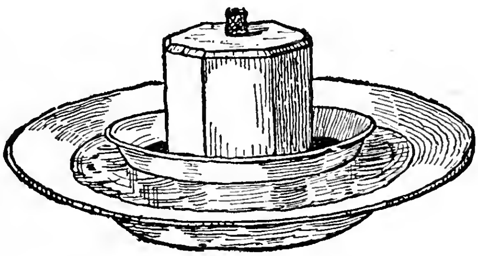


FIG. 20. A SULPHUR CANDLE.

These fumes of sulphur are often used to disinfect rooms where there has been sickness. Its power in this respect is far less than is generally supposed however, and much larger quantities of the gas are required for thorough work than are commonly used. Chlorine gas is an excellent disinfectant, but is dangerous to use because of its irritating effect upon the throat and lungs. The use of "chloride of lime" as a disinfectant depends upon the fact that chlorine slowly **Disinfection** escapes from this substance when it is exposed to the air.

Hydrogen Peroxide

Another bleaching agent of growing importance is peroxide of hydrogen. Water is a compound made up of one-third oxygen and two-thirds hydrogen. Under certain conditions, a compound half oxygen and half hydrogen may be prepared. This is not very permanent as the extra oxygen slowly escapes. This extra oxygen has great power as a decolorizer. The peroxide is a liquid much like water in appearance and is used in bleaching hair, feathers, and ivory. It is the safest bleaching agent for the housekeeper to work with and may be used on wool and silk as well as cotton and linen.

CLEANING WOODWORK

In the interior of the house woods are seldom used in their natural state. The surface is covered with two or more coatings of paint, varnish, etc., which add to the wood durability or beauty. The cleaning processes are applied to the last coat of finish and must not injure this.

Soft woods are finished with paint, stain, oil, shellac, varnish, or with two or more of these combined; hardwoods with any of these, and in addition, wax, or wax with turpentine, or both with oil.

Alkalies on Paint

All these surfaces, except those finished with wax, may be cleaned with a weak solution of soap or ammonia, but the continuous use of any alkali may impair and finally remove the polish. Refinishing will then be necessary. Waxed surfaces are turned dark by water. Finished surfaces should never be scoured nor cleaned with strong alkalies, like sal-soda, orpotash soaps. Scouring with these strong alkalies will break the paint or varnish and in this way destroy the finish.

Kerosene in Cleaning

A few drops of kerosene or turpentine on a soft cloth may be used to clean all polished surfaces. The latter cleans them more perfectly and evaporates readily; the former is cheaper, safer, because its vapor is not so inflammable as that of turpentine, and it polishes a little while it cleans; but it evaporates so slowly that the surface must be rubbed dry each time, or the dust will be collected and retained. The harder the rubbing, the higher the polish.

Outside the kitchen, the woodwork of the house seldom needs scrubbing. The greasy layer is readily dissolved by weak alkaline solutions, by kerosene or turpentine, while the imbedded dust is wiped away by the cloth. Polished surfaces keep clean longest. If the finish be removed or broken by deep scratches, the wood itself absorbs the grease and dust, and the stain may have to be scraped out.

CLEANING METALS

Most metals may be washed without harm in a hot alakline solution or wiped with a little kerosene. Stoves and iron sinks may be scoured with the coarser materials like ashes, emery or pumice; but copper, polished steel, or the soft metals, tin, silver, and aluminum require a fine powder that they may not be scratched or worn away too rapidly. Metal bathtubs may be kept clean and bright with whiting and ammonia, if rinsed with boiling hot water and wiped dry with soft flannel or chamois.

Porcelain or soapstone may be washed like metal or scoured with any fine material.

Tarnish

The special deposits on metals are caused by the oxygen and moisture of the air, by the presence of other gases in the house, or by acids or corroding liquids. Such deposits come under the general head of tarnish.

The metals, or their compounds, in common use are silver, copper and brass, iron and steel, tin, zinc and nickel. Aluminum is rapidly taking a prominent place in the manufacture of household utensils.

There is little trouble with the general greasy film or with the special deposits on articles in daily use, if they are washed in hot water and soap, rinsed well and wiped dry each time. Yet certain articles of food act upon the metal of tableware and cooking utensils, forming true chemical salts.

Silver Sulphide

The salts of silver are usually dark colored and insoluble in water or in any alkaline liquid which will not also dissolve the silver. Whether found in the products of combustion, in food, as eggs, in the paper or cloth used for wrapping, in the rubber band of a fruit jar, or the rubber elastic which may be near the silver, sulphur forms with silver a grayish black compound—a sulphide of silver. All the silver sulphides are insoluble in water. Rub such tarnished articles, before washing, with common salt. By replacement, silver chloride, a white chemical salt, is formed, which is soluble in ammonia. If the article be not washed in ammonia it will soon turn dark again. With an old or deep stain of silver sulphide friction must be used.

Silver Polish

The analysis of many samples of silver polish, showed them to be made up of either precipitated chalk, diatomaceous earth or fine sand. In using them, it is necessary to be careful in regard to the fineness of material since a few coarse grains will scratch the coating of soft silver. In former times the housewife bought a pound of whiting for fifteen cents, sifted it through fine cloth, or, mixing it with water, floated off the finer portion, and obtained in this way, twelve ounces of the same material for three ounces of which the modern housewife pays twenty-five cents or even more, when she buys it "by the box."

Whiting

The whiting may be made into a paste with ammonia or alcohol, the article coated with this and left till the liquid has evaporated. Then the powder should be rubbed off with soft tissue paper or soft cotton cloth, and polished with chamois.

Protecting Metals

The presence of water always favors chemical change. Therefore iron and steel rapidly oxidize in damp air or in the presence of moisture. All metallic articles may be protected from such action by a thin oily coating. Iron and steel articles not in use may be covered with a thin layer of vaseline.

Rust can be removed from iron or steel by kerosene if not too deep.

The tarnish on brass or copper will dissolve in ammonia water, but the objects tarnish again more quickly than if polished by friction.

CHEMISTRY OF THE HOUSEHOLD.

PART II.

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. *Do not copy answers from the lesson paper.* Use your own words, so that your instructor may know that you understand the subject. Read the lesson paper a number of times before attempting to answer the questions.

1. Name all the substances you can think of which are not soluble in water and are soluble in naphtha or benzine.
2. Does sugar neutralize acid chemically? Why?
3. How is soap made? What is the difference between hard and soft soap?
4. What is "hard" water? How does it act with soap? How is it softened?
5. Explain how "bluing" may make white clothes yellow.
6. Why remove stains when fresh? Why before washing?
7. Why is there danger in using naphtha, benzine, and to some extent alcohol near a light?
8. How do cotton and woolen differ in the effect of acids and alkalies upon them?

9. What precautions must be taken in bleaching or removing stains with chloride of lime solution or with Javelle water?
10. Give a good method of starching and ironing clothes.
11. If possible, try to remove some stain by a method given in this lesson and tell of the results.
12. Describe a good method of washing woolens.
13. Why does the drying of a little acid or alkali on a fabric have a very disastrous effect?
14. What is your method of washing dishes?
15. What can you say of acids, alkalies, salts?
16. What is "washing soda?" How should it be used? When should it *not* be used?
17. Why does strong soap or washing soda harm varnish or paint?
18. What is the cause of tarnish on metals? How can it be removed and prevented?
19. What advantages has ammonia for use in the laundry?
20. Do you understand everything given in this lesson paper? Are there any questions you would like to have answered?

NOTE.—After completing the test sign your full name.

CHEMISTRY OF THE HOUSEHOLD.

A Day's Chemistry.

PART III.

CHEMISTRY OF BAKING POWDER

We will suppose that after the strenuous course of cooking, washing, and cleaning outlined for the morning, that the housekeeper still has strength to make soda biscuits for tea, and we will study the chemical action involved.

One of the first chemical methods of securing carbon dioxide to use in making bread rise, was by putting hydrochloric acid and cooking soda together in a dough which might be put into the oven before the gas escaped from it.

Cooking Soda

Cooking soda is a salt called bi-carbonate of sodium. It differs from the ordinary mono-carbonate of soda (washing soda) in yielding twice as much carbon dioxide in proportion to the sodium part of the compound. The saleratus of our grandmother's time was bi-carbonate of *potash,* made from wood ashes. The name is still used, but at all stores, cooking soda would be delivered invariably if saleratus were asked for. The true saleratus costs ten times as much as the soda and is no more effective. The carbonic acid is easily set free by chemical compounds of an acid nature, and new chemical compounds result.

Experiment. Put a little cooking soda into any acid—lemon juice, vinegar, almost any fruit juice—and the carbon dioxide will be seen to escape in tiny bubbles. Part of the acid unites with part of the soda, forming a new salt, and the acid taste will be much reduced or lost.

Heating Cooking Soda

Part of the carbon dioxide in sodium bi-carbonate is driven off by simply heating, leaving ordinary sodium mono-carbonate, washing soda. In using this process, cooking soda is mixed with the flour. The high temperature of the oven drives off carbon dioxide, and the bread puffs up. It is light, but yellow in color. The sodium carbonate remains in the bread and its alkaline nature serves to neutralize the acid fluids of the stomach (gastric juice) so that digestion of the bread may be retarded. The sodium carbonate also acts in some way upon the gluten producing an unpleasant odor.

Early Experiments

Among the first methods proposed was one undoubtedly the best theoretically, but very difficult to put in practice. This depended upon the liberation of carbon dioxide from bi-carbonate of sodium by means of muriatic acid—the method already described. The liberation of gas is instantaneous on the contact of the acid with the "soda" and even a skilled hand cannot mix the bread and place it in the oven without the loss of much of the gas. Tartaric acid, the acid phosphates, sour milk (lactic acid), vinegar (acetic acid), alum, all of which have been used, are open to the same objection.

Cream of Tartar

Cream of tartar is the only acid substance commonly used which does not liberate the gas by simple contact in cold solution. It unites with "soda" only when heated, because it is so slightly soluble in cold water.

Experiment. To illustrate this stir a little soda and "cream of tartar" into some cold water in a cup. In another cup mix the same amounts of each in warm water. Note the difference in the action produced.

To obtain an even distribution of the gas by thorough mixing, cream of tartar would seem to be the best medium by which to add the acid, but because there are other products which remain behind in the bread in using all the so-called baking powders, the healthfulness of these residues must be considered.

Common salt is the safest residue and perhaps that from acid phosphate is next in order.

The tartrate, lactate, and acetate of sodium are not known to be especially hurtful. As the important constituent of Seidlitz powders is Rochelle salt, the same compound as that resulting from the use of cream of tartar and "soda," it is not likely to be very harmful, even in the case of the habitual "soda biscuit" eater, because of the small quantities taken.

Injurious Products

The various products formed by the chemical decomposition of the alum and "soda" are possibly the most injurious, as these are sulphates, and are thought to be the least readily absorbed salts. The sale of "alum" baking powder is increasing, as it is cheaper.

Taking into consideration then the advantage given by the insolubility of cream of tartar in cold water, and the comparatively little danger from its derivative —Rochelle salt—it would seem to be, on the whole, the best substance to add to the soda in order to liberate the gas, but the proportions should be chemically exact, since too much alkali would hinder the process of digestion. Hence baking powders prepared by weight and carefully mixed, are a great improvement over cream of tartar and "soda" measured separately. As commonly used, the proportion of soda should be a little less than half.

LIGHTING

By the time supper is over or even before, during a large portion of the year daylight has gone. Our grandmothers would have brought out the candles. Perhaps we shall use a candle to light our way while we carry the butter and food into the cool cellar.

The Candle Flame

The candle flame although small in area is typical of all flames. Flame indicates the burning of a gas for solid substances in burning simply glow and do not burn with flame. When wood and soft coal burn, gases are set free by heat and these gases burn over the bed of fuel, giving the flames.

The general form of the candle flame is a cone widest above the base, or about at the top of the wick. If it is examined carefully it will be seen to consist of three layers. Fig. 21. The interior part is dark, giving out no light. The second is yellow and is the luminous part, and surrounding this and most easily seen at the base, is a very thin blue layer.

Experiment. If a small splint of wood or a match be placed across the lower part of the flame near the wick for a moment, it will be charred where the outer layers of the flame have touched it, but the centre will not be changed. Press a piece of card board quickly down on the flame from above and remove it before it is set on fire, and a ring of scorched paper will show the shape of the hot part of the flame.

Fig. 21. Flame of a Candle.

The candle consists of hydrocarbons (compounds of carbon and hydrogen). When a match is applied to the wick, the hydrocarbons are melted and the liquid rises on the wick by capillary attraction. The heat changes this to gas (or vapor) which is set on fire, since at the high temperature it easily unites with the oxygen of the air. There is plenty of oxygen present, but it is all seized upon by the carbon and hydrogen in the outer parts of the column of gas rising from the wick, so that none reaches the centre. The gas diffuses outward toward the oxygen continually, so that the inner cone may be regarded as a gas factory. The yel-

Chemistry of the Candle Flame

low light is caused by the incandescence or glowing of small particles of carbon, heated to "white heat." These are set free from the compounds where the flame is very hot and they are not yet united with oxygen.

Nature of Smoke

Flames "smoke," that is, throw off unburned carbon when there is an insufficient supply of oxygen. Any device which constantly renews a steady supply of air (with oxygen) will make the flame burn better. The chimney of a lamp does this by protecting the flame from wind and by making, enclosing, and directing upward a current of air. The chimney makes the lamp "draw," as the chimney of the house makes the stove "draw."

Explosions

When the air is mixed with an inflammable gas and the temperature of any part is raised to the kindling point of the gas, as happens if a light is brought into such a mixture, an explosion takes place. The flame spreads through the whole and combination ensues everywhere almost instantly. Great heat is produced and the gases expand suddenly and with violence. If the gases are confined, the enclosing walls may be broken by the pressure. Contraction follows this expansion and air rushes in, producing a second sound. The sounds occur so near together as to give the impression of one.

Explosive Mixtures

In a mixture of inflammable gas and air there must be a certain proportion of each to give conditions which will produce an explosion. A very small amount of gas in the air will not explode under any conditions, as when there is an odor of coal gas in the room from which no explosion follows even though a light be present. On the other hand, a mixture containing a large proportion of inflammable gas and a little air will not explode. The proportion of air to gas in an explosive mixture varies in different cases, but in general ranges from about twelve to five parts of air to one

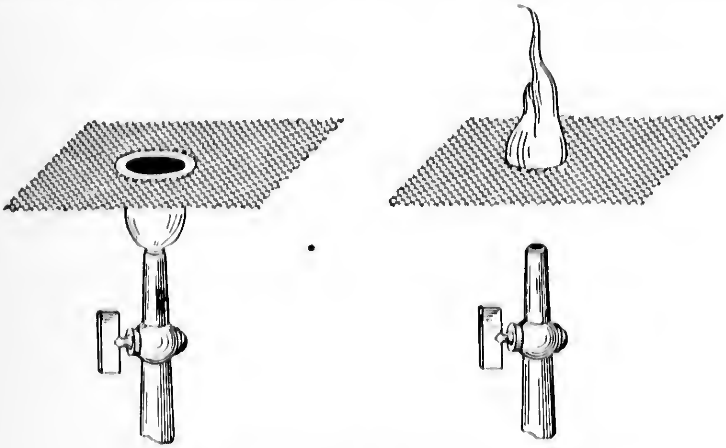


Fig. 22a. The Effect of Wire Gauze on a Gas Flame.

part of gas. It is, of course, never safe to rely on the chance of the correct proportions of gas and air not being present.

Explosions sometimes occur by unwise use of kerosene in kindling a fire in a stove. If the kerosene is poured upon a fire already burning, enough vapor of kerosene may be produced to give a disastrous explosion. Soaking wood or paper in kerosene for use as kindlings and then lighting would produce no such dire results.

Safety Lamps

Explosions in mines are usually caused by a gas called fire-damp and composed of carbon and hydrogen. When this escapes from the coal and becomes mixed with air, it is very explosive. If a miner brings a naked flame into the mine, the fire-damp will ignite and disaster results. A safety lamp was devised by Davy for use in such dangerous places. It was found that a gas is cooled below its kindling temperature in passing through a fine wire gauze. Lamps surrounded by such a gauze may be taken into a mine with comparative safety. Fig. 22.

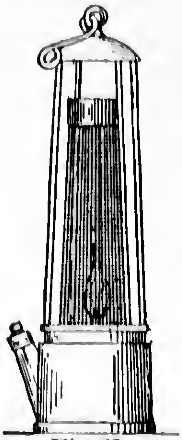


Fig. 22

The action of the wire gauze upon the gas may be studied by holding over a gas jet a piece of fine wire netting, such as is used in window screens, and then lighting the gas above the netting. Fig. 22a. It will be seen that the gas below the netting is very slow in igniting, since it does not readily become sufficiently heated, the wire netting cooling it below its kindling point.

Kerosene Lamps

The kerosene lamp gives light by the principle already described. The reservoir of the lamp corresponds to the cup of melted tallow at the top of the candle. The oil is drawn to the top of the wick by capillary attraction, where the heat vaporizes it; so that vapor and not oil is what really burns. The structure of the flame is precisely like that of the candle, although its shape differs, because of the shape of the wick.

Illuminating gas is today the source of light in most city houses. There are two kinds of gas now furnished for this purpose. Coal gas is obtained from the destructive distillation of soft coal. Receivers or retorts of iron or fire clay are filled with soft coal and heated to 1100° or more. From these retorts tubes lead up into a large pipe called the hydraulic main, **Coal Gas** **Distillation of Coal**

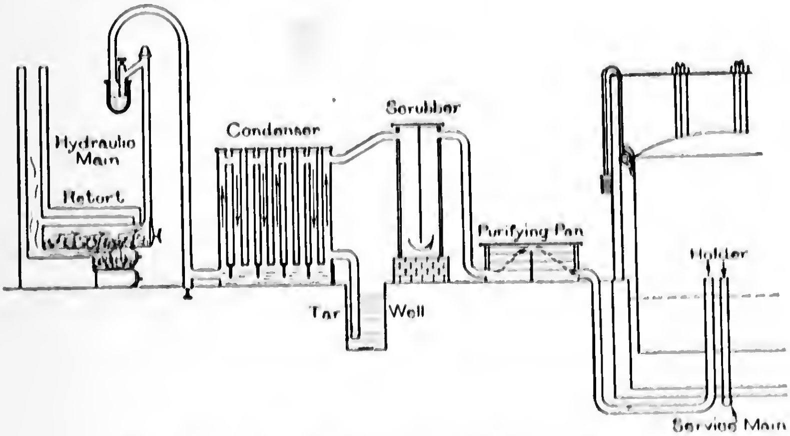


FIG. 23. MANUFACTURING OF COAL GAS.

through which water is kept flowing. As the coal becomes heated, a number of different substances are given off, which at this high temperature are in the gaseous state. Some of them dissolve in the water of the hydraulic main, but those needed for illuminating gas are not soluble and passing out of the main, they travel through several hundred feet of vertical pipe called the condenser, where more water removes any impurities which may have escaped from the hydraulic main.

Purifying Coal Gas The gases are then passed on through numerous other devices to remove remaining traces of impurities, and are finally collected in a circular chamber known as the gas-holder, from which they are distributed to the consumer. Fig. 23.

If the purification is not perfect, the coal gas will contain sulphur compounds, and these on burning produce oxide of sulphur, which is further changed by moisture and the air into sulphuric acid. The quantity produced may be very minute and yet in time may be sufficient to damage books and fabrics.

Aniline The materials which collect in the hydraulic main and the condensers contain many useful substances, one of the most valuable being ammonia. Among the most interesting substances obtained from coal tar is aniline from which beautiful dyes are made. Aniline itself is a colorless liquid, but in combination with other chemical substances it yields a wide range of beautiful colors now used in dyeing. Other useful substances obtained from the distillation of coal tar are carbolic acid, a disinfectant, and naphthalene which is sold in the form of moth balls.

Water Gas In some cities what is known as water gas forms the basis of the illuminating gas. This is made by passing very hot steam over red hot anthracite coal or coke. The oxygen of the water unites with the carbon of the coal, forming carbon monoxide—a compound of one part oxygen and one part carbon—and the hydrogen of the water is set free. Both the gases thus formed wili burn, but in burning they produce a colorless flame. It is therefore necessary to mix with them some gases containing much more carbon which will give light when burning. The mixture is stored and distributed like coal gas.

This gas is cheaper to manufacture in most localities, but it contains much more carbon monoxide which is a very poisonous gas. Much discussion has arisen as to the safety of using water gas and in some places its manufacture is forbidden by law.

Natural Gas

The destructive distillation of vegetable and animal life in the depths of the earth, caused by the great heat within the earth, has in some places given rise to petroleum and natural gas. The gas gave a cheap and convenient fuel, but unfortunately the supply is becoming rapidly exhausted.

Acetylene

An illuminating gas of growing importance today is acetylene. This is a compound of carbon and hydrogen and is prepared by the action of water upon calcium carbide, which is a compound of carbon and the element calcium. Calcium carbide is manufactured in large quantities at Niagara Falls where pure lime mixed with powdered charcoal is fused at an intense heat. A dark gray crystalline solid results which, when mixed with water, produces acetylene gas and slaked lime.

Acetylene is a colorless gas of characteristic odor, soluble in water, and explosive if mixed with air. With an ordinary burner it makes a yellowish smoky flame, but with a properly constructed burner, it gives a brilliantly white light, very like sunlight. Colors appear at their true values seen in this light. The flame is an intensely hot one. In acetylene burners the gas escapes through two very minute holes directed obliquely towards each other, as shown in Fig. 24.

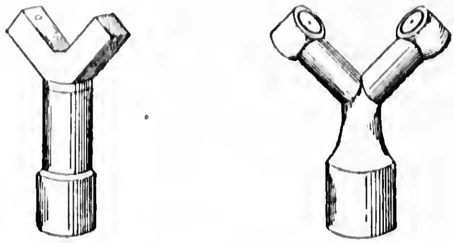


FIG. 24. ACETYLENE GAS BURNERS.

Acetylene Generators

The gas has been somewhat in disrepute because of lack of a suitable arrangement for making and storing it. Many generators are upon the market, it is true, but very few of these are really safe. As soon as a reliable one is obtainable, the gas will be widely used for lighting. It may also be used for cooking, but at present is rather expensive. One form of generator is illustrated in Fig. 25. The calcium carbide in lumps is fed automatically into water as long as the gas is used. When the storage tank is nearly full the supply of carbide is automatically shut off. In another style, which is also automatic, water is fed on to the lumps of carbide. Both styles have their advocates, but the lump feed generator is most generally recommended. The apparatus costs from about $65.00 for a 10 light plant to $300.00 for a 100 light plant.

A cheaper gas than acetylene is gasoline gas, sometimes called carburetted air gas because it is common air impregnated with the vapors of gasoline. It burns with a rich, bright flame similar to coal gas and

Gasoline Gas

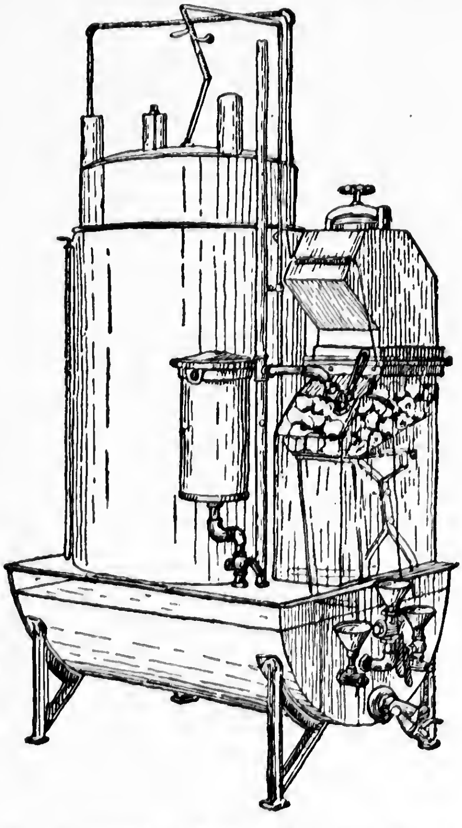


Fig. 25. Acetylene Gas Generator and Storage Tank.

is conducted through pipes and fixtures in the same manner. It may be used in an ordinary gas stove.

The gas machine consists of a generator containing evaporating pans, an automatic air pump operated by a heavy weight or by a water motor, together with a regulator or mixer. The general arrangement is shown in Fig. 26, the generator being entirely outside the building in which the gas is used. All such machines require intelligent care, for several disastrous

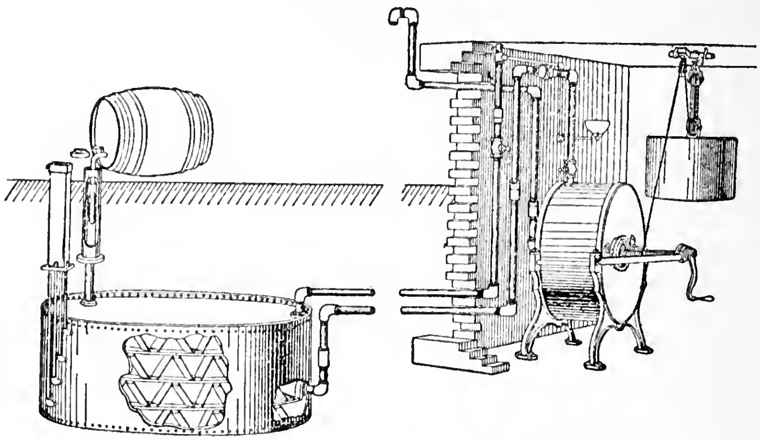


FIG. 26. GASOLINE GAS PLANT.

explosions have taken place when such care has not been given to the apparatus.

LIME.

One of the common chemical substances found about the country house at least is quick lime, used for whitewash and as a deodorizer.

Oxide of Calcium

The term lime usually means the oxide of the element calcium. Its commonest compound is calcium carbonate which is found in nature as limestone, chalk, marble, coral, shells, and several other familiar substances. Calcium is also found combined with sulphur and oxygen in the compound calcium sulphate, which is the mineral gypsum from which plaster of Paris is made. Bones contain a considerable amount of calcium phosphate and egg shells, calcium carbonate.

Quick Lime

Lime, the oxide of calcium, is made by heating broken pieces of limestone in furnaces called lime kilns. The calcium carbonate as a compound is broken up, carbon dioxide gas being given off and calcium oxide left. This freshly formed oxide is called "quick lime," and when it is exposed to moist air, it attracts water and changes to a form called chemically, calcium hydroxide and, commonly, "slaked lime." Quick lime may be used to dry the air of damp cellars, etc., because of this property. The process of slaking the lime is also accomplished by treating quick lime with water. When this is done, much heat is evolved and the hard lumps crumble to a soft powder and increase considerably in bulk. The rise in temperature shows that chemical change is taking place.

Lime Water

Slaked lime will dissolve slightly in water, yielding lime-water. This is a mild alkali and has several household uses. It may be prepared by pouring two quarts of boiling water over about a cubic inch of unslaked lime. Stir it thoroughly and let it stand over night; in the morning pour off the liquid and treat the sediment with hot water a second time. When the sediment has again settled, pour off the clear liquid and bottle this. It is mixed with milk and fed to young children and invalids to prevent acidity of the stomach and make the milk more easily digested. Lime-water and oil form one of the best remedies for burns. The alkali of the lime neutralizes the acid nature of the burn.

Mortar and Plaster

Mortar is made of slaked lime and sand. When this is spread upon the walls, the lime slowly absorbs carbon dioxide, always present in the air, and changes to carbonate of lime. The water is given off into the air (evaporates) and the mass becomes hard. Of course the surface becomes carbonate sooner than the deeper parts because this has closer contact with the air, and it therefore takes considerable time for all the plaster to harden. The water contained in the mortar soon dries, but while the mortar is becoming hard, more water is continually formed in the chemical process, so that it requires a long time for the new plaster to become quite dry. It is considered unhealthy to live in rooms with newly plastered walls. This may be because such walls are damp, thus producing damp air, or it may be because the moisture in the walls interferes with the passage of air and other gases through the walls—a process little considered as a rule, but of great importance.

Hydraulic Cement

Certain varieties of limestone contain other salts, such as magnesium carbonate. Lime made from these does not soften from exposure to the air. It will, however, harden after long contact with water, and such substances are known as *cements.* Portland cement will harden under water.

Quick-lime is a strong alkali and does the work of such substances. It is used in tanneries in taking hair from hides and also in decomposing fats for making candles. When dead animal substance is buried in lime, the process of decomposition is greatly hastened, probably because the lime unites with all water present while the strong alkali acts upon the fats reducing them to soaps of different kinds.

Whitewash

Whitewash is simple slaked lime mixed with water. It is very cleansing in its effects and also gives the appearance of freshness and cleanness. When newly applied, it is nearly colorless, for the calcium hydrate is colorless; this in the air soon changes to calcium carbonate which is white and opaque.

CHEMISTRY AND ELECTRICITY.

In most houses electricity is used for operating the door bell, table bell and perhaps the electric gas lighters. We have learned how stored up chemical energy is changed into heat and force in the stove and in the human body; but in the electric cell, chemical energy is changed into electrical energy.

A Voltaic Cell

If a strip of pure zinc be placed in a weak solution of acid, no chemical action takes place. Place in the same solution a strip of sheet copper and again no action takes place; but let the copper and the zinc be brought in contact, or connected by a copper wire, and immediately vigorous chemical action will begin at the surface of the copper plate; bubbles of hydrogen collecting there. This action is as follows: the zinc dissolves in the acid and hydrogen is set free. This hydrogen travels with an electric current set up in the liquid, passing from particle to particle through the liquid until it reaches the copper. Here the hydrogen stops, but the electric current passes up the copper plate and over the wire to the zinc and down that to

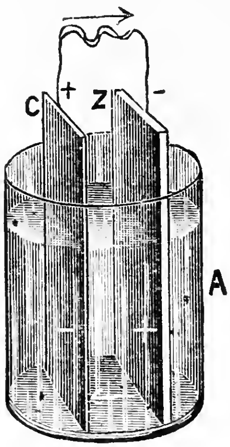


Fig. 27. A Simple Voltaic Cell.

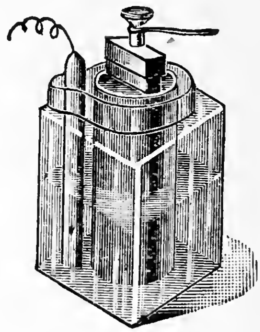


Fig. 28. A Leclanche Cell.

the liquid and so on. This arrangement of acid and metals is called a *simple voltaic cell.* Fig. 27.

Leclanche Cell

Other cells are arranged with different liquids and solids to gain various ends, and several cells may be united by wires between the plates to gain additional strength of current. The form of cell often employed to work electric bells is the Leclanche cell. Fig. 28. This consists of a plate of carbon (or a porous cell containing carbon), in place of the copper, a strip or rod of zinc, and a solution of ammonium chloride which takes the place of the acid. The zinc is not affected by the ammonium chloride unless it is connected with the carbon, but when there is a circuit for the electricity, a current is generated. The common conductors of the electric current are the metals and carbons.

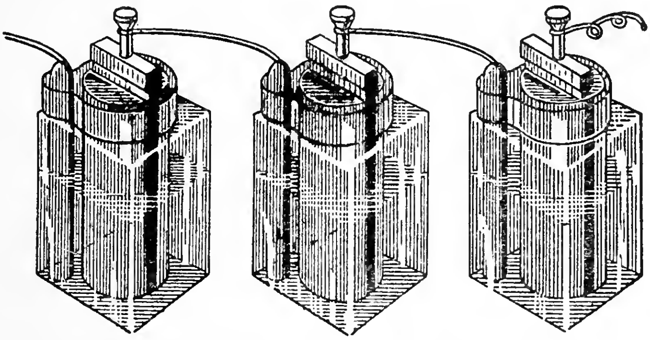


Fig. 29. A Battery of Cells Connected in Series.

Renewing Batteries

The zinc is gradually changed to zinc chloride, at the expense of the ammonium chloride, and after a time both the zinc and the ammonium chloride must be renewed. In renewing the battery, the jars should be cleaned out carefully and the zincs renewed if they are completely eaten through. A quarter of a pound of pure ammonium chloride (sal-ammoniac) is dissolved in enough water to about half fill a jar. When the carbon and the zinc are replaced, this will bring the liquid up to two inches from the top. The jar should not be filled too full. The wires which have been disconnected should be reconnected as before.

Cells in Series

For bell work the cells are usually connected up "in series," that is, the zinc of one cell is connected to the carbon of the next, the outside circuit being established between the end carbon and end zinc. Fig. 29.

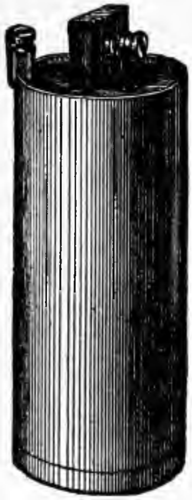


Fig. 30. A Dry Cell.

If there is a short circuit anywhere in the line, that is, if the current has a chance in any way to flow from one wire to the other without going through the bell or other apparatus, the batteries are very quickly exhausted.

A modification of this cell has been made in which the spaces inside it are filled with some spongy mass in the pores of which the ammonium chloride is held. These may easily be carried about without danger of spilling solutions. They are called *dry cells* and when exhausted cannot readily be renewed.

PLANTS.

Most housekeepers have at least a few house plants and many have gardens which occupy part of the time each day. All foods are directly or indirectly produced by plants and it is well to consider also what food these living things require in their turn.

Plant Foods Plants are able to take from the materials forming the crust of the earth and from the air surrounding them all that they need for their life. The leaves of the plants, because of the green substance called chlorophyl, have the power of decomposing carbon dioxide gas in a such a way that plants make use of the carbon and breathe out oxygen. Fig. 31. This separation is very difficult to make in the laboratory. The energy of sunlight is utilized by the plant for this work, for the action does not take place in darkness. In this way plants return to the air the oxygen so necessary for animal life and are themselves fed in part by the useless and even harmful gas exhaled by animals. **Chlorophyl**

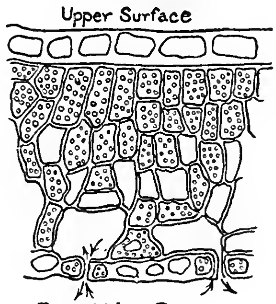


Fig. 31. Section Through a Leaf.

The soil on which the plant grows furnishes the mineral matter needed. When plant tissues are burned, these mineral substances remain as ashes. When the ashes of plants are analyzed, they are found to consist of potash, soda, iron, and lime in the form of phosphates, sulphates, and silicates. Some of these substances are present in the soil in inexhaustible quantities, but others are less abundant and unless the soil be fertilized from time to time, the plant soon uses them up. These less abundant substances are phosphates, potash, and nitrogen.

The lover of house plants has long resorted to various expedients for feeding them, and many plant foods are now sold and in common use. In using these for manuring potted plants, care must be taken not to **Fertilizers** use too much, since strong solutions of them are likely to corrode the roots and kill the plants.

Nitrogen and Plant Life

Although nitrogen is a very abundant element, forming as has been said, four-fifths of the air, yet it is comparatively rare in forms which are of use to plants. As a rule plants cannot take it from the air and therefore require soluble compounds of nitrogen for food. One of the most important of these is ammonia. This is formed when organic substances decay, its odor being very noticeable about stables. Its action with acids was described in the pages about cleaning and it was explained how it unites with acids to form salts, usually soluble. Sulphate of ammonia is the form used in agriculture. A *very little* ammonia in the water used on house plants is a good thing for them.

It has been seen that plants by aid of sunlight breathe in carbon dioxide and breathe out oxygen gas. In addition to this, they also breathe as animals do, to a slight extent, taking in oxygen and breathing out carbon dioxide. This action is more pronounced in darkness.

Conservation

The wonderful principle called conservation is illustrated by what we know of plant life. Plants in growing store up energy derived from the heat and light of the sun. When they decay, or are burned, or are eaten by animals, exactly the same amount of energy is set free and changed into a new form, and just as much carbon dioxide as the plant breathed in, is given back to the air. A plant which was many years in growing may be consumed in an hour or may decay slowly for years. In either case the same total amount of energy is set free, fast or slowly. This energy is most apparent as heat. In the growth and destruction of the plant both energy and matter have been transformed, but neither energy nor matter has been made or lost—it has merely taken on a new appearance. When animals feed on plants they transform the energy of sunlight which is stored up in the plant into energy of vitality. In this sense man and all animals are "children of the sun."

CHEMICAL TERMS.

To explain various chemical and physical phenomena the scientists consider that matter consists of certain small molecules and atoms.

If a drop of water be divided and sub-divided indefinitely, it is conceivable that a point would come when it could not be divided further by physical means. This final bit of water is called a molecule. It would be far from visible by the most powerful microscope. From calculation which we will not go into, we learn that a few hundred million ordinary sized molecules would cover the space of a pin head.

Molecules

If the water is broken up by some powerful force as by the electric current, we have seen that two different substances are obtained—oxygen and hydrogen. Consequently the molecules of water must have been made up of other still smaller particles and these are called atoms. The atoms of a chemical element, then, are of the same kind, for from an elemental substance like oxygen, only oxygen can be obtained by any means now known.

Atoms

The atoms may be likened to the letters of our alphabet and the molecules to the words. From a few different kinds of atoms (letters) can be made a great variety of molecules (words).

TABLE OF COMMON ELEMENTS.

Aluminum	Al	Iodine	I	Oxygen	O
Arsenic	As	Iron	Fe	Phosphorus	P
Barium	Ba	(Ferrum)		Silicon	Si
Boron	B	Lead	Pb	Silver	Ag
Calcium	Ca	(Plumbum)		(Argentum)	
Carbon	C	Magnesium	Mg	Sodium	Na
Chlorine	Cl	Manganese	Mn	(Natrium)	
Copper	Cu	Mercury	Hg	Sulphur	S
Gold	Au	(Hydrargyrum)		Tin	Sn
(Aurum)		Nickel	Ni	(Stannum)	
Hydrogen	H	Nitrogen	N	Zinc	Zn

The atoms of an element are all exactly alike. They weigh the same and act the same whatever their source. Two or more atoms of an element may combine to make a molecule of that element. The molecules of a chemical substance are always composed of the same number and kind of atoms.

Chemical Signs

To express the composition of substances chemists have made use of certain abbreviations and signs. To indicate an atom of hydrogen the letter H is used and for oxygen, the letter O, for nitrogen, N, and so on as shown in the table.

When expressing a compound the number of atoms is indicated by sub-script; for example, H_2 means two atoms of hydrogen; H_2O expresses two atoms of hydrogen and one atom of oxygen, and as we have found, this is the composition of water; so H_2O is the chemist's short way of indicating water. These are called chemical formulas. The formula for sulphuric acid is H_2SO_4. This indicates that it is made up of two atoms of hydrogen, one atom of sulphur, and four atoms of oxygen. The following table gives the chemical formulas of many of the chemical substances found in the household. **Expressing Molecules**

THE HOUSEKEEPER'S LABORATORY.

All modern science is based upon experiment. Chemistry was hardly a science until experimental research began. It must be confessed that the average housewife seldom thinks of making experiments. She is apt to remain helpless before any new problem of the home without printed directions or advice from friends. Very often the easiest and surest way to find out a thing is to *try it*. Use your kitchen as a laboratory. It would, of course, be most unwise to make experiments on expensive materials. For example, if a stain was to be removed from colored goods, it would be best to find the effect of the chemicals to be used on some small piece of the fabric. **Experiments**

To test the color of a sample of gingham for fastness in washing, try a part of the sample in soap and hot water and see if the color "runs" or stains the water. Dry and iron the piece treated and compare with the portion of the original sample kept. A sample can be **Testing Colors**

TABLE OF COMMON SUBSTANCES AND THEIR FORMULAS.

SUBSTANCE	FORMULA	SUBSTANCE	FORMULA
Water	H_2O	Calcium Oxide (Lime)	CaO
Peroxide of Hydrogen	H_2O_2	Lime Water	$CaOH$
Sulphuric Acid	H_2SO_4	Calcium Carbonate	$CaCO_3$
Sulphur Dioxide	SO_2	Calcium Hypochlorite (Chloride of Lime)	$Ca(ClO)_2$
Hydrochloric Acid	HCl	Sodium Thiosulphite ("Hypo")	$Na_2S_2O_3$
Acetic Acid	$C_2H_4O_2$	Cane Sugar	$C_{12}H_{22}O_{11}$
Tartaric Acid	$C_4H_6O_6$	Milk Sugar	$C_{12}H_{22}O_{11}+H_2O$
Cream of Tartar (Acid potassium tartrate)	$KC_4H_5O_6$	Grape Sugar	$C_6H_{12}O_6$
Carbon Dioxide	CO_2	Starch	$(C_6H_{10}O_5)x$
Carbon Monoxide	CO	Cellulose	$(C_6H_{10}O_5)y$
Caustic Soda	$NaOH$	Stearine (in fat)	$C_3H_5(O_2C_{18}H_{35})_3$
Caustic Potash	KOH	Palmitin (in fat)	$C_3H_5(O_2C_{16}H_{31})_3$
Sodium Carbonate (*Anhydrous*)	Na_2CO_3	Soap	$NaO_2C_{18}H_{35}$, $NaO_2C_{16}H_{31}$, etc.
Sodium Carbonate (*Crystalline*) (Washing Soda)	$Na_2CO_3+12H_2O$	Albumen	(*Not definitely known.*)
Sodium Bicarbonate	$NaHCO_3$	Alcohol	C_2H_5OH
Ammonia (*gas*)	NH_3	Wood Alcohol	CH_3OH
Ammonium Hydrate (Ammonia Water)	NH_4OH	Glycerine	$C_3H_5(OH)_3$
		G'soline, N'phtha, Benzine, etc.	C_6H_{14}, C_7H_{16}, C_8H_{18}, etc.

tested for fastness to light by exposing to direct sunlight for a day or two, saving a portion of the cloth as before for comparison. If the dye will stand direct sunlight without appreciable change for this length of time, it will not give much trouble by fading. Wall paper may be tested for fading in a similar way.

Testing by Comparison

The industrial chemist always endeavors to test materials in a manner as nearly like the way they are to be used as possible. For example, if he were testing two samples of flour to be used for making bread, he might make up two small loaves, using carefully weighed quantities of each sample of flour and other materials and baking the loaves at one time, compare the result. In such cases it is usual to have a "standard" flour or other material to use for comparison.

This method of testing by comparison could often be used by housekeepers provided reasonable care were taken as to weights and conditions. Working thus, flour, baking powder, soap, spices, flavoring extracts, in fact almost all the raw materials of the kitchen and laundry could be tested.

Household Chemicals

The chemicals for househald use are chiefly acids, alkalies, and solvents for grease. Acids and alkalies are opposed to each other in their properties and if too much of either has been used, it may be rendered innocent or neutralized by the other; as when soda has turned black silk brown, acetic acid or vinegar will bring the color back.

Acids for the Laboratory

The acids which should be on the chemical shelf for the household are acetic, hydrochloric (muriatic), oxalic. Vinegar may be used in many cases instead of acetic acid, but vinegar contains coloring matter which stains delicate fabrics and it is better to use the purified acid. Hydrochloric and oxalic acids are strong acids and will harm most household materials if allowed to act for *long time*. Acetic acid is a weak acid and as it is volatile, evaporates without becoming concentrated as do the others.

Some bright blue flannels and other fabrics, when washed with soap or ammonia become changed or faded in color. If acetic acid or vinegar be added to the last rinsing water, the original appearance may be restored. Not all shades of blue are made by the same compounds, hence not all faded blues can be thus restored.

Care of Chemicals

The use of these acids has been indicated in the previous pages, and there remains to be considered, only certain cautions. *Hydrochloric acid* is somewhat volatile. It will escape even around a glass stopper and will eat a cork stopper; therefore, either the glass stopper should be tied in with an impervious cover—rubber or parchment—or a rubber stopper used, for the escaping fumes will rust metals and eat fabrics.

Oxalic acid should be labeled POISON.

The bleaching agents, "*chloride of lime*" and *Javelle water* owe their beneficent effect to substances of an acid nature which are liberated from them. They should all be used in solution only, and should be kept in bottles with rubber stoppers.

Sulphurous acid gas, obtained by burning sulphur, will often remove spots which nothing else will touch. The amount given off from a burning sulphur match will often be sufficient to remove from the finger fruit stains or those made by black kid gloves.

The alkalies which are indispensable are: **Alkalies**

1st. *Ammonia*—better that of the druggist than the often impure and always weak "household ammonia." The strong ammonia is best diluted about one-half, since it is very volatile, and much escapes into the air.

2nd. *Potash* and *Caustic Soda,* which are to be had at the grocers in small cans. The lye obtained from wood ashes owes its caustic and soap-making properties to potash. The caustics are corrosive in their action, and must be used with discretion.

Crystallized sodium carbonate, the sal-soda of the grocer, is chemically speaking a salt and not an alkali, but it gives all the effect of one, since the carbonic acid is so weak that it readily gives place to other substances.

Sal-soda is a very cheap chemical, since it is readily manufactured in large quantities, and forms the basis of most of the washing powders on the market. With grease, it forms a soap which is dissolved and carried away.

3rd. *Borax* is a compound of sodium with boric acid, and acts as a mild alkali. It is the safest of all the alkalies, and affects colored fabrics less than does ammonia.

Solvents

Solvents for grease are alcohol, chloroform, ether, benzine, naphtha, gasolene—all volatile—kerosene and turpentine. Of these chloroform is the most costly, and is used chiefly for taking spots from delicate silks. Fabrics and colors not injured by water may be treated by alcohol or ether. Benzine, naphtha or gasolene are often sold, each under the name of the other. If care is taken to prevent the spreading of the ring, they can be safely used on any fabric. They do not mix with water, and are very inflammable.

The less volatile solvents are kerosene and turpentine. Kerosene is a valuable agent in the household, and since some of the dealers have provided a deodorized quality, it should find an even wider use. The lighter variety is better than the 150-degree fire test, which is the safe oil for lamps. As has been indicated in the preceding pages, the housewife will find many uses for this common substance.

On account of the purity and cheapness of kerosene, turpentine is less used than formerly, although it has its advantages.

Closet for Chemicals

These household chemicals should have their own closet or chest, as separate from other bottles as is the medicine chest, and especially should they be separated from *it*. Many distressing accidents have occurred from swallowing ammonia by mistake.

In addition to these substances, certain others may be kept on hand, if the housewife has sufficient chemical knowledge to enable her to detect adulteration in the groceries and other materials which she buys.

A few of these simple tests are given with the chemicals needed. **Tests**

Directions for Using the Housekeeper's Laboratory.

When directed to make a solution acid or alkaline, always test it by means of the litmus paper:

Blue turned to red means acid. Red turned to blue means alkaline.

Only by following the directions can the test be relied upon. Under other circumstances than those given, the results may mean something else.

Use the acids in glass or china vessels only. Metals may be attacked. Do not touch brass with ammonia or marble with acid. Aluminum is quickly corroded by the alkalies. **Vessels**

Heating or burning a substance often gives evidence of its character. Organic solids will char, leaving charcoal (carbon) when heated and will disappear completely when burned. Some salts melt; others do not.

All the carbonates that the housewife is likely to meet will give an effervescence of carbon dioxide with muriatic acid and most of them with acetic acid. **Carbonates**

Substances of an acid nature will effervesce with a solution of cooking soda. The test will be more delicate if the solutions are warm.

To test for *sulphuric acid* or soluble *sulphate* in soda, cream of tartar, baking powder, vinegar, sugar or syrup: Add muriatic acid to the solution (if the insoluble part is sulphate of lime, it will dissolve in the acid on heating), then add barium chloride. A heavy white precipitate proves the presence of sulphuric acid, either free or combined. If the solution is not distinctly acid at first, it is not free.

Lime Test

To test for *lime* in cream of tartar, baking powder, sugar or syrup: Make the solution alkaline with ammonia and ammonium oxalate. A fine white precipitate proves the presence of lime. Good cream of tartar will dissolve in boiling water, and will show only slight cloudiness when the test for lime is applied.

Phosphates

To test for *phosphates* in cream of tartar or baking powder: Make acid by nitric acid, and add ammonium molybdate. A fine yellow precipitate or yellow color proves the presence of phosphates.

Chlorides

To test for *chlorides* in soda, baking powder, sugar, syrup or water: Make the solution (a fresh portion) acid with nitric acid, and add silver nitrate. A white curdy precipitate or a cloudiness indicates chlorides.

Ammonia

To test for *ammonia* in baking powder: Add a small lump of caustic soda to a strong water solution. Red litmus will turn blue in the steam, on heating.

Alum

To test for *alum* in cream of tartar, baking powder or bread: Prepare a fresh decoction of logwood; add a few drops of this to the solution or substance, and render acid by means of acetic acid. A yellow color in the acid solution proves absence of alum. A bluish or purplish red, more or less decided, means more or less alum.

Starch

To test for *starch* in any mixture which has been cooked, simply moisten with dilute tincture of iodine such as is kept by the druggists. An intense blue color will show the presence of even a minute quantity of starch. If the substance has not been heated, boil a portion and *let cool* and then test with a few drops of iodine solution. Heat destroys the blue color of iodine with starch and therefore the test must be made in cold solutions.

Washing Powder

If the label of a washing powder claims it to be something new, and requires that it be used without soda, as soda injures clothes, it can be tested as follows: Put half a teaspoonful of the powder into a tumbler, add a little water, then a few drops of muriatic acid. A brisk effervescence will prove it to be a carbonate, and if the edge of the tumbler is held near the colorless flame of an alcohol lamp, the characteristic yellow color of sodium will appear and complete the proof. If the acid is added drop by drop, until no more effervescence occurs, and there remains a greasy scum on the surface of the liquid in the tumbler, the compound contains soap as well as sal-soda, for the acid unites with the alkali of the soap and sets free the grease. Acetic acid or a solution of oxalic acid may be used in place of the muriatic acid.

Silver Polish

If some very costly silver polishing powder is offered as superior to all other powders, a drop or two of muriatic acid or of warm vinegar will decide whether or not it is chalk or whiting by the effervescence or liberation of the carbonic acid gas.

Sample Tests

In making all the foregoing tests, it is well to observe the effect of the chemicals used on the substance to be tested for, and so become familiar with the characteristic color or appearance of the test. For example, before testing a washing powder, add a little acid to a soap solution and observe the greasy film produced, and in testing for alum add a very little alum solution to some flour and test with the logwood solution, noting the color given. This procedure will lead to more reliable results.

Caution! Use a new solution of a fresh portion of the first one for each new test and follow directions exactly. This is essential to remember.

CHEMISTRY OF THE HOUSEHOLD.

PART III.

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. *Do not copy answers from the lesson paper.* Use your own words, so that your instructor may know that you understand the subject. Read the lesson paper a number of times before attempting to answer the questions.

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1. What properties of "cream of tartar" make it suitable for baking powder?
2. Explain how a candle is a gas factory.
3. What conditions must be present for an explosion to take place?
4. What is "cooking soda?" How does it differ from washing soda?
5. What is the principle of the Davy safety lamp?
6. Describe the manufacture of coal gas.
7. How is water gas made? What objectionable features has it?
8. What is "quick lime" and what are its uses?
9. How is electricity produced in a voltaic cell?
10. What does the chemical formula H_2SO_4 indicate?

11. How is "conservation" illustrated in the life and decay of a tree?

12. What can you say about the advisability of the housekeeper making experiments?

13. How would you test for a carbonate? How for an acid without using litmus paper?

14. How are tests made by comparison?

15. Are there any questions you would like to ask relating to "A Day's Chemistry"?

16. Have you any personal experience, original method, or new fact to offer, relating to the subjects taken up in the lesson on the "Chemistry of the Household" that would be of interest to your fellow students?

Note — After completing the test, sign your full name.

SUPPLEMENT

CHEMISTRY OF THE HOUSEHOLD

By Margaret E. Dodd, S. B.

In reading many hundreds of test papers written by our students I have found that additional comments suggest themselves frequently, and it may be of interest to bring them together here.

IMPURITIES IN WATER

By the term impurities, we mean substances out of place. Pure water is oxide of hydrogen, H_2O. If water has salt dissolved in it, for instance, the salt is an impurity for the water, though we do not think of salt as being an impure substance in itself. The mineral impurities in drinking water are seldom a source of danger, although if the amount is large, such water may not "agree" with persons not used to it. Mineral impurities will usually make the water hard, and therefore troublesome for laundry work and to some extent in cooking.

LAUNDRY WORK

Satisfactory water for laundry work must not only be clear and soft but it must be free from iron, from the discoloration due to decaying vegetable matter, clayey soil, and so on. It should also be free from any odor when hot. Muddy water may be cleared more or less satisfactorily by filtering it through sand or "by precipitation." In the latter method, dissolve a scant tablespoonful each of alum and borax in a little hot water, and add this amount to each gallon of water used, stirring it in, and allowing it to settle. The alum and borax react to form a cloudy substance which settles to the bottom, carrying the mud with it. The clear water must then be carefully poured or dipped off from the sediment. A siphon is an excellent contrivance for such a use. If a piece of garden hose is used, tie on a piece of wood so that it extends one or two inches beyond the end, to keep it above the sediment. Weight it with a piece of lead.

When water made hard by carbonate of lime is to be softened, addition of any of the alkalis will soften it, for this reason. These carbonates will not dissolve in water unless it contains carbon dioxide gas in solution. The alkalis added, unite with the gas, and the lime is thereby made insoluble and separated from the water. We do not see it as a rule, for there is in reality, very little of it, and this little separates in very tiny particles. Water which is hard in the clothes boiler frequently causes trouble because of tiny bits of lime which separate from it and make spots upon the clothes.

A spring situated in sandstone rock generally yields soft water because the sandstone is so slightly soluble, but one situated in limestone rock always gives hard water. Limestone is a very common rock, so many springs are of hard water. A shallow well is more apt to yield soft water than a deep one is, and a river has clearer and softer water near its source, where it runs over rocks, and through uncultivated land.

Occasionally where free alkali is added to hard water, it unites with greasy or oily matter in the garments being washed, and forms dark spots of soap insoluble in water. This is prevented to some extent by addition of a very little turpentine, and boiling such spotted garments in clean suds may dissolve out the stains if they have formed. This happens so seldom that the use of soda in laundry work (with caution) for softening water is still to be recommended

Washing powders are usually composed for the most part of washing soda, and as they cost more than soda, it is rather better to buy the latter. Moreover, the strength of the alkali may be more accurately judged.

Water varies greatly in hardness, so it is difficult to give exact rules for softening it, though I am often asked for them. In general, for moderately hard water use:

1 level tablespoonful of sal soda to 1 gallon water.

½ level tablespoonful of powdered lye to 1 gallon water.

1 level tablespoonful of borax to 1 gallon water.

Do not use ammonia with very hot water, for heat liberates the ammonia gas, which is thus lost.

Some students have thus described the use of ashes from hard wood:

Add a quart or more of water to a quart of ashes. Boil it a few minutes, adding more water if necessary. Then add sufficient water to make a gallon. Let it settle, then pour off the water and strain it. Put enough of it in the wash water to secure a good suds with soap. The water dissolves the potash (potassium carbonate) from the ashes. So this is an economical method of getting this alkali.

I have had many interesting letters on the subject of laundry work. Some of the processes described may be new to many of our students.

One writer describes a method of using paraffine in washing. She dissolves a bar of soap in boiling water and adds to it a piece of paraffine almost as large as a walnut. She uses this in making a suds with *boiling* water in which the clothes are thoroughly boiled for twenty minutes or more, punching them ocassionally. They must be rinsed in several hot waters to ensure the removal of the paraffine, but she claims the clothes will be beautifully white.

A number have advocated the use of kerosene in laundry work, especially with very much soiled articles. Both this and paraffine certainly act upon the oily film which entangles the dirt and thus make the washing easier. The objection to their use is that more soap and more hot water and therefore more fuel must be used. Two tablespoonfuls of kerosene in a boiler of soapy water is about the right quantity. In this connection it should be said that when clothes are taken from the boiler, they should be put into tepid water, and pushed well into it, for lying in the air seems to set the dirt, probably because the fibres contract as they cool, so that foreign particles are enclosed in the cloth and cannot fall out into the rinse water.

Kerosene is excellent to use in washing dish towels. Make a strong soap suds, putting in a tablespoonful of oil to a gallon of water. Soap the towels well. and boil them in this suds for half an hour or so. Then wash, rinse and dry them, in the fresh air. Kerosene is somewhat volatile, and its odor will escape in time. When kerosene has been used, the wringer, tubs, etc., will need very careful cleaning to remove any film of oil before it has time to catch dust.

BLUING

There are three kinds of bluing now on the market. The action and disadvantages of Prussian Blue have been described. It gives a better color, however, than either of the other two . A second kind is Ultramarine blue. This, also, is an iron compound, but it does not decompose with alkali. It is what we often buy as the "ball bluing," and is insoluble in water. Water, however, causes it to break up into very minute particles which spread through the liquid and give it a blue color. The water must be kept stirred, and one must be careful in using it that the clothes do not get streaked. The balls of bluing should be tied up in a cloth and washed from this into the water. It is well to prepare it in a separate dish and then add it to the water. Indigo blue is easier to use, but does not give so good a color. Preparations of indigo for laundry work may still be obtained.

Here is a method of cleansing knitted worsted goods which was strongly recommended. Wash the garment in gasoline, and allow it to dry. Then shake it well in a tight box with flour or fuller's earth, allowing it to remain there an hour or more. The powder will absorb any greasy or oily substance, and later may be shaken out. In using gasoline for cleaning in this way, have a generous amount, and allow for rinsing the articles well. The gasoline may be used more than once, for the dirt which it contains will settle to the bottom of the vessel in which it stands and the clear liquid may be poured off. Use it out of doors, or in a strong outward draft, that the inflammable vapors it produces may blow harmlessly away.

To many people, the word "chemical" always means an *acid*. Now, acids and alkalis differ so much in their properties, that it is wise to be able to distinguish between them. Injuries due to the use of one may frequently be remedied by prompt use of the other. Alkalis are especially useful in laundry work because of their action upon grease of most kinds. Some of the salts formed with the alkali metals are alkaline in reaction. Among these are washing and cooking soda.

HOME SOAP MAKING

All fats and oils are compounds of certain fatty acids combined with glycerine. Glycerine is easily separated from this combination by strong alkalis, and thus soaps are made. The glycerine is a by-product in many soap factories, but it is not evident in home-made soap, being thrown away with any waste water, or, perhaps, left in the soft soap. The various fats are composed of different kinds of fatty acids, so we have varieties of soap made from them.

Rosin acts like fatty acids, for it is able to combine with alkali to make rosin soap. This is good for rough work, but it is apt to separate in hot water, setting free the rosin acids, which may settle upon the fabric being washed, giving it the odor of rosin or causing it to become yellow. It is very objectionable when the clothes come to be ironed. This rosin also makes fabrics likely to take up dust. If the clothes are well rinsed, the amount of rosin soap in ordinary yellow soap gives no trouble.

I have often been asked for a recipe for home-made soap, and, too, I have had many students write me of their success in this process. Many housekeepers keep and clarify the fats from food. Soap may easily be made from this, as follows:

Take a pound can of lye (Babbitt's potash is good) and dissolve it in three pints of cold water. It will become quite hot as it dissolves, and care must be taken in adding the lye to the water, as it is apt to spatter, and is likely to irritate the hands.

Have ready five pounds of clean fat, which has been melted and strained through cheese-cloth to remove all specks of brown. When the lye is cool, pour it slowly on the grease, stirring it with a stick until the two mix, and the liquid becomes about as thick as honey. Too long stirring may cause the ingredients to separate.

Mould the soap in agate or wooden trays. If a wooden box is used, it should be lined with several thicknesses of wrapping paper. The layer next the soap should be oiled. The soap should harden in a moderately warm place, and then may be cut into cakes. This is the so-called "cold process" soap. It will not be suitable for fine work but improves with age.

Several students have described to me how they remembered seeing soap made at home from alkali obtained by leaching wood ashes. The ashes were put into a large box pierced with holes, the box placed over the soap kettle, and hot water was poured upon the top. This alkali would make soft soap, which would be stored in barrels. If hard soap were desired, salt was added to some of the soft soap.

A reaction takes place by which some of the sodium in the salt is combined with the fatty acids, sufficient hard soap being formed to harden the mass. Nowadays, even when we buy "potash" we are quite sure to find that we can make hard soap, for it almost always is chiefly soda (caustic soap).

Washing soda has a great many uses, and I am frequently reminded of new ones by our students. I am told how excellent it is to put a little in water and boil this in the cooking dishes on which food has hardened or burned. Another describes how she cleans silver by boiling it with a little soda, then rinsing it in very hot water and drying quickly and thoroughly. The wife of a dairy farmer assures me that she could never get her creamery cans suitably clean without plenty of sal soda, which quickly removes the butter fat. When we use it in laundry work, however, we must remember that, like other solids, when it dissolves, a saturated solution forms around each piece, and this strong solution may injure anything on which the pieces rest. Therefore the crystals should always be dissolved, and the solution diluted as much as may seem necessary.

DISH WASHING

The washing of dishes takes so much time in every house that it is evidently a subject calling for close attention. Nothing is more desirable than that this work be done thoroughly and well; still, it is doubtless possible to plan for it in such a way that time may be saved for other matters.

In the first place, systematic work is sure to go more rapidly than haphazard fashions. The dishes should be prepared for washing by scraping them as clean as possible, and some housekeepers advocate rinsing off many of them under the hot or cold water faucets before putting them in the dish-pan. Hard water is very unsatisfactory for dish washing, and the use of soda or borax is a great help when soft water is not available. Borax is not so hard on the hands as soda. Dishes which have contained milk or eggs are better rinsed well in cool water, for heat hardens the albumins so that they are removed with difficulty.

Plenty of hot, soapy water is necessary to do this work easily, and a second dishpan of clear, hot water in which to rinse the dishes is a great help. Use very little soap on gilt china, however.

There seems to be a great variety of opinion on the subject of washing glass. Many housekeepers have expressed a preference for washing it in cold water rather than in hot. Where the glass is not at all greasy, this is very well. Ammonia or soda in the water helps to clean the glass and makes it lustrous. Glass washed in cold water should be allowed to drain almost dry before it is polished.

One housekeeper has described to me a wire basket which she has had made to hold dishes when they drain, and which is made to fit into her dishpan. Fitting the dishes into this, she is able to immerse them in hot rinsing water, and then lift them out to dry. She finds the plan an excellent one.

Another student writes that she has found sifted coal ashes a most useful article to use in cleaning knives. Another prefers sifted wood ashes. These most be very carefully sifted, so that no hard bits be left in, which might scratch the articles polished.

The kitchen dishes are usually the most difficult to wash, and one student describes a home-made "scrubber" which she declares is very useful. "Take a broom apart, a good one, by removing the wire and letting the straw loose," she says. "The upper part of the straw is then put into boiling water and left long enough to soften it. Then the straws are tied together in bundles about two inches across, using a strong twine. The twine is pulled tight, and sinks into the softened straw, and when dry, it does not slip. A loop is left for hanging the bundle, and the straw is left its whole length. These are so long and slender they will reach into anything. They are a great saving on the hands, and allow the use of much hotter water."

Many of our students recommend the use of soft paper in cleaning greasy dishes, kettles, and pans, The papers may be burned, thus disposing of much grease which would otherwise find its way into the kitchen sink drain.

LATENT HEAT

The subject of latent heat, described on page 12, has proved very puzzling to many. It is certainly a strange idea at first, that heat does anything more than make things *warm*. Still, a moment's consideration recalls to mind that heat can do many other things. Heat causes chemical change, for substances are often changed by strong heat. Heat causes most substances to expand. If a sealed can of any substance is strongly heated, it will probably explode. Heat causes liquids to evaporate, and solids to melt.

If a liquid is placed in an open dish on a source of heat, its temperature will rise until it begins to boil. After this, it gets *no hotter*, no matter how much heat is applied, unless the liquid is becoming more dense as it boils, as would be the case with a syrup, for example. The heat it receives is all expended in changing the liquid into vapor, or, as we say, changing the "state of matter." The particles (molecules) are driven farther apart by the heat. A cubic inch of water makes a cubic foot of steam. The amount of heat necessary to produce the change from liquid to gas varies with different substances. Water requires a very large amount. Four times as much heat is required to change an ounce of water into steam as to vaporize the same amount of alcohol. If heat is applied rapidly, the liquid will boil rapidly, but it does not affect the temperature. The heat used in this way is not lost, but is stored up in the vapor as latent heat. The steam is no hotter than the boiling water, and heat added keeps it from becoming liquid. When vapor condenses and changes back to liquid, the latent heat is given out, and warms surrounding things. In fact, the vapor cannot condense unless the latent heat it contains is removed, except under pressure. This latent heat makes steam an excellent medium for heating buildings, as it contains so much heat and passes through pipes rapidly. Not only is the steam itself hot, but it carries a vast amount of heat stored up, to be liberated in the cooler regions.

Latent heat is stored up in water, also, and is liberated when the water becomes ice. This is seldom apparent, for far less heat is thus stored in water than in steam, and, too, the temperature of freezing water is low. The heat given out when water freezes is at 32° F, while that given out when steam condenses is at 212° F. Still, a cellar may be several degrees warmer if it contains a tank of water which freezes than if the water were not there. The temperature may keep about 32° F. where otherwise it might go to 26° or less.

A room is cooled in warm weather by sprinkling water upon the floor. The evaporation of the water takes much heat from the air, storing it in the vapor produced. Britannia and some other metals of which pitchers, teapots, etc., are made will melt if placed on a hot stove. If, however, they contain water, this is not likely to occur, for the water cannot be heated above its boiling point, and this is far below the melting point of the metal, and keeps the temperature of the metal low enough for safety. This reminds me of an experiment I once saw where candy was actually made in a pasteboard box. The syrup never became hot enough to scorch the paper, and thus the paper itself was kept fairly cool.

USE OF THE THERMOMETER

A kitchen thermometer may be bought of any dealer in the better class of kitchen goods. The floating dairy thermometers are convenient. One to register 212° F, may be obtained from the School for 50 cents. A thermometer made to register oven temperatures is more expensive, one registering to 600° F. costing $1.50. Various uses of the thermometer are described in *Principles of Cookery* and *Home Care of the Sick*, but there are many times in the kitchen when it is of assistance, as in getting the right density for syrups in candy making, for syrups in preserving, and the right temperatures for raising bread, making soups, custards, etc.

Some uses of the thermometer in the kitchen are the following, described in Miss Parloa's "Home Economics":

Olive oil is liquid above 75°. If above this temperature it shows solid specks, making it look cloudy, you may be sure it is adulterated with some fat having a higher melting point.

Butter should melt at 94°. If it does not, you may know it is adulterated with suet or some other fat having a higher melting point.

BREAD MAKING

The composition and manufacture of bread are subjects which have been given much study. The carbon dioxide which serves to lighten the dough raised with yeast is produced at the expense of some of the starch of the flour. This starch is completely driven from the loaf as carbon dioxide gas and alcohol during the baking. The loss is estimated at about 2 per cent. Attempts have been made in large bakeries to save the alcohol, but no economical method has been devised. About fifty years ago, German chemists in studying the question estimated that the food materials lost in twenty-four hours, when bread is raised with yeast, was sufficient to supply bread to 400,000 people! These figures were certainly startling to the thrifty Germans, and the possibility of producing the carbon dioxide gas in some less extravagant manner was studied with considerable care in German laboratories, and also at Harvard University in America. Baking powders are the result of these investigations. Gluten is not changed chemically by the action of the yeast or of the carbon dioxide, but it is physically changed—the escape of the gases stretching it out into fibres. Gluten, like other proteids, hardens when heated. Baking thus makes the porous condition of the dough permanent.

MAKING BAKING POWDER

Several students have sent me recipes they like to use for making baking powder. The claim is made that these cost rather less than the kinds that can be bought, and also that they are much more effective. Here is one:

½ lb. cream of tartar.

¼ lb. cooking soda (bicarbonate of soda).

⅛ lb. corn starch.

The best quality of each must be bought. Sift them together at least a dozen times, the last time into baking powder boxes. Be careful to seal up all cracks by pasting over them paper strips. About one half as much of this is required as for the average powder sold.

These proportions would probably give a slight excess of acid. We might combine 2¼ parts of the acid salt with one part of soda if our salts are chemically pure. The corn starch is added to keep the soda and acid salt from forming quite such an intimate mixture. The two salts in contact would very slowly combine, and the baking powder thus lose its strength.

DISTILLATION

A few more words might be said on the subject of distillation. I am sometimes asked to explain more fully the term "destructive distillation." When a complex substance like wood or coal is heated some of its ingredients are made volatile at the high temperature, and so escape as gases. The wood itself is broken up into simpler substances. It is plain that in this process the original substance is lost *as such*, new substances taking its place, and we therefore speak of the process as *destructive* distillation.

When water containing various salts or gases in solution is heated, the gases will be given off as the temperature rises. At the boiling point, the water itself will begin to pass off as vapor. The salts will not vaporize unless much more strongly heated. If the steam be collected and cooled, it will condense to form pure water. This in an illustration of *simple* distillation. If a mixture of alcohol and water be heated some of the alcohol will vaporize before the water. It may in this way be separated from the water, and this process is called *fractional* distillation. This is the principle employed in the manufacture of whiskey, etc.

COMPOSITION OF GAS

The complex nature of coal gas is shown by the following table, which represents an average sample:

Hydro-carbon vapors	0.6
Heavy hydro-carbons	4.4
Carbon dioxide	3.4
Carbon monoxide	10.0
Methane (CH_4)	30.6
Oxygen	0.3
Hydrogen	45.9
Nitrogen	4.8
	100%

Of these, the hydro-carbons, carbon monoxide, CH_4 and hydrogen are combustible.

Coals always contain more or less sulphur, which is a great trouble to the gas manufacturer. It frequently happens that some of it gets into the gas. If such gas escapes, the sulphur compounds unite with the silverware, giving is a coating of dark sulphide of silver. If silver tarnishes quickly, it is an indication of a leak of gas or sewer gas. It is estimated that a ton of coal should yield 10,000 feet of gas, 1,400 lbs. of coke (35 bushels), 12 gallons of tar, 4 lbs. of ammonia.

More than six hundred products are obtained from the coal tar. The nature and uses of these products would form an interesting topic for futher study.

The composition of water gas is somewhat as follows:

Hydro-carbon vapors	1.2
Heavy hydro-carbons	12.0
Carbon dioxide	3.0
Carbon monoxide	28.0
Oxygen	0.4
Hydrogen	31.4
CH_4 (Methane)	20.8
Nitrogen	3.2
	100%

Notice that this gas contains less methane and hydrogen (which are combustible), and their place is taken by carbon monoxide, which, although combustible, is very poisonous. There is some carbon monoxide in ordinary illuminating gas but not nearly so much. The water gas has a strong odor from the hydro-carbons (crude gasoline) added to make it luminous, but comparatively little of it in the air is likely to produce very injurious effects upon living things, plants and animals alike. It is the most poisonous substance that comes into the house. It is estimated that about fourteen per cent of the gas manufactured escapes into the earth through leaky gas mains. In passing through the soil the odorous part of water gas may be strained out, so that it becomes odorless. Whole families have been poisoned from deodorized water gas leaking into the house by way of the cellar. This emphasizes the importance of having a perfectly tight cellar, with cemented walls and floor, and the importance of ventilating the cellar, for the cellar air finds its way to the rooms above.

Natural gas contains practically no carbon monoxide.

SPONTANEOUS COMBUSTION

We often hear of fires apparently "starting themselves." Such cases are due to accumulation of heat produced by slow oxidation. If a pile of oily rags, cotton waste, etc.,be allowed to stand for a time, the oily matter will begin to combine slowly with oxygen. This may occur in the inner part of the heap, and the outer layers retain the heat until, perhaps, the kindling point of some of the inflammable oils is reached, when the whole mass will burst into flame. This is much more likely to happen with linseed oil and certain other vegetable "drying oils," as they unite readily with oxygen, and so become hard and varnish-like. The mineral oils (paraffine oil) do not combine with oxygen at ordinary temperatures, and probably will not cause spontaneous combustion. Still, all oily cloths should be burned or disposed of in some safe fashion.

CONSERVATION OF ENERGY

An interesting and important principle, explained on page 23 of Part I, and again on page 110 of Part III, is Conservatism. This principle has been established by countless experiments, but it is not one that the housekeeper can well investigate. It is, however, one she must continually bear in mind. Matter and energy can never be *created* or *destroyed*; both may be transformed, and may therefore appear in many different ways. The voltaic cell is a simple device for transforming chemical energy into electrical force. The chemical affinity of two substances causes them to unite under the right conditions. This union results in the liberation of energy, which may appear as heat, light, or electricity. When coal and oxygen unite, we get both heat and light as a result. Chemical union usually produces heat.

The energy of our bodies we get *solely* from the food we absorb. We should eat such foods as best give us the needed energy, and we should learn to expend this energy wisely, as we have but a limited amount of it. One student wisely comments upon this, as follows:

"In the economic plan of housekeeping, it would be well if each one would endeavor to realize that she is a part of the machinery of the household, and that to be continually on the move is as disastrous to the equilibrium of the home as it is to rust, as it were, for want of use. A given amount of rest each day is a true part of economy. Then, too, in the daily regime, there are ways and ways of doing things. Always choose the easiest, if it conflicts not with the quality of the work done. For example, do not stand while paring potatoes, apples, etc. It is just as easy to do this work sitting, and you can then get some rest at the same time. Don't worry—to worry is a very extravagant thing, for it uses up valuable force, and does no good at all."

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Arsenic in Wall Paper and Fabrics Bulletin No. 86, Bureau of Chemistry. (Price 5c.)

Chemical Composition of Apples and Cider. Bulletin No. 88, Bureau of Chemistry. (Price 5c.)

Note.—For the *free* bulletins, send to the Department of Agriculture, Washington, D. C.; to obtain the *for sale* bulletins, send coin or money order to the Superintendent of Documents Washington, D. C.

SUPPLEMENTAL PROGRAM ARRANGED FOR CLASS STUDY ON

CHEMISTRY OF THE HOUSEHOLD

By Maurice LeBosquet, S. B.
Director, American School of Home Economics

As in the study of chemistry and physics so much emphasis is placed on laboratory work, the following supplementary program is made up chiefly of simple experiments, such as may be performed with little or no apparatus. When heat is required, it may be supplied by a small gas stove, a one burner oil stove, or an alcohol lamp. The lamp of a chafing dish might be used. A thermometer will be loaned by the School for 6 cents postage, or one may be purchased for 50 cents.

MEETING I

(Study pages 1–29)

Water

To show that ordinary water has gases dissolved in it. See experiment on page 2. The gas dissolved in water is not exactly of the same composition as air. It usually contains more oxygen and more carbon dioxide than ordinary atmospheric air, varying somewhat with the sources of the water. This dissolved gas enables fish and other marine animals to live. A fish cannot live in water that has lost its dissolved air by being boiled. It is drowned just as human beings are, because of lack of oxygen.

Water of Crystallization

Make crystals as described on page 5. A certain definite amount of water is present in the crystals which varies with each substance. Clear crystals are pure or nearly so. The "mother liquor" remaining after the crystals are formed contains most of the impurities; thus crystallization is a method of purification.

The water in the crystals of washing soda may be shown by heating some in a tin dish. The crystals will melt and on continued heating, steam will be given off. Not all crystals contain water of crystallization,—for example, common salt, cane sugar.

Boiling Point

It is almost impossible to convince any "domestic" that water boiling furiously is no hotter than when it is just barely boiling. It is instructive to prove this with a thermometer. Also observe that the "simmering" temperature is very nearly the same as the water when boiling, so that cooking may be done nearly as rapidly by simmering and with *far less fuel.*

Latent Heat

This is a somewhat perplexing phenomenon. We all recognize that steam is hot, but that it contains a much greater supply of heat than hot water is not so easy to realize. The following may make this a little clearer: In a small sauce pan or dish put about two tablespoonfuls of water. Heat it to the boiling point and then continue the boiling until it has all boiled away. Note (1) how long it takes to raise the water to the boiling point, and (2) how much time is required to convert it all into steam.

To start the boiling, the water is raised from about 60°F. to 212° F., or through 152°. In converting the water into steam, there is no *rise in temperature*, but the heat has to be applied for a much longer period. On page 12 is the statement that "966 times as much heat is required to change a given quantity of water into steam as to raise it one degree F." but the water in this experiment was raised 150°. As 966 divided by 152 equals 6 (plus), we might expect that it would take six times as long to boil the water away as to raise it to the boiling point. Of course no exact results can be expected in this experiment, as not all the heat applied is absorbed by the water and used in boiling it, but the experiment will show that the steam must contain a great deal of heat.

A similar experiment will show the latent heat contained in water in reference to ice. If a teaspoonful of ice cold water and an amount of snow or ice which when melted would make a teaspoonful, each be added to a glass of water of the same temperature, it will be found that the pulverized ice or snow lowers the temperature much more than the teaspoonful of ice-cold water. That is to say, a great deal more heat would have to be added to the "ice and water mixture," to bring it back to the original temperature, than to the "ice cold water and water mixture."

Oxygen in the Air

To show that the atmosphere contains a gas which is used up in combustion, attach a candle an inch and a half long to the bottom of a saucer with some of the melted wax. Pour about one-fourth of a glass of water into the dish, light the candle and invert the glass (one with straight sides) over the lighted candle. The flame will grow dim and soon be extinguished and the water will rise about one-fifth way up the glass. This shows a number of things. In burning, the carbon of the hydrocarbons of which the candle is made unites with the oxygen, making the gas carbon dioxide. This takes up the same volume as the oxygen out of which it was formed, but the water quickly dissolves the carbon dioxide and the *pressure of the atmosphere* on the water outside the glass forces it up into the partial vacuum formed.

The nitrogen of the air remains, but this will not "support combustion," and so the candle is extinguished.

Manufacturing Water

That the burning of a candle produces water as well as carbon dioxide may be shown by placing the flame against a window pane. A film of moisture may be seen, also, when a lamp having a cold chimney is first lighted. The burning of a match will show water when it is placed against a cold surface, but this experiment is not so conclusive, for the wood may contain moisture. The candle contains no moisture, so the water must have been manufactured by the burning.

Atmospheric Pressure

We have had one example of the result of atmospheric pressure in the candle experiment. The working of a siphon is an interesting example. Take a small rubber tube, fill it with water, pinch both ends, put one end in a glass of water, and lower the other end into an empty glass at a foot lower level; release the pressure of the fingers, and the water will run from the tube, apparently going "up hill" over the edge of the glass. The explanation may be found in any text book on physics. This is a good way to empty wash tubs, etc., using a piece of rubber hose.

Carbon Dioxide

Light a splinter of wood and let it burn in a wide-mouthed bottle until it is extinguished. Add a tablespoonful of clear lime water (obtained at any drug store, or add a small lump of lime to warm water in a fruit jar, stir well, cover and let settle over night), close the bottle and shake the lime water around. It will grow milky from the formation of carbonate of lime (calcium), with which we are more familiar in the forms of chalk, marble, and clam shells.

Again with any sort of a tube (a straw), blow into a little clear lime water. It will grow milky, showing that the breath contains carbon dioxide. If you will continue to blow into the lime water for a *long time*, the milkiness will be seen to disappear. This is because the carbonate of lime is dissolved by the excess of carbon dioxide in the water, after the lime water (hydrate of lime) is all changed into carbonate of lime. This point comes up in connection with hard water and laundry work.

Flash Point of Kerosene

The flash point of a sample of kerosene may be determined approximately by placing about two teaspoonfuls in a cup, then adding hot water to a bowl of water in which the cup containing the oil is placed. Stir the kerosene with a thermometer, and apply a lighted taper to the surface of the oil from time to time as the temperature of the oil rises. A quick flash over the surface of the kerosene will show the flash point. Read the temperature indicated by the thermometer.

References: Chemistry of Daily Life, by Lassar-Conn. Chapter I, Atmosphere, Combustion. ($1.50, postage 12c.)

Story of a Lump of Coal, by Martin. (35c., postage 6c.)

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Topics: The Formation of Coal—See any good encyclopedia and geologies.

Fire Worship—See "Popular Science Monthly," Volume X, page 17, also "Public Opinion," Volume XIV, page 251.

MEETING II

(Study pages 29 – 55)

If the Food Course is being taken, some of the experiments here suggested might better be postponed until the lessons on *Principles of Cookery* or *Food and Dietetics*.

Starch

The blue color produced by a tincture of iodine (obtained at the drug store) on the faintest trace of starch is a very delicate test for starch. Cooked starch shows the test much better than uncooked. Note that the blue color is destroyed by heat, but appears again when the test is cool. Test various foods — grains, vegetables, fruits, and nuts for starch.

The conversion of starch into dextrin may be shown by heating a little flour or corn starch in a hot oven for half an hour or so, or until it becomes a deep yellow color. Dissolve in a little cold water, filter out the unchanged starch by pouring through absorbent cotton in a funnel; test the filtered liquid to see if there is still any unchanged starch in it. Add double the quantity of alcohol to a part of the liquid. The dextrin will be precipitated, i. e., thrown out of solution and will settle as a fine powder, because dextrin is not soluble in alcohol. The water solution should be concentrated by boiling if much is used.

That the starch is changed by heating with butter or other fat may be shown by adding two teaspoonfuls of flour to one teaspoonful of very hot butter, stirring for some time. Remove a drop on a piece of white paper and test it with tincture of iodine.

Make starch paste by mixing a quarter of a teaspoonful of laundry or corn starch with a spoonful of water and adding it to a cup of boiling water and boil. To about half a glass of this when it has cooled to body temperature (100° F) add a half teaspoonful of saliva. Keep the mixture warm (not hot) for some time by placing it in warm water. From time to time test small portions with iodine solution as it grows clearer. Add saliva to a portion of hot starch; to a cold portion testing as before.

Gluten

May be the gluten separates from flour as described on page 49, or better as described in "Food and Dietetics" page 41. Bake part of it in an oven.

Experiments with other proteids also described on pages 41 and 43 of "Food and Dietetics."

Experiments with yeast described on page 45 of "Household Bacteriology," Part I.

"Digestion is Synonymous with Solution"

This statement is made on page 35. To show the relation of the length of time required to make a solution, take two equal portions of any crystals, such as washing soda or alum, and pulverize one portion. Stir each in a glass of water and observe the time for each in dissolving. Note that the time required for complete solution is determined by the largest crystal.

This experiment shows how important a part of digestion chewing is and that the teeth are primarily digestive organs.

Cooking Meat

See experiment on pages 50 and 51.

Mineral Matter — Gelatin

See experiments on page 53.

References: Chemistry of Cookery, by Mattieu Williams Pages 19-31. Albumen. ($1.50, postage 16c.)
Chemistry of Daily Life, by Lassar-Conn. Pages 56-66. Digestion of Food. ($1.50, postage 10c.)

(Select and send to the School a composite set of answers to Test Questions on Part I, and report on supplemental work and experiments.)

MEETING III

(Study pages 55–65)

Cleaning: Acids, Alkalies, and Salts

Strips of litmus paper may be obtained at a drug store or will be sent from the School on request. Moisten the blue paper in vinegar, lemon juice, tomato, solution of cream of tartar, etc., and then in ammonia (even the vapor will change it), in solution of washing soda, baking soda, borax, soap, and various washing powders. If the paper is washed in running water after being turned blue with ammonia, a test for acid may usually be found in milk, molasses, and sometimes butter. One piece of paper will be found to turn from blue to red and back again to blue an indefinite number of times when wet with solutions of acids and alkalies alternately.

Buy five cents' worth of hydrochloric acid and a little caustic soda at the druggist's. As caustic soda is unpleasant to handle, it is best to have the druggist dissolve it in water. Now pour a part of the acid into a saucer or glass, with a little water, and add the solution of caustic soda until the mixture begins to turn the litmus faintly blue. In an agateware dish, free from worn places, evaporate the solution to dryness. A whitish substance will be found, which by testing will be recognized as common salt.

From two very active chemical substances has been formed a neutral substance—salt. Not all salts, however, are neutral. Sodium carbonate (washing soda) is chemically a salt, but it is made up of a very strong alkali forming element—sodium—and a very weak acid—carbonic acid—and the alkali properties predominate. Cream of tartar is an example of an acid salt. It is acid potassium tartrate, which is a double salt, that is, tartaric acid is added to neutral potassium tartrate, the result being a substance which has acid properties. Common alum is slightly acid to litmus paper.

Soap

Soap chemically considered is a salt, made up of a fat acid and the metallic substance sodium. The fatty acid can be separated by adding any acid like vinegar to a solution of soap. If the solution is warm, it rises as a scum to the top. It can be dissolved in ammonia, forming an ammonia soap. The sodium part of the soap unites with the acid and forms a salt. If hydrochloric acid is added to a soap solution (a sufficient quantity to make the solution very slightly acid), the fatty acid removed, and the residue evaporated to dryness, common salt will be found.

If lime water be added to a solution of soap, white clots of "lime soap" will be formed which are insoluble in water, but on collecting and drying will be found to dissolve in gasoline, naphtha, or kerosene. This is why naphtha or gasoline is useful in cleaning bath tubs, bowls, etc. Quite a good varnish can be made of aluminum soap, made from alum and white soap, dried and dissolved in gasoline.

Washing Powders

It is not difficult to get some idea of the composition of the various washing powders on the market. When acid is added to a solution, if there is effervescence, washing soda is probably present. A skum would indicate that soap formed a part of the mixture.

Hard Water

In the experiment with cabon dioxide it was shown how carbonate of lime might be dissolved by an excess of carbon dioxide gas, the bicarbonate of lime being formed, which is soluble in water. This is an example of an "unstable" chemical compound. Simply boiling drives off the excess of carbon dioxide gas, leaving the ordinary carbonate of lime which is insoluble and is deposited on the sides of the tea kettle or other vessel. This may be shown by blowing into lime water until the cloudiness which at first appears begins to dissolve. As it is difficult to dissolve it completely, the solution may be filtered. On boiling the clear solution, the milkiness will appear again.

Hardness that is brought about by the sulphate of lime—"permanent hardness"—is difficult to remedy by any household means. Washing soda helps a little, but not very much. The so-called alkali waters of the west, in addition to sulphate of lime contain sulphate of soda and other salts, so that they are beyond remedy.

Reference: Chemistry of Daily Life—The Manufacture of Soda. Page 194.

MEETING IV

(Study pages 66-88)

Laundry Work

Bluing May Yellow Clothes: On page 70 is the statement that the repeated use of ordinary bluing may stain the clothes yellow. To prove this, dip a piece of white muslin into a strong bluing solution—about a teaspoonful of liquid bluing to a cup of water—dry the cloth with a hot iron and boil it in a little strong soap solution. The color will be seen to fade. Rinse and dry with the iron. On comparing the cloth with part of the original piece, a slight yellow stain will be seen. This is oxide of iron (iron rust) and can be proved to be such by adding a drop of pure dilute hydrochloric acid and then a drop of yellow prussiate of potash (potassium ferro-cyanide), the intense blue color produced being a test for iron. The conditions in this experiment are, of course, much more severe than obtained in ordinary washing, as most of the bluing is washed out before the clothes are boiled again, but the experiment proves the possibility. As indigo costs about a dollar a pound and Prussian blue only a few cents, practically all the bluings on the market are Prussian blue.

Iron Rust Stains

Make "rusty water" by letting a few nails stand in a can of water over night or longer. Boil some white cotton cloth in a little of the water. Try the same with wool. Strain some of the water through white muslin and boil the muslin in soapy water.

Stains

One of the classes gave a demonstration before a large audience on the removal of stains as outlined in this lesson. As the only way to learn how to remove stains is to *remove stains*, it would be advisable to make a few, if none are at hand, and then try the experiments on them.

Referenees: Chemistry of Daily Life—Inks. Page 178.
Laundry Work, by Juniata L. Sheppard. (50c., postage 6c.)

(Send answers to Test Questions on Part II, and report on supplemental work.)

MEETING V

(Study pages 89-111)

Baking Powder

Perform experiments suggested on pages 90 and 91.

Reference: Baking Powders. Bulletin No. 119, Maine Agricultural Experiment Station. (Loaned for 2c.)

Lighting

(1) See Experiment page 93.
(2) Insert the small end of a clay pipe stem in the inner part of a candle flame and touch a lighted match to the other and so prove that the candle is a "gas factory."
3) With a piece of wire gauze make the experiments illustrated on page 95.
(4) Visit the local gas plant if there is one—or the electric light station—obtaining permission first from the office.

Electric Batteries

(1) Detach one of the batteries that furnish the current for the electric bell, attach a wire to each pole and place the other ends on the tongue and note that the electric current gives a slight "taste"—i. e., stimulates some of the nerves of taste.

(2) Get some one to explain the action in an electric bell or send 2c. stamp to the School for circular giving descriptive diagram, diagrams for bell wiring, etc.

Plants

Examine with a microscope the "breathing pores" on the under surface of leaves.

MEETING VI

(Study pages 111-122)

Chemical Formulas

Reference: "Chemistry of Cooking and Cleaning," by Richards and Elliott. Pages 9-30. ($1.00, postage 10c.)

"Elementary Chemistry." Text book of American School of Correspondence. (Postage 4c.)

Housekeepers' Laboratory

Make some of the tests described.

Reference: "Some Forms of Food Adulteration and Simple Methods for their Detection." Bulletin No. 100, Bureau of Chemistry, U. S. Department of Agriculture. Send 10c. (coin) to the Supt. of Documents, Washington, D. C.

(Send answers to Test Questions on Part III and report on supplemental work.)

PRINCIPLES OF COOKERY

A NATURAL starting point in the art of cookery is the fire, since cookery without heat is an impossibility. Human beings everywhere use fire to prepare their foods and by such applications of heat man first showed his superiority to the beasts.

FIRE

Among the ancients fire was regarded as a gift from the gods, to be protected in every way, and all civilization, forms of religion, civil ordinances, and family life have been traced to the care primitive man bestowed upon his fire. Among the early tribes, the chieftain was often the only one to have a fire in his home. The hearthstone thus became the center of the home life, the abode of the household gods, and even at the present time it is impossible for some persons to separate the spirit of the home from the kitchen fire.

Ancient Stoves

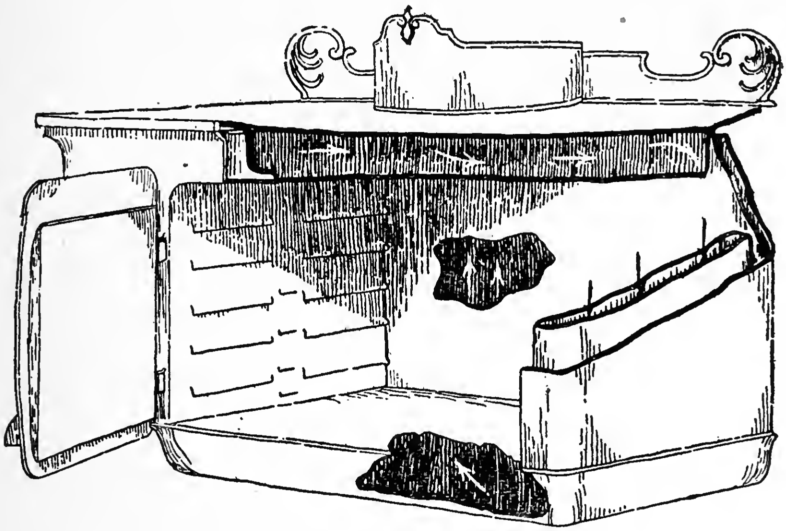
In different sections of the country may still be seen all the types of fire and stove that have been developed through centuries, and every housekeeper should be familiar with the principles underlying the care of each. Among these are the camp fire where food is broiled over coals or buried in hot ashes, the charcoal brazier of the fruit vender, essentially the same as the portable stoves found in Pompeii, the open fireplace, the brick oven, the Franklin stove, (an invention of Benjamin Franklin), cookstoves adapted to wood, to hard and soft coal, to kerosene, to gas, and the electrical appliances which as yet are little more than toys for the rich.

A century and more ago chimneys and fireplaces were often troublesome by smoking and Count Rumford and Benjamin Franklin each in different ways brought their inventive faculties to the solution of this serious problem of daily life. When the fireplace was the dependence of the home for warmth and cooking, the charred, half-burned brands of wood were carefully covered with ashes at night to start the fire the next morning. If the wind had blown off the ashes and the coals were gone out, it was easier to borrow more coals from a neighbor than to use the flint to produce a spark. All this was changed when matches were invented.

A Roman Stove or Brazier.

First Ovens

It was but a step for primitive man from baking in hot ashes or in a covered kettle set on the coals to a simple form of oven. Often one oven served a community. Brick ovens were built at one side of the chimney. Sometimes the heat was turned through a flue to heat these ovens, sometimes a fire was built directly in the oven, and when it was burned down the oven was swept out and the food put in to be cooked by the heated bricks. The later brick ovens, still used in some old houses, often had space underneath for a separate fire.



An Oven, Showing Direction of the Hot Gases.

For the open fire, wood is the most satisfactory fuel but it is not desirable for continuous use in cooking or heating. Wood is sold by measure, which is an inaccurate method at best. The drier the wood the better it burns, and a hard wood which produces coals is most useful. **Wood as Fuel**

When wood is heated and the volatile portions expelled, charcoal is produced. This is usually sold by measure. Its weight is about one-fifth that of the wood from which it is made. It is a primitive form of fuel and generally used in warm countries. A succession of small fires which can be quickly lighted and as quickly extinguished are more suitable to such conditions than the one large stove or range.

The small stoves used today by the Latin races and their colonies do not differ materially from those of the early Romans.

Charcoal The charcoal broiler is used by many hotels because of the flavor it appears to develop in meats.

Peat is an important fuel in some sections of the world. It must be thoroughly drained or dried, and at best contains a large percentage of ash.

Both anthracite and bituminous coal have been in common use for less than a hundred years.

Hard Coal A dense solid, like hard coal, kindles slowly but requires far less care to maintain a fire than wood. Coal is a better fuel for winter than summer. If the lumps of coal are too large they will not kindle readily; if too small, they choke the flame. The large nut and egg grades are best suited to cooking purposes. The draft and size of the fire box determine the size and grade to be used for good results. The free burning "Franklin" coal should be used with poor draft, while with a good draft and large fire box all grades and the larger sizes may be used. A dark brilliant coal will have fewest clinkers. The intense heat resulting from open drafts fuses in large masses the foreign matter which is mixed with the carbon. By burning oyster shells in such cases, new compounds are formed which prevent the clinkers, but the clinkers seldom form with a moderate supply of air.

Soft coal needs very different treatment from hard. Little draft underneath is required, but some draft is necessary over the top to burn the gases given off, and the funnel draft must be open to allow the smoke to escape. If the coal has "coked" over on top it must be broken up when good fire is required. If the fire is to be kept, it is allowed to coke over. **Soft Coal**

Briquettes are made from coal dust and other substances and are used extensively in places where coal is high priced.

The wood and coal stoves and ranges are today the most common means of cooking foods. Housekeepers often become familiar with one stove and one kind of fuel and are unsuccessful with another because they are unwilling to study the laws of nature, or lack the patience to experiment with a new adaptation of them. **Stoves and Ranges**

Much besides personal preference must be considered in the proper valuation of fuels; not only the percentage of carbon, moisture, and volatile matter in each, but the necessary waste, the by-products, and the time required for caring for each and keeping the surroundings clean.

The best stoves and ranges are those plain in finish and simple in construction, with parts well fitted together so that they can be taken apart if necessary and easily cleaned.

A portable range is one that may be moved if necessary, while the "set" range is built into the chimney.

The fire box is lined on the sides with a kind of brick **Fire-Box** above which the fire should never come. The revolving grate is the most common in recent styles of stoves. There is a grate underneath, and below is a place for ashes or a pan which may be taken out to empty. The oven is surrounded by spaces through which hot gases circulate.

The housekeeper should investigate her stove thoroughly when the fire is out, take off all covers, open doors, remove the "clean out" plate for the space under the oven; then see how the dampers work and explore all passages with a lighted match or candle if need be.

The Draft The draft given by the chimney depends upon the difference in temperature between the air of the room and the gases of combustion. The hot gases are more expanded and therefore lighter and tend to rise. The hotter the fire the greater the draft will be.

The supply of air is as essential as fuel for a good fire; combustion depends upon both. Smoke and an accumulation of soot are indications of incomplete combustion.

Several drafts and dampers are common to all wood and coal stoves and ranges. They should be open to start the fire, but closed to keep it. The slide under the fire box supplies the fresh air necessary for perfect combustion. A check in the pipe or at the back of the stove under the pipe, or in both places, is usually known as the chimney damper. A slide in the stove pipe or connected with the chimney damper admits cold air into the stove pipe when opened and thus lessens the draft.

The oven damper turns the heated air away from the pipe so that it goes over the top, down the side, under the bottom, and up the back flue in most stoves and heats the oven before it makes its escape. These differ slightly in different ranges but the purpose of each is the same. Experiment with your own stove until you can control it. **Oven Damper**

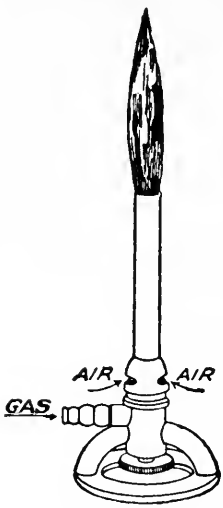
Many ranges have a slide or door above the fire box which may be used for broiling. Hoods are sometimes placed over large ranges to gather odors and excessive heat and convey them to the chimney.

Whether the fuel be coal or wood, the starting of a fire and its care afterwards are much the same process. First remove ashes, brushing off the top of the oven under the covers. When the fire box is clear, put in crumpled paper, bits of wood, and then larger wood and a sprinkle of fine coal. See that all drafts are open. Replace the covers and then blacken the stove, if necessary, but polish after the fire is started. Light the paper and as the wood settles down, add coal, little by little, till it is even with the lining of the fire box. When the blue flame of coal disappears, close the oven damper, and a little later shut the slide under the fire box and the chimney damper. Open the damper when more coal is added. When coal is red it is nearly burned out. **Kindling the Fire**

To keep a fire several hours shake out the ashes, fill with coal, close the dampers, and partially open the slide above the fire. **To Keep the Fire**

For continual use it is better to add a little fuel at a time, but not in the midst of baking anything. With wood and soft coal the chimney damper cannot be closed as much as with hard coal, because there is more soot and smoke which must be allowed to escape.

Gas is an invisible fuel obtained from several sources. Pure coal gas is more satisfactory than natural gas, or than the so-called "water gas." The escape of the latter is less easily detected and it is much more poisonous, hence there is more danger in using it.



Bunsen Burner.

For institutions at a distance from large towns a private supply of gas which is fairly satisfactory is made from gasoline, and acetylene gas is now often made even for the single house.

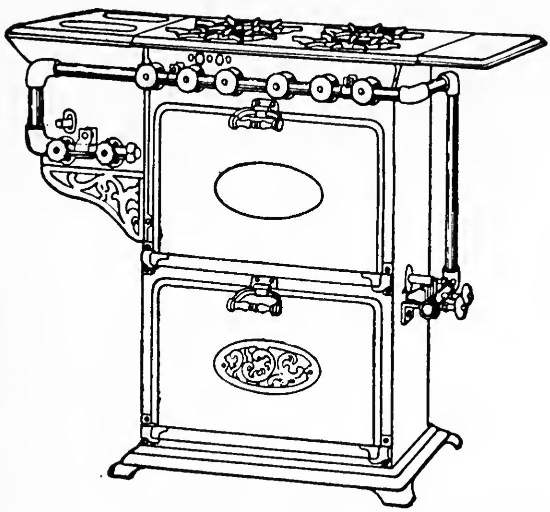
Gas Burners

For fuel purposes, the burners are so constructed as to admit sufficient air with the gas for complete combustion. A bluish flame is produced, which is much hotter than the yellow blaze used for light.

It is possible to admit too much air, which causes a loss of heat. If the air supply is adjustable, close the opening for the air until a yellow flame is produced, and then open it until the flame just comes blue again.

If a burner in a gas stove "burns back" and shows a yellowish flame, leaving a deposit of soot on the bottom of kettles, turn it out and light it again, being careful that the gas does not ignite back in the pipe before it mixes with the air.

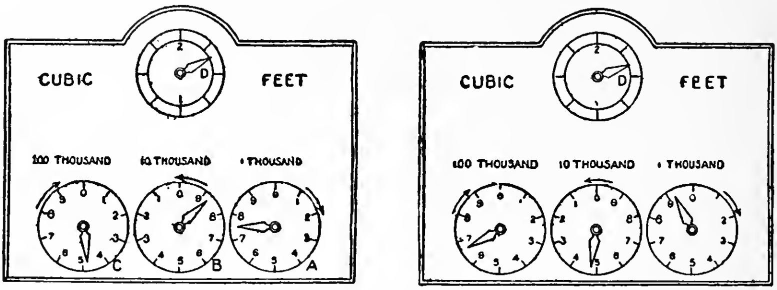
Gas stoves should be connected with the main supply by a pipe large enough to insure sufficient supply of **Gas Stoves**



Gas Stove with Oven. Broiler, and Hot Water Heater Attachment.

fuel under all conditions. The amount used can then be regulated by the cook for each burner. Care must be taken to keep the burners and all parts of the stove perfectly clean.

The gas stove is especially adapted to the conditions of the present age; it is far less care than either wood or coal ranges, and at ordinary rates for gas, less expensive when properly operated. Even at high prices **Advantages of Gas Stoves** for gas it is a cheap fuel if human energy and time are considered. The application of a match makes the full power of the stove available at once and as soon as work is done, the flame may be shut off. Any desired degree of heat may be obtained at short notice with no waste of fuel and no debris to be cared for. The stoves occupy small space and each part may be used independently.



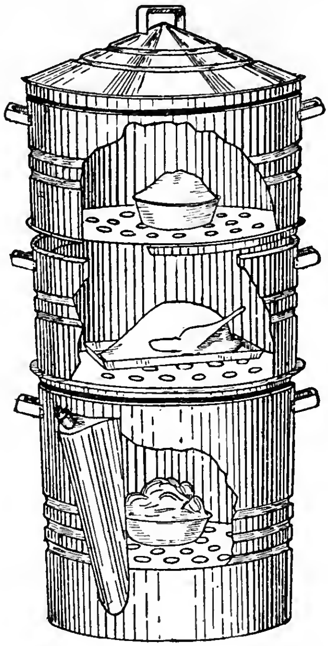
(a) (b)

Dial of a Gas Meter, (a) At the Beginning of a Month.
(b) After Registering the Amount of Gas Used for the Month.

Gas Meter

The housekeeper should learn to read a gas meter. Each space on the right hand circle passed by the hand indicates the consumption of 100 cubic feet of gas, on the middle circle 1,000 feet, and on the one on the left hand 10,000 feet. Read from left to right, taking the figure just passed by each hand and add two ciphers for the hundreds. A previous reading deducted from the present one shows the amount of gas consumed in a given time.

Example. In the illustration, the hand on dial A has just passed the figure 7, indicating 700 cubic feet; on dial B the hand has passed figure 8 (note that this hand moves in the opposite direction to the first), and on dial C the hand has last passed the figure 4. The reading is then, 700+8,000+40,000=48,700 cubic feet. If in a month the hands are in the position indicated in the second figure, the reading is 64,900 cubic feet. The difference between the two readings is 64,900—48,700=16,200 cubic feet. Sixteen thousand two hundred cubic feet is the amount consumed for the month.



Steam Cooker, Circular Form.

The small dial at the top of the illustration indicates cubic feet and is used only for testing the system for leakage.

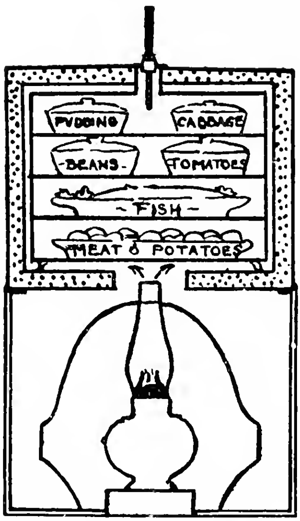
Kerosene and Gasoline

Kerosene and gasoline are useful fuels for summer and emergency use. These are sold by the gallon and only the best qualities should be used. The blue flame kerosene probably are the best of this class of stoves. The small lamp stoves also have merit. They are similar in construction to readding lamps and should receive equal care. Two small stoves often are more useful than one large one, because more readily moved where needed. It is essential that such stoves should stand out of a draft.

Steam Cooker

A steam cooker is an invaluable adjunct to the small stoves whether gas or kerosene is burned. Several articles may thus be cooked over one burner and both time and fuel are saved.

The Aladdin oven is an arrangement for saving heat. It may be used with an ordinary large lamp or with gas. The iron oven is placed inside a jacket of non-conducting substance, hence little heat is lost. It is especially useful for slow cooking.



Aladdin Oven Heated by Lamp.

The Norwegian cooking box is another plan for saving heat. A kettle of food is raised to the boiling point and then packed in a box lined with non-conducting materials.

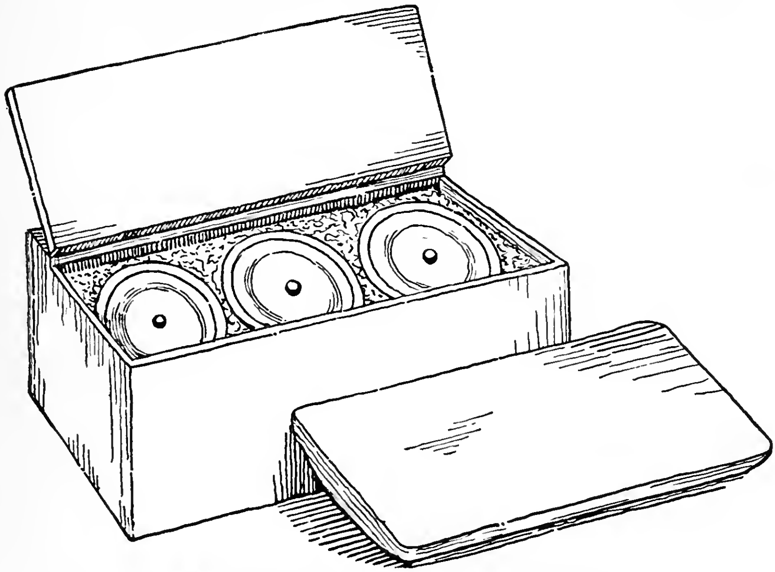
Chafing Dish

The modern chafing dish is but slightly different in effect from the primitive charcoal stove or brazier. The use of alcohol for fuel makes it simple and clean. Wood alcohol—a by-product from distillation of wood—is often used for fuel, but its disagreeable odor makes it less desirable.

Anything that may be cooked over any other stove in a frypan, saucepan, or double boiler may be prepared in the chafing dish.

Effects of Cooking

Heat brings out the flavors in food and develops new ones and makes soluble, substances which the human stomach could not otherwise digest. In most cases moderate heat long continued produces better results than intense heat applied for a short period.



A MODIFIED NORWEGIAN COOKING BOX.
Graniteware Pails with tight covers are packed with asbestos and covered with a pad, the lid of the box is then closed and the whole wrapped in an old blanket.

The degree of heat best adapted to make food digestible is not always that which produces the most acceptable flavor, hence cooking must be more or less of a compromise. As yet we know little about the degree of heat best suited to the perfect cooking of each food and the temperature at which it should be served.

Nothing will cook until it is warmed, and warming and drying are usually the first steps in the cooking process.

Transmission of Heat

The transmission of heat from a fire to our foods may be by conduction, as when heat travels along a bar of metal, by convection, when heat is transferred by the motion of heated liquid or gas, and by radiation through the air. The effect of heat on the food is further modified by the way the metal or other substance containing the food is affected by heat.

The use of asbestos in the form of mats and linings for ovens and jackets for kettles to modify the heat transferred to food is likely to increase in the future.

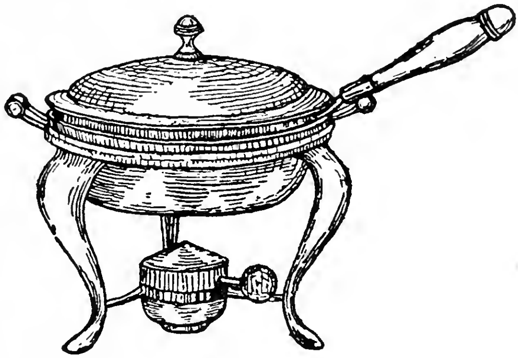
Boiling

Broiling probably was the first attempt at cooking since it required little beside the fire and the heat. Roasting is a similar process applied to larger sections of meat and therefore requiring a longer time. The relationship of roasting and broiling is most apparent with a gas range for there is no line of separation between the cooking of thick steaks and thin roasts. Much so-called roasting is really baking.

Roasting

In broiling and roasting, tender portions of fish, flesh or fowls are exposed to intense heat at first to sear the outside and close the open tubes or pores which contain the juices. The fire should be free from smoke and may be charcoal or half-burned wood or coal or gas. After the surface is browned the section of meat should be drawn away from the intense heat and kept at a more moderate temperature until cooked thoroughly. More depends upon the shape of the article to be broiled or roasted than upon the weight.

When a thick mass is to be cooked in this fashion it becomes necessary to modify the heat on the outside and to aid in driving it in by the process known as basting; that is, dipping up the hot fat which has dripped into a pan beneath the meat and hence is known as dripping, and pouring it over the outside of the mass. The glossy brown secured by basting may have suggested to some early cook the advantage of deep frying. **Basting**



Chafing-Dish—the Modern Brazier.

The difference between broiling over coals and in a hot pan is but slight and dry frying or sautering is a similar process. Toasting is a similar application of heat to foods already cooked once.

The earliest forms of baking were in the hot dishes and then in covered kettles set in coals or hung over the fire. Our ovens are an outgrowth from those primitive methods, and now much so-called roasting is really baking.

A point to study in this connection is the fact that food is fuel for the human body. The amount and quality of fuel is varied according to the work to be done, so should the food be chosen according to the work of the individual and the climate or season of the year.

WATER

Water is not always considered to be strictly a food in itself, but by its aid many foods and flavors are put in forms more acceptable to the palate and more readily absorbed by the body than they could be in any other way.

Importance of Water in Cooking

Immense quantities of water are necessary for the preparation of food and the cleansing of dishes in addition to what is needed for laundry and bathing purposes. Cities make provision from some source safe from contamination for the water needed by their inhabitants. In small communities the individual family must each be responsible for its water supply. This is not the place to discuss the medical aspect of the water question, but all agree that water should be above the suspicion of danger of transmitting disease. Moreover, for household purposes water should be clean and soft, since hard water containing mineral salts hinders processes of cooking and cleaning.

A limited water supply or inconvenient arrangements for its use and disposal afterward, tend to reduce the consumption to such an extent as to interfere with the proper cooking and service of food, if not below the actual standards for health.

Nearly three-fourths of the human body is water and a similar proportion will hold in most foods served at our tables. The total amount of water taken by a human being daily averages two or three quarts, or from four to six pounds. The portion of this which is taken as a beverage depends upon the solidity of the food.

Minera Water

The benefit gained from mineral waters often is quite as much due to an increased consumption of water as to the mineral constituents they contain. The tendency of civilized man in feeding himself is toward too concentrated foods, too little water as a beverage and too little watery food. Water not only brings solids into the stomach in an acceptable form, but it is essential in building new tissues and removing wastes. The inside of the body, as well as the outside, sometimes requires washing.

The temperature at which water is taken into the stomach is an important point. A glass of cool water sipped slowly may have as stimulating an effect as one of wine. Often more ice than water is found in the glasses on American tables, and the ice water is taken hurriedly and interferes with digestion.

Hot water taken slowly will often revive tired people as effectually as tea or coffee. The merit of soup as a first course at dinner probably is due to the fact that it contains ninety to ninety-five per cent hot water and that the solids are largely in solution and absorbable.

If clear hot water is an unpalatable beverage, salt or lemon juice may be added to give a distinct flavor.

Flavor of Water

There is a marked difference in flavor between water freshly boiled and that which has been kept hot for a long time. The latter has lost the gases which give life to fresh water. For any purpose in cooking stale water will injure the flavor of foods whether it be taken from a hot water faucet or from a teakettle where it has stood for hours.

Other ill flavors come into our foods because of imperfect utensils, badly washed. A rough surface or seam will retain something from previous cooking to add to the next substance cooked therein, or greasy dishwater or soap may be left in sufficient quantity to give an appreciable change of flavor.

Another important use of water essential in good cooking is for the cleaning of utensils.

Dishwashing

Dishwashing is not a popular occupation probably because repairing or setting to rights is never quite as interesting as the construction of something definite. Insufficient appliances and inconvenient conditions for the work are other causes for its unpopularity.

With a convenient sink of the right height, ample table room for soiled and clean dishes, abundance of towels and hot water, dishwashing loses its terrors.

A knowledge of the composition of each food and the way it is affected by different degrees of heat is as desirable in dishwashing as in cooking. For example, where gelatine has dried on a strainer it should be softened in cold water, but that treatment would not be helpful if the strainer had been used for fry fat, while an egg beater plunged in boiling water would be all the harder to wash because the egg would be cooked. Time is saved by careful sorting and scraping of dishes before washing. Detergents are helpful but less important than abundance of water.

Soaking Dishes

Strong soda water boiled in a utensil will remove food that has burned on. Soaking is as helpful in dishwashing as in the laundry and dishes that cannot be washed as soon as used should be covered with water. After washing, any dishes are improved by rinsing in scalding water.

The usual plan is to wash dishes in this order, glass, silver, crockery, cooking pans, or kettles. Often it is more desirable to get the large pieces out of the way first.

It is half a century since the first dishwashing machine was invented and though they are in general use for hotels, hand work seems better adapted to most households.

To illustrate the effect of the range of temperature from the block of ice at 32° F to the steaming kettle at 212° F let us follow the process of making a simple gelatine jelly. The gelatine has been extracted for us in factories from bones of animals and needs no cooking, but must be dissolved and combined with liquid and flavoring. It is first softened in cold water, the time required varying according to the size of the particles of gelatine. Then it must be dissolved with boiling liquid. Use only as much boiling liquid as is necessary to dissolve the gelatine. The sugar, if that is to be used, added next, because it will dissolve more rapidly in a warm medium, and then is put in the fruit juice or whatever is to flavor the jelly.

Gelatine Jelly

The compound is to be strained and cooled. The larger the mass the slower the cooling.

Experiment. To illustrate this put half the jelly in one mould and the other half in several cups. The cup will be firm before the large mould at any temperature.

To illustrate another point put one cup in a pan of snow or cracked ice mixed with coarse salt. When some of the jelly is half thickened combine with it whipped cream or white of egg.

If possible take temperature of each with a thermometer. The key to all gelatine desserts, is to have proper proportions of gelatine and liquid and to have the right temperature for the different stages. The proportions are given by each manufacturer on the package.

METHODS OF COOKING IN WATER.

Water is as essential as fire in all processes of cookery. No food can be cooked without water and unless it naturally contains a large proportion of the fluid, more must be added during the cooking process.

Boiling

Cooking food *in* water indicates further progress in this art than either broiling or roasting. It implies the invention of a kettle to contain the water, though the earliest cooking of this sort may have been done by dropping heated stones into a hollow one containing the water and meat or into a water tight basket. Homer and other ancient writers have nothing to say about boiled meats, though they mention those which were broiled or roasted.

Boiling, stewing, and steaming are slight variations of the same process. Under ordinary conditions, without pressure, no food thus cooked can be raised to a higher temperature than 212° F at sea level, and at high altitudes few foods can be cooked in this way, since water boils at a lower temperature.

Experiment. Much may be learned by heating a given measure of water and watching it until it reaches the boiling point.

Tiny bubbles hardly larger than the point of a pin soon form and rise to the top, but this is not boiling. The same thing may happen in a glass of water standing for an hour on the table. How will you explain this?

When the water is actually boiling large bubbles rise rapidly and break on the surface. Keep up this process until nothing appears to be left in the pan. Where has the water gone? Has anything been left behind? There will usually be a trace of coloring matter to indicate that solids do not evaporate.

This point may be made more apparent by putting a tablespoonful of salt in the water that is to be evaporated.

What is left behind in a teakettle which is never cleaned inside though the water is allowed to boil day after day?

Evaporation

Experiment. Other simple experiments may be made with two dishes of uniform size containing the same amount of water exposed to the same heat, one covered, the other uncovered. Which reaches the boiling point first? From which does the water first evaporate?

The evaporation of water is an important factor in cooking. The rate of evaporation is proportionate to the surface exposed to the air and not to the amount of water in the kettle.

Thus the same quantity of syrup or sauce made in a shallow pan will naturally become thicker than when cooked for the same time in a deep pan having only one-fourth the surface.

Choice of Utensils

The art of the cook is displayed by the proper choice of utensils, or, if utensils are limited, by varying the time of the process or by the addition of more water for different purposes. Where long cooking is necessary choose deep utensils, reserving the shallow ones for the occasions when haste is essential.

The use of a cover serves several purposes; it protects the food in the kettle from foreign matter from outside, it aids in retaining the heat, and prevents the loss of water to some extent, as much of the steam condenses and runs back.

Even without a thermometer it is evident that water cannot be made as hot as fat, for a potato, a bit of meat, or a lump of dough might be cooked in water indefinitely without assuming the brown color which would come to any one of these articles in hot fat.

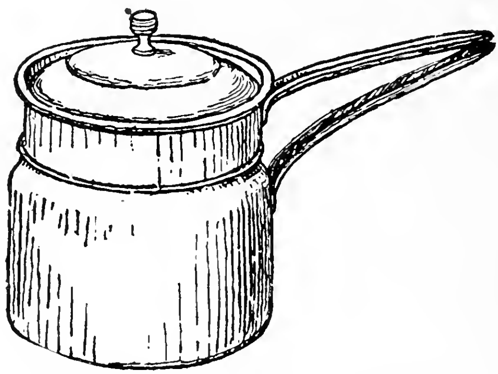
By observation also, we might discover that, however rapidly the water in a kettle boils, potatoes or other foods do not cook more quickly. In the same way we should find that absolute boiling or bubbling of the water was not necessary in order to cook some foods.

Temperature in Cooking

Through such observation and experience certain common laws of cooking have been established and these have been verified and explained by the experiments of modern scientists. The temperature of the water should be adapted to the type of food material to be cooked in it. Vegetables containing woody fibre to be softened require the boiling-point, while meats and eggs, of different composition, will cook more perfectly at a lower temperature. To extract juices and flavors of meats and vegetables to the fullest degree divide the substance finely to expose as much surface as possible to the action of the water and let that be cold. Soak first, then heat the whole slowly and hold below the boiling point till the end is gained.

Cooking with Water

When water is used only for the purpose of conveying heat let it be boiling hot when the food is put into it. Even then some of the solids in the food will be dissolved in the water and lost unless it be used. In some cases, as in strong flavored vegetables, this may be a desirable loss. Mediums like hot fat, a thick syrup, or a gravy in which water is thickened with flour, by their density prevent loss of shape and flavor in the articles cooked in them. Rapid boiling in water tends to disintegrate foods. Meats are cooked to rags, potatoes become a soggy paste, and no intensity of heat is gained.



A Double-Boiler—an Invention of Count Rumford.

Stewing Stewing implies moist heat, a sort of sweating process. Boiling requires much water, at its highest temperature; stewing is done with little water at a heat sufficient to soften the substance, but considerably below the boiling point. Hence boiling is more applicable to vegetables and stewing to animal foods.

Braising Braising and fricasseeing and pot roasting are combinations of broiling or frying and stewing. Sections of meat are first browned to secure a good flavor and then stewed until tender in broth or gravy.

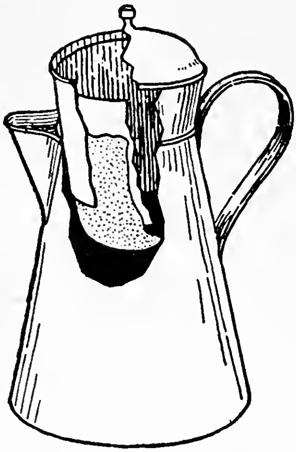
Water is a restless substance and is constantly escaping from the surface of our foods while they are being cooked. Keep the water in the right place, is a watchword against many of the difficulties that arise in cookery.

When a sauce or soup is too thick water may be added. On the other hand, when such foods are too watery the surplus often may be evaporated by cooking rapidly, uncovered, for a short time.

The Double Boiler

Besides kettles of various shapes, the double boiler and the steam cooker are important utensils dependent for use upon water. The double boiler we owe to the inventive genius of Count Rumford. Here is one kettle set in another containing water, and so long as there is water between a food and the fire no browning can take place in the food. This utensil is especially associated with compounds of milk and with the cooking of cereals. Though the food in the upper part does not quite reach the boiling point, this disadvantage is more than balanced by the long time which may be allowed for cooking with no danger of burning.

The steam cooker is found in many patterns, all on the same general plan. It differs from the double boiler in having several parts above the kettle containing the water, each with perforated bottom, so that the steam and vapor have direct access to the food. The "bain marie" is a French device to serve the same end. One large kettle of water contains a number of deep sauce pans. This is especially useful for food already cooked which is to be kept hot for intermittent serving in restaurants.



Coffee Pot for Making Drip Coffee.

The prevalent idea that all food must be served the moment it is cooked is due in many cases to imperfect methods for keeping it warm.

For tea and coffee a moderately soft water is generally considered best.

The different kinds of tea receive their name from the locality where they grow and from the size of the leaf, the younger leaves furnishing the choicer varieties. (See the illustration and description given on page 139 of *Food and Dietetics*.)

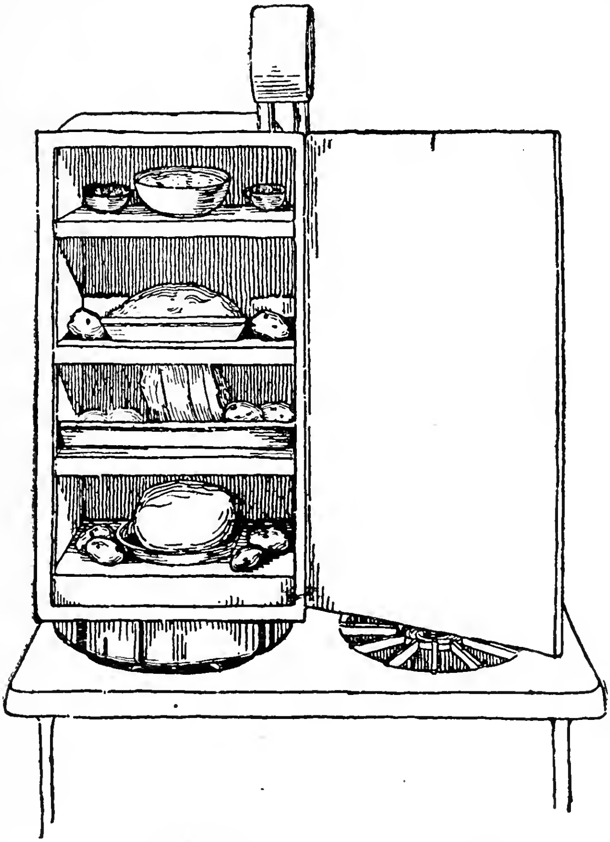
Making Tea

To make tea, use an earthen pot, fresh boiling water, and from one-half to one teaspoonful of tea for each half pint of water. Leave covered in a warm place to steep for three to five minutes and serve. For cold tea drain from the grounds at once.

Coffee

Names mean little in brands of coffee further than to indicate the original home of a special variety of the plant. The berry improves in quality for several years but loses flavor after roasting and more after grinding. One pound of good coffee measures about one quart and will make at least thirty full cups of strong coffee. Thus one pound should supply one person for a month or four persons for a week. It is better to buy coffee in small lots often, unless it is ground as used.

Coffee may be steeped like tea or boiled. All things



STEAM COOKER WITH DOORS.

considered, the drip coffee pots are most satisfactory and the beverage thus made is more economical and uniform and probably less injurious than when it is boiled.

ICE

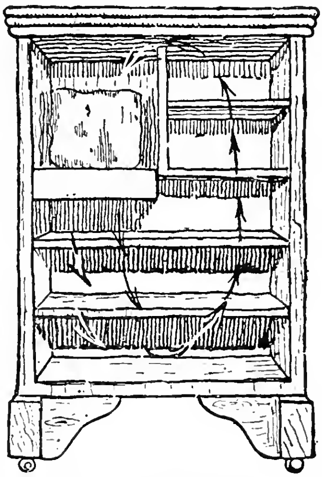
Ice is becoming more and more essential to civilized man, not only for summer use but for the year around. The future promises many improvements along this line, in more rigid inspection of the sources of the natural ice supply, in improved facilities for the manufacture of artificial ice, perhaps even in the individual home, by the transmission of cold brine as gas and water are now supplied from house to house from central plants, making it possible to dispense with the iceman's daily round. Patents have been issued for methods of cooling houses in summer similar to those used in cold storage plants. Food is now sent long distances in refrigerator cars and the whole subject of refrigeration has received much study. It has been found that different foods require various degrees of temperature.

Cold Storage The preservation of food by cold storage is of great benefit to armies and navies, but is not an unmixed blessing to the housekeeper for it has upset the seasons of foods, and when we can obtain a food at any time of the year it loses the charm it possessed when the season was a short one. Moreover, though food in cold storage does not spoil, it parts with something and undergoes certain changes which are not fully explained as yet. The housekeeper is usually safer in the use of canned foods than of those subjected to a long period of cold storage.

The Refrigerator

The household refrigerator is frequently expected to do impossibilities in caring for foods. It is a great labor saver when properly used and may be depended upon the year around and not merely in summer.

It should be placed in a cool, light, airy place, convenient to kitchen and dining room unless a second



A Refrigerator showing Direction of Air Currents.

refrigerator be placed there. If possible place it near the door so that the ice man need not track all over the kitchen floor. The cellar is no place for a refrigerator. A good cellar is a safe place for most foods, and a poor one will injure the refrigerator.

In many households the cost of ice is more than saved by the preservation of food that would otherwise be lost. The average family will use from one to two dollars' worth of ice a month at city prices.

In modern houses the water pipe from the ice compartment of the refrigerator is often connected with the sewer pipe. This should never be direct. Let the pipe drip into a spout.

A refrigerator should have several compartments, that foods like milk and butter may be kept apart from others. The coolest place is usually under the ice. A tile or enamel lined refrigerator has many advantages, but any that are properly made if kept clean will do good work. Any break should be repaired at once, for an overflow of water or a crack in the lining may cause an odor which will flavor all food.

Care of Refrigerator

The ice should be washed clean before putting in place and no food should ever be placed upon it. The jars of water chilling for table use are the only things to be allowed beside the ice in its compartment. No food should be put away while warm.

How often a refrigerator should be cleaned depends upon the way it is used. If nothing is allowed to spill or rub against the sides or shelves, or, when this happens, if it is cleaned away at once, and if nothing stays there until unfit for food, frequent scalding is unnecessary. Every week or fortnight when the ice is nearly out remove shelves and scald them thoroughly and wash throughout.

Glass and stone jars, deep earthen and agate plates are the best utensils in which to put foods away in the refrigerator.

The principle of the refrigerator is exactly that of the Aladdin oven—a closet with shelves is put inside a case of non-conducting substance.

On the same plan, our ice cream freezers are built. The outer tub is a non-conducting substance to prevent the entrance of heat. **Ice Cream Freezer**

There are jugs for hot water and coolers for ice water constructed according to the same idea.

Salt is mixed with ice because its affinity for water will cause the ice to melt, and when a solid changes to liquid form, heat is absorbed from the surrounding objects. Cracked ice about the size of coarse rock salt is used, the proportion being three parts ice to one of salt.

Ice cream, custard, or fruit juice to be frozen, should be more highly flavored and sweetened than if it were to be eaten at an ordinary temperature. The organs of taste are benumbed by the cold, and a stronger flavor is necessary to produce an effect. The cost of ice for making frozen desserts is less than the cost of fuel for cooking many.

PREPARATION AND PRESERVATION OF FOODS

All processes of cooking are the result of gradual evolution. Nature ripens fruits and seeds in the sunlight. Dry nuts and seeds are stored by squirrels and other creatures. Primitive men were but little in advance of the squirrel when they saved different grains and pounded or parched them for food.

Uncooked Food

We may understand better the origin of our processes of cooking if we first consider the foods available without special preparation. Tropical countries have always afforded a variety of fruits capable of sustaining human life. It is estimated that many more persons may be supported on a given piece of ground planted to bananas than by the same surface planted with any crop in a temperate climate. The breadfruit, fig, date, and raisin are other important fruit foods.

In temperate climates without knowledge of agriculture mankind must depend largely upon animal foods, and doubtless here would come the first application of heat to change the flavor or to aid in preservation of the food from day to day.

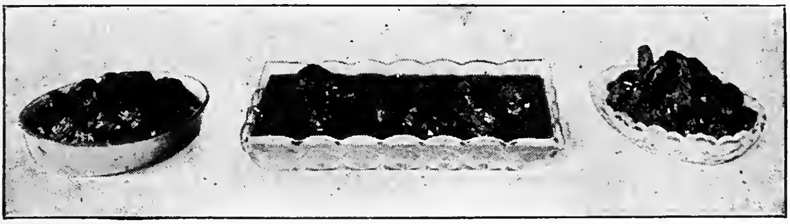
Preserving Food

The drying of fruits and the smoking of meats naturally were the earliest methods of preserving foods. Probably the preservative action of smoke was accidentally discovered and the salting of fish may have been derived naturally from its association with salt water.

Since all foods are mainly water it was an immense advantage to wandering tribes to reduce their burdens by drying their foods. Even the most primitive housekeepers discovered that in proportion as food parted with water it was less liable to ferment, mould, or decay, though the scientific reason for this that most bacteria can live and develop more rapidly in fluids has only been discovered recently by bacteriologists.

Dried Foods

The modern housekeeper seems to be losing the art of drying foods, yet in many cases that mode of preservation is more desirable than canning or cold storage.



Dried Prunes Before and After Soaking.

One reason why dried fruits have fallen into disrepute is this: To remove the discoloration which takes place when cut fruits are dried or evaporated in factories they are often bleached by sulphur and suffer loss of flavor. Another reason for not using dried foods is that it takes time to soak them.

When they are to be made ready for use the first step is to supply as much water as they lost from evaporation. This is best accomplished by long soaking without heat, merely cooking them enough at the end to soften tough fibres and to prevent fermentation.

Honey and olive oil may be considered with the food products requiring little preparation. They were commonly used by the ancients.

Nuts Nuts are an important food in some parts of the world. The peasantry of southern Europe find in the chestnut a substitute for cereals. It is made more digestible by a partial cooking. The neglect of nuts in our country is due to the cheapness of cereal products but there is an increasing use of them as a substitute for meats. Average shelled nuts have weight for weight about twice the fuel value of wheat flour because they contain so much fat. Chestnuts are about two-thirds starch, and contain little fat. Other nuts are from one-third to two-thirds fat.

It is a common idea that nuts are very indigestible. That may be changed if we learn to masticate them properly or to grind them and combine with other foods instead of eating them without chewing properly, as dessert after sufficient nourishment has been taken.

Nuts and fruits supplement each other, to some extent, the one containing what the other lacks.

The leguminous seeds, peas, beans, lentils, and peanuts, are somewhat like nuts, but are not so rich in fat and are unpalatable unless cooked. Most of our common vegetables are the result of ages of cultivation.

Fruits We are only on the threshold of the possibilities of combining and preserving fruits. An increased use of fruit, fresh and preserved, will tend to cause a diminished use of alcoholic beverages. Fruit juice is one of the best agents to quench thirst. A desire for some other beverage than water may be taken as a cry for food. Fruit juices, hot or cold, will better supply this desire than tea or coffee. The expressed juice of real fruit may be sterilized and then charged with carbon dioxide, as well as the chemical compounds now sold as soft drinks.

Jellies

Inferior fruits and skins and cores, if clean, may under pressure yield juice for jellies, or to flavor other foods. Fruits may be blended, pressed, and strained, and used in many ways even for children and invalids when the solid particles and seeds would prove irritating. The juice of the lemon or orange and the pulp of the banana may thus be combined.

Canned Goods

Since modern housekeepers lack patience to dry foods and soak them out again the canning factory has come to their aid. Within the last half century this business has developed immensely. Home canning cannot compete with that of the factory, because there a higher temperature is gained which more effectively sterilizes the food.

Canned foods keep because the bacteria in them are destroyed and others cannot enter because the air is kept out. Fruit will not spoil even if the jar is not full, provided the air above it has been sterilized.

Unfortunately, ignorance of the processes involved makes the consumer demand impossibilities in color and form, and this has led the manufacturer to use artificial colorings freely.

Preservatives of different kinds have been found to be cheaper than care and time expended in the preparation. Clean foods keep better than unclean ones, but skilled human labor is the means to cleanliness and that is expensive.

Preserving in Sugar

Pound for pound preserves which include jellies made from fruit juice and marmalades from fruit pulp with equal weight of sugar keep even if exposed to air, because bacteria do not flourish in dense substances.

Some fruits are preserved half by drying in the sunshine, half by sugar. Spiced fruits were more common before the days of air-tight jars, for spices are enemies of bacteria.

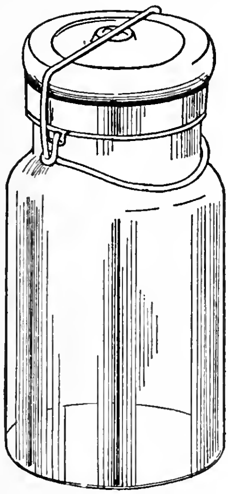
Canning

The canning of food is not a complicated process. Everything must be clean, that is, free from spores of mould or germs that promote decay. Such cleanliness may be accomplished in part by water, partly by heat. The jars, covers, tunnels, and spoons must be subjected to boiling water to render them sterile. They are usually put in cold water which is slowly brought to the boiling point. The scalding of tomatoes and peaches not only renders the skin easy of removal but sterilizes the outside so that nothing is rubbed on to the inner surface as it is peeled.

An accumulation of dust, mould, and decayed portions, even if each be slight, cannot but affect the result. Therefore the fruit for any purpose must be carefully picked over and washed. Very juicy fruits, like currants, may have the juice expressed without first cooking, while others, like the crab apple, require the effect of heat to start the juice.

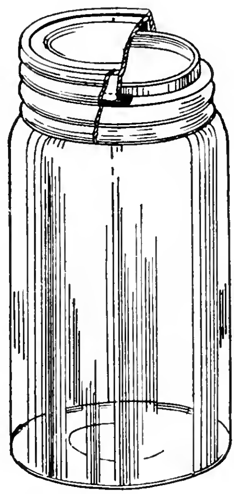
Utensils for Canning

The utensils for cooking and straining should not be of metal if the best flavors of the fruit are to be retained. Agate or earthen ware kettles, wooden spoons, and linen strainers are desirable for this work. If



"LIGHTNING."

PRESERVE JARS.



IMPROVED "MASON."

necessary to use metal anywhere, do it as quickly as possible, and never leave an iron spoon in a kettle of cooked fruit.

Sugar is not essential to canning, but is usually added for flavor and because fruit cooked in a syrup keeps its shape better than when cooked in water.

Preserve Jars

The best jars are those having glass covers and fastening with a spring. The screw tops are easily rendered imperfect and are hard to close and open.

The less lettering there is in the glass the surer we are of keeping it clean. The rubber rings spoil quickly and none that are stretched or brittle should be used. New ones are usually required every year. Pint jars are more satisfactory for the average family than the larger sizes.

A grocer's tunnel is desirable for filling the jars, and a half-pint dipper with a long handle is another help.

Essential Points

The essential points in canning fruit may be summed up in very few words. All that is necessary is to have the fruit and everything that comes in contact with it sterilized, and then keep the air away from it. That is, the fruit and whatever it touches must be raised to a sufficient degree of heat to destroy any micro-organisms already there that would cause change of form or decay. This being done care must be taken that no others are allowed to enter through the air. There is no magic about it, only constant watchfulness.

Gentle cooking, long continued, seems to be fatal to the bacteria, which might work so much ill, and this method is more conducive to preserving the natural appearance of the fruit than is intense heat for a short period.

Fruit, vegetables, milk, and meats all are prepared in similar fashion. Animal foods spoil easily because of their composition.

CHOICE OF FOOD

Primitive man made use of anything near his hand to satisfy his need and accidents and extreme hunger made many foods appetizing to our ancestors which might not appeal to us today if we had not inherited the taste for them.

According to W. Mattieu Williams, "the fact that we use the digestive and nutrient apparatus of sheep, oxen, etc., for the preparation of our food is merely a transitory barbarism." Other authorities agree with him that the art of cooking may some time be so developed as to enable us to prepare the coarser vegetable substances in an easily assimilated form without depending upon animals as middle men.

The Art of Cooking

The art of the cook has done much to make unlikely food materials attractive, but there is another phase of the question, and that is the problem how to make what we know is nourishing both pleasant and attractive. The cook of the past had to make the best possible use of the meager nutrients at hand. The cook of the present and future has the harvests of the whole world within reach all the year around. How shall such abundant material be combined to satisfy the palate without overloading the digestive organs?

More important still, how shall we select and prepare foods that they may produce sufficient energy in the human body for the great tasks awaiting it in our complex civilization.

39

During the last twenty years or less much material has been published by the U. S. Department of Agriculture recording the results of investigations. Many of these pamphlets can be secured for the asking.

Classification of Food

For practical use all the principal substances found in our foods may be classified under five heads: water, mineral matter, protein, fat, and carbohydrate. The first, and its importance in cooking, has already been considered. The second appears in different forms in all foods, rarely exceeding one per cent. of their natural weight. This it is which remains as ash when a food is burned. It is most prominent in the refuse portions of food which are removed before coming to the table, such as the husks and bones. Some of these mineral matters are readily soluble in water, hence are lost when no use is made of the water in which vegetables are boiled.

Common salt is the principal mineral substance in use in cooking.

Organic Foods

The other three great classes of food substances are known as organic compounds,—the protein, fat, and carbohydrate.

The proteins are subdivided into many classes, but so far as practical cooking is concerned, little need be said of these here. Since this type of material constitutes about one-fifth of the human body by weight it must be found in the daily food. Lean meat, eggs, milk

*Following the nomenclature of the U. S. Department of Agriculture, the term protein is used to denote all classes of nitrogenous foods.

curd, and portions of grains and seeds are the principal sources of this class of food. As a whole, protein of vegetable origin is more slowly and less perfectly absorbed than animal protein. The principal duty of nitrogenous foods is to build up the body and to keep it in repair.

Fats

Fats are obtained from both animal and vegetable sources and for the convenience of the cook are commonly separated by heat or pressure. Considerable fat is stored as a reserve fund in the normal human body. Its principal office is that of fuel to keep the body's machinery going.

Carbohydrates

Carbohydrates are chiefly of vegetable origin and include starch and sugar. They are not apparent to any extent in the body but are important fuel foods, though more than two pounds of starch or sugar would be required to produce as much energy or bodily heat as one pound of fat.

The provider of food, the cook, and the consumer all should be familiar with the composition of common foods in order that the daily meals may be adapted not only to purse and palate but to climate and the condition of individual bodies.

Milk is a complete food for the young animal because it contains the five fundamental types of food material—water, mineral matter, fat, carbohydrate, and protein.

The analysis of average milk is about as follows:

	Per cent.
Water	.87
Mineral	.01
Fat	.04
Casein	.03
Sugar	.05
	1.00

Since the fat is the most valuable portion commercially, dairymen study to feed their cows in such a way as to increase it, and in some instances milk has been produced containing 6 per cent of fat.

Use of Milk

Though mainly water, milk is a valuable nutritious food and should be used freely by itself and in combination with other food materials, in soups, sauces, and puddings. When we remember what the department of agriculture has proved for us, that a quart of milk is quite as nourishing as a quart of oysters for which we pay six or eight times as much, we can see that it is desirable to use it more freely than is generally done. Especially during the summer months we do well to substitute milk and cheese for meats. There are average families which do not use over a pint of milk a day; there are others who find it necessary to take a gallon, and the meat bill in the latter cases becomes proportionately small. A pint of milk a day is not an excessive allowance for each member of a family, though many households consume much less.

Composition of Milk

To study the composition of milk put a quart of fresh milk in a glass jar and leave it twenty-four hours or longer until it is thick and sour. What percentage of the whole is the cream? Remove the layer of cream on top to another jar, screw on the top, and shake until the fat separates from the watery portion of the milk. Collect the butter on a spoon, wash out the milk by pressing and folding with a knife. Weigh or estimate carefully the value of the butter obtained. What proportion of the original bulk of milk does it represent? Persons fond of unsalted butter may thus prepare it for themselves.

Why is salt added to butter?

The remainder of the milk, now a thick mass of curd, may be pressed out with a spoon or cut with a knife to show the greenish water known as whey. What nutritive substances are there in this?

Turn the thick milk into a two-quart pan and fill with hot water, in twenty minutes drain the water off through a strainer, that no curd need be lost, and pour on more hot water. Do this several times until the curd loses its sour taste and has contracted, but do not allow it to become too hard. If boiling water is used the curd will become unpalatable and indigestible.

Buttons have been made of sour milk treated by heat and pressure.

Sour Milk Cheese

Press as much water as possible from the curd and compare the quantity with the original amount of milk. Remember that this still contains much water. Now combine the curd with butter or thick cream, salt it and shape in small balls or pack in cups. Thus we learn something of the value of milk and have made a sour milk cheese more palatable than when the whole mass of curdled milk is heated on the stove or strained in a cloth.

Junket

With prepared rennet in liquid or tablet form the curd and whey of sweet milk may be separated. The milk should be warmed slightly before the dissolved rennet is added, then chilled in the dishes from which it is to be served. This is known as junket or rennet custard.

Absolute cleanliness is essential for every utensil to come in contact with milk. The souring of the milk is due to the action of bacteria which come to it from contact with utensils and the air. Its fluid form and nutritive material afford a medium peculiarly favorable to the development of germs of disease, as well as to the growth of useful bacteria which aid in butter and cheese making.

The growth of such micro-organisms is hastened by moderate heat, but most of them are killed by raising the milk to the boiling point.

Sterilization requires a temperature of two hundred and twelve degrees F, continued for about twenty minutes; this process usually changes the flavor of the milk so that it is disagreeable to many palates. The high temperature also causes the fat globules to separate instead of being retained in the form of cream.

To Prevent Souring

Pasteurization takes its name from the noted French scientist, and consists in raising the milk to a temperature of about one hundred and fifty-five degrees F. By this means the flavor of the milk is unchanged.

The cook finds it safe to scald the milk for soups, bread, or puddings, to prevent its souring during the process, before cooking it with the other ingredients. There is a gain in the time of cooking when the milk is heated while the other materials are being prepared.

Neutralizing Acidity

A bit of bicarbonate of soda dissolved in milk before it is heated often will neutralize any incipient acidity and make it usable for puddings or soups. The "cream" of tomato soup is liable to curdle unless the acid of the tomato is neutralized by soda or the milk thickened with flour before the two parts are combined. It is safer with all "cream" soups to keep the stock and thickened milk apart until just before using.

Mixing with Acid

Lemon or other acid fruit juices are sometimes mixed with milk for sherbet without curdling if, before the juice is added, the milk is thoroughly chilled in the freezer can.

Salt sometimes curdles milk, especially when it is added to hot milk.

Since the solid portions of milk readily adhere to the bottom of the saucepan placed in direct contact with heat, and the resulting burned flavor rapidly penetrates the whole of the milk, a double boiler or its equivalent, one dish set in another of boiling water, is the best way to heat milk.

Milk is an important ingredient in preparing cocoa and chocolate, and such beverages rank with soup in nutritive value. Hot milk sipped slowly is a simple remedy for exhaustion and sleeplessness. Hot milk should be served with coffee when cream is not available. The milk soups are valuable foods and have as their foundation the white sauce described further on.

Most of our puddings require milk, especially the cereal and custard varieties.

Cooking in Milk

Because there are solids in the milk more time must be allowed for the grains of rice or corn meal to absorb the moisture than when cooked in water. The protein portions of the milk have somewhat the same effect as the egg used to coat the croquette or oyster before frying. If the particles of grain are thus varnished over they cannot absorb moisture as rapidly as from clear water. Hence, it is often advisable to cook the grains in water first and finish the process in the milk.

In making blanc mange from Irish moss, if the moss is first cooked in a small quantity of water and the thick paste strained before it is added to the milk, there is no loss of milk. When the moss is cooked directly in the milk there is some loss of milk when the moss is strained out.

Concentrated Milk

The baked Indian meal pudding and the creamy rice pudding require long, gentle baking. There is a continual evaporation of moisture from the surface of

"BLANC-MANGE."

the pudding pan, and really a condensing of the milk. In proportion as the pudding dish is refilled with milk, the pudding increases in nutritive value.

Milk is commonly used for mixing dough of many types and this adds to the nutritive value of bread and cakes.

Bread made of milk or part milk will have a browner, tenderer crust than bread made wholly with water. There seems to be good ground, however, for the prevalent idea that bread or cake made with milk does not keep so well as that made with water. A certain cheesy flavor develops where milk is a principal ingredient.

Sour Milk Sour milk is often used for mixing griddle cakes and quick doughs, because the acid it contains will be neutralized by the soda added, and thus produce the effervescence which makes the dough light. The souring process seems to have so affected the protein substances in the milk that such a dough is tenderer than one made with sweet milk and baking powder. The use of sour milk will be further treated in the section on doughs.

Skimmed Milk For doughs, soups, and puddings, in which additional fat is introduced, skimmed milk may be used as well as full milk.

The use of cream in well-to-do families is increasing. Whipped cream is demanded as a garnish or sauce for many desserts quite complete in themselves.

The process of beating or "whipping" cream gives it an attractive appearance, and by expanding its particles probably makes it more digestible.

BUTTER

Butter is one of the most digestible forms of fat. An ounce of butter a day is a fair allowance for each person when meats, lard, olive oil, and cream are used. To test this in your own case, divide one ounce of butter in three portions, one for each meal, and see whether you naturally use less or want more. Or, this may be tried in a family by shaping a portion of butter into balls with butter paddles and noting the amount consumed by each person at the table. An ounce of butter is easily secured by cutting a quarter pound pat into quarters. Or, if that is not available, measure the butter. Two level or one round tablespoonful is equivalent to one ounce. A pound of butter will measure one pint.

Individual Shortcakes to be Served with Whipped Cream.

Butter for Flavoring

Butter is probably rendered slower of digestion by cooking, and for this reason it is wiser to flavor foods with it after they are cooked. Often it is better to allow the individual eater to butter the broiled meat, or fish, or mashed vegetables, according to his own taste. Then there need be no waste if a portion of the whole dish is not eaten, and if the food is reheated the flavor is better.

In one dietary study of the Department of Agriculture of the United States (Bulletin 75 from the office of Experiment Station), so much butter came back in the platters where it had been poured over steaks, chops, and fish, that it was assumed that none was consumed. Certainly, in every household considerable butter and other valuable fat finds its way to the dish water. One of the first steps in the application of science to housekeeping is to stop such needless waste.

Composition of Butter

In a glass measure cup, or a tumbler, put a quarter of a pound of butter, set the glass in a pan of warm water and leave until the butter melts.

Estimate the percentage of clear fat.

What other substances appear to be present?

How does this explain the sour and cheesy tastes sometimes noticed in butter?

White Sauce

Milk thickened by flour and made richer with butter and flavored, is known as milk gravy, drawn butter, or white, or cream sauce. It is a substantial food in itself and forms a valuable addition to fish, eggs, meats, and vegetables. By its addition a small portion of any food substance is extended and made to do more service, and flavors too pronounced to be agreeable to all are much modified.

There are several ways of compounding this sauce which apply to other sauces in which butter is the principal ingredient. A general formula covering the ordinary sauces—white, tomato, and brown—is this: one ounce of butter, one-half ounce of flour, and one-half pint of liquid; or, to express the same quantities in other terms, two level tablespoons of butter, the same of flour, and one cup of liquid.

1. Melt the butter in a saucepan, stir in the dry flour, cook and stir until frothy all over, then draw to a cooler part of the stove and stir while adding the liquid hot or cold, then cook again till thick, stirring till smooth. **Methods of Making**

2. Another way is to rub butter and flour together and stir into the warm liquid in a double boiler, then stir till thick and smooth.

3. When thin cream is substituted for butter and milk, or when less butter is to be used, rub the flour smoothly with a little cold liquid and stir into the remainder, which should be hot, and cook over water until smooth. Then add butter and season.

The theory of the first method is that the butter attains a slightly higher temperature than the milk and if the flour is combined with the hot butter it is cooked more quickly and thoroughly than when put into milk.

In the second case, longer time is required, but the flavor of the butter is changed less than by the first method.

The third way is more economical of butter.

Butter is also used for brown sauces. These are made after the first plan for the white sauce, but the butter is allowed to brown before the flour is put in, and is cooked until a reddish brown hue is acquired before the liquid, which is usually brown meat stock, is added. **Brown Sauce**

Varieties of White Sauce

In many other sauces the plan is similar to that followed in making the white sauce, but meat stock, strained tomato, or other vegetable stocks, are used in place of part or all of the milk.

These sauces are the foundation of many entrees or made dishes, such as croquettes and soufflés.

For meat or fish croquettes the sauce is made of a double thickness by using only half as much liquid. It is then combined with about an equal quantity of meat, seasoned and cooled, when the mixture may be shaped. Soufflés have the sauce as the basis and the puffy effect is produced by eggs.

Creamed Dishes

The usual white sauce, combined with an equal quantity of meat, fish or vegetable stock, gives us the cream soup, cream of chicken, cream of cod, cream of asparagus, etc., etc.

Since butter is not pure fat but contains water and curd, it is less desirable than other fats for greasing pans unless it is melted and the fat used alone.

Precautions in Using Butter

Except in cases when it is necessary to brown something quickly, butter should not be used for frying or or sautéing. It is too expensive and burns easily. Because of the quantity of milk, often sour, contained in butter, it is not strange that some recipes for rich cake call for small quantities of soda to balance this acidity. For such purposes, butter is frequently washed to remove milk and salt.

That butter responds quickly to changes of temperature should be remembered in mixing any dough, like pastry, when a large proportion of butter is used.

Slightly rancid butter may be made usable for some purposes by scalding it in water, then chilling and removing the cake of fat on top. If further treatment is necessary the fat alone may be heated with bits of charcoal. **Rancid Butter**

CHEESE

Composition The origin of cheese is probably more ancient than that of butter. It is a form of dried or condensed milk convenient for transportation. Milk is nine-tenths water, while cheese contains but a trifle over three-tenths water. Average cheese is about one-third each water, fat, and casein.

Nutritive Value A pound of cheese costing sixteen cents contains about twice as much nutritive matter as a pound of meat which will vary in price. There will be less waste in the cheese than in an average piece of meat. Moreover, cheese has the advantage of keeping better than the meat under adverse conditions. Its disadvantages are that because of its concentration it is not easy of digestion. This may be overcome somewhat by diluting the cheese with milk, as is done in many of the rarebits, fondues, and soufflés. The addition of a small quantity of bicarbonate of potash or soda aids in making cheese soluble. There is danger that the cheese will be over cooked. When merely melted it is probably quite as digestible if used moderately, as many of our common ways of preparing meat. Judging from the types of people who depend upon cheese largely it might be used with us more generally than it is. The annual consumption of cheese in this country is only about three pounds per capita. We might well use cheese more freely in cooked dishes, for flavor as well as for nutriment.

PRINCIPLES OF COOKERY.

PART I.

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. *Do not copy answers from the lesson paper.* Use your own words, so that the instructor may know that you understand the subject. Read the lesson paper a number of times before attempting to answer the questions.

1. Give a rough diagram of the stove or range with which you are most familiar. Show where in the oven and on top of the stove the heat is greatest, and explain why.
2. What is your method of starting and regulating a coal fire?
3. Counting the time required to keep fire and stove in good condition, what is the most economical fuel within your reach?

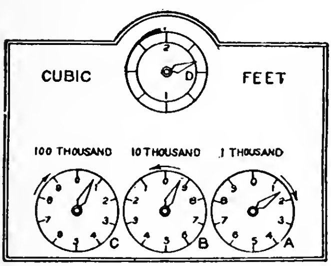


Fig. 1.

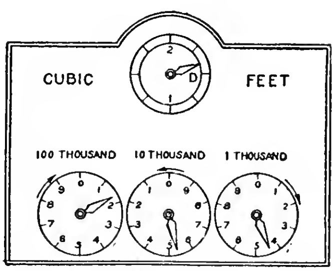


Fig. 2.

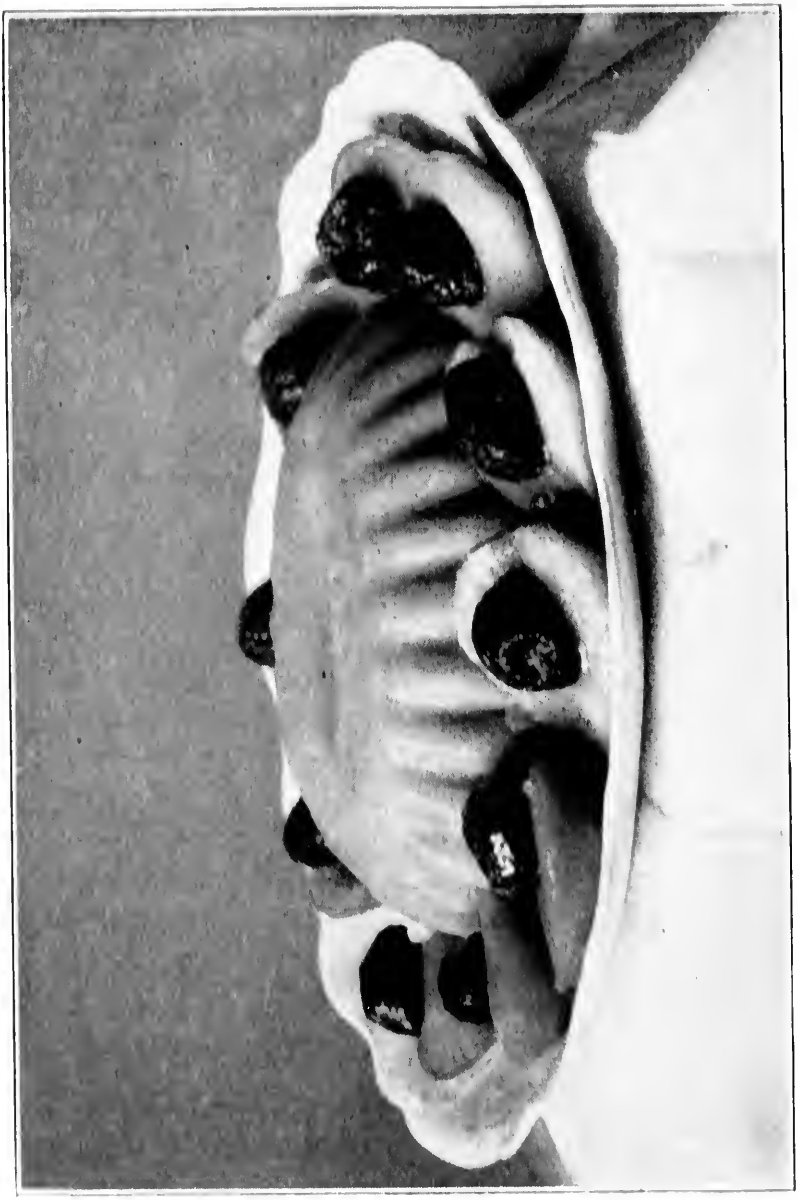
4. Fig. 1 represents the dial of gas meter at the beginning of the month; Fig. 2 at the end of

the month. What is the reading in each case, and what will be the amount of the bill at $1.25 per 1,000 feet of gas?

5. If you use a gas stove, read the meter before and after a day's baking and find the cost of fuel. If other fuel is used, give the amount and approximate cost.
6. Where, in your experience, would a thermometer be helpful in cookery?
7. Mention several foods requiring the action of heat, yet which need little preparation and few utensils.
8. What different ways have we of cooking with the aid of water?
9. Is it possible to cook in water that does not boil? Give examples.
10. What gain in cooking certain foods over, rather than in, water? Describe utensils by which this can be accomplished.
11. What kinds of foods should be kept in the refrigerator? Describe the refrigerator, or whatever is used in its place.
12. What are the essential points in canning fruit?
13. How should dried fruit and vegetables be prepared to restore them as nearly as possible to their original condition?
14. Are there any substances suitable to add to foods as preservatives?

15. What are the relative merits of paper bags, wooden boxes, tin cans, and glass jars for keeping groceries in pantry or store closet?
16. How can you determine for yourself that there is water and fat in milk, cheese, and butter?
17. Make a menu for meals for two days, introducing as many dishes as feasible that contain milk or cheese.
18. Suggest treatment and uses for sour milk, dry cheese, and butter of poor flavor.
19. Make a white sauce three times or more, putting the ingredients together in different order each time, and report which seems the most satisfactory and expeditious.
20. Are there any questions which you would like answered, relating to the topics taken up in this lesson?

NOTE.—After completing the test sign your full name.



FRUIT SPONGE

PRINCIPLES OF COOKERY

PART II

EGGS

Since the egg is similar to milk in composition, both containing water, fat, and protein, without starch, and as there are many simple dishes in which milk and eggs are combined, it is natural that that should be our next topic.

The egg may seem a small article to have much space devoted to it, but there is no other food so indispensable to the art of cooking. A French chef has compared the office of eggs in cooking to the usefulness of *the*, *an*, and *a*, in conversation, both would be difficult without them.

Usefulness of Eggs

Aside from its great food value, and there is no egg of bird that may not be eaten, the egg is a general harmonizer in the kitchen; it serves to thicken custards and sauces; to clarify soups and jellies; to make a coating of crumbs adhere to chops or croquettes; it puffs up soufflés; it leavens a whole group of cakes; it garnishes salads and emulsifies oil into a smooth, rich dressing for them, and combined with odd bits of fish or meat, it makes many a savory dish of what would otherwise be lost.

The composition of eggs varies with the kind of fowl and its food. The edible portion of the average hen's egg is nearly 75 per cent. water, 12 per cent. protein, 12 per cent. fat, and 1 per cent. ash or mineral matter.

Since carbohydrates are lacking, we naturally combine eggs with starches and sugar which supply the class of substance missing.

Like milk, eggs may be eaten either raw or cooked, and the ways of cooking eggs, however elaborate they seem, may be reduced to a few simple processes.

We shall have the key to all cookery of eggs if we study some eggs cooked by moderate and some by intense heat.

Effect of Heat on Eggs

To see how the egg is affected by different degrees of heat, we may poach several eggs, or drop them from their shells into water at different temperatures. When an egg is dropped into a saucepan with cold water, and heat applied, before the egg begins to cook, the egg and water mingle somewhat, showing that a portion of the raw egg is soluble in cold water. As the water is heated, this soluble egg becomes cooked and rises in a thick froth on top, and if the cooking is continued longer, this froth may contract and settle. This point is turned to the cook's advantage in clearing jellies, soup stocks, and coffee. Thus even the little portion of the egg white adhering to the shell is sometimes utilized for clearing coffee.

When an egg is dropped directly into boiling water, the outer portions of it are hardened by the heat. This cooked egg does not appear to be soluble itself and, moreover, protects the under portion until that also is penetrated by the heat.

Experiment.—Boil one egg rapidly; put another into the boiling water, remove from the stove, and let stand for fifteen minutes or more. Compare temperatures with a thermometer. See which egg is more tender, and presumably, more easy of digestion.

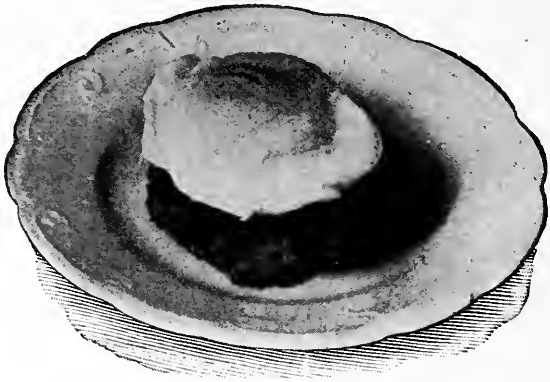
Temperature for Cooking Eggs

The white and yolk of eggs cook at different temperatures, and these appear to vary slightly with the freshness of the egg. For general use it is sufficient to remember that 150° to 180° F is ample heat for dishes composed mainly of eggs and milk. When starch is used, a higher temperature is required, and whenever possible, this should be obtained before combination with the eggs. Having learned this, we have the key to the successful cooking of all custards and the like. A custard that has curdled, or wheyed, or settled in the center, has cooked too long, or in too hot an oven. The custom of setting a custard in a pan of water in the oven is wise, for the moisture lowers the temperature of the oven. Excessive beating of eggs may aid the curdling of the custard; it certainly is a waste of effort here, however it may be in cake making.

Custards

Average custards are made with three to six eggs to a quart of milk; naturally the larger number makes a firmer custard, but the other is quite palatable. Often gelatine or corn starch is used to assist in thickening milk when eggs are expensive, but these combinations are not real custards.

Eggs with Starch There is a long list of puddings where a custard or egg and milk are combined with starchy materials. In such cases as have already been stated, it is wise to have the starch, whether in the form of rice, tapioca, sago, or corn starch, cooked in the milk before the



POACHED EGGS ON FISH BALLS.

egg is added. Bread or cracker crumbs may be combined directly with the milk, for then the starch has already been cooked.

Dropped Egg A single dropped egg may show that water need not boil in order to cook an egg. Even if a thermometer is not available, it can be seen that the white of the egg instantly changes in appearance when it comes in contact with water far below the boiling point. A muffin ring placed in the water assists in keeping the egg in good shape. A little salt and lemon juice or vinegar in the water makes the egg harden quickly on the outside instead of mingling with the water.

Value

Since we reckon the cost of other foods by the pound, for easy comparison we must estimate the value of eggs on the same basis. It will be found that the average hen's egg weighs about two ounces, and that eight good sized eggs in their shells, or nine or ten shelled eggs, weigh one pound. The fuel required, the labor of preparation, and the waste are much less with eggs than for most other foods.

Some experiments recorded in "Eggs and Their Uses as Food" (Farmers' Bulletin No. 128, U. S. Dept. Agl.), show that it cost more than twice as much to serve and satisfy at breakfast a family of over one hundred women in a college boarding hall with mutton chops or beefsteak at less than 20c. per pound, than with eggs at 25c. a dozen.

Preserving

Commercially, there are many grades of eggs, dependent upon their age. Cold storage has done away with most other methods of preserving eggs. Anything that will exclude air, without bringing ill flavor to the egg, will aid in preserving it. Eggs are available almost everywhere at all seasons and even at their highest prices, are not more expensive than the choicer cuts of meat.

An inferior egg injures all other materials with which it is combined, therefore it is never economy to buy poor eggs. When eggs are high do without them, making dishes which require few, if any; then when they are again plenty they will be all the more appetizing. With proper conditions for keeping eggs, it may be economy for some housekeepers to buy a large quantity in the fall and pack them carefully in an upright position, but many find it better to give the grocer a few cents more than to take the time and risk of loss.

COMBINATION OF EGGS WITH OTHER FOODS.

Any fundamental food, like the egg, must be served in a variety of ways or we tire of them. Foods having short seasons should be prepared in the simplest fashion.

Variety

The nutritive value of the food is not materially changed by a variation in the method of cooking, provided no additions are made to it. It may appeal more to the palate in one form than another, and the time of digestion may vary, though in the end as much may be absorbed in the one case as in the other.

Combinations to Reduce Cost

To illustrate this point, let us take two eggs costing at average prices two cents each, or four cents. Whether boiled in the shell or dropped from the shell into boiling water, their food value would be practically the same; when scrambled or made into an omelet there is a slight addition of nutritive material.

But the rigid economist says that eggs at two cents apiece are too expensive for the family of limited means. Then comes in the art of cooking to show how the eggs may be combined with less costly food materials to make several palatable dishes which may take the place of meats and yet require but little more labor in preparation.

First, the two eggs may be combined with one cup of white sauce; this may be served with the omelet, or blended with the scrambled egg, or made into a souffle, or served with hard boiled eggs chopped or sliced. **With White Sauce**

The identical quantities might be used in each case. By such combination the cost of the dish is doubled, but it will go at least twice as far and its fuel value is more than trebled. Or, instead of the sauce, we may use one cup of milk thickened with white bread crumbs and well salted and omit the butter or use less. This will reduce both cost and fuel value.

The foundation may be again extended and varied. To the two eggs and cup of white sauce may be added two ounces of grated cheese or two ounces of chopped ham. If the ham is of average fatness, the fuel value of the cheese and ham will be about the same. The ham might be more expensive than the cheese were it not that this is a way to turn to good account the smaller bits of meat. By this addition the dish, at two and a half times the cost of the eggs, becomes about five times as efficient in fuel value. **With Cheese or Ham**

This combination may be served in many forms,—the cheese may be warmed in the sauce and poured over the eggs hard boiled, poached or made into an omelet, and the ham might be used in the same way. **Serving**

After mixing sauce, cheese, and yolks of raw eggs, the stiff whites of the egg may be folded in and the mixture baked in one dish or several little ones.

All such combinations are naturally eaten with some form of bread, and here again the whole cost is diminished with an increase of fuel value.

A summary of these possible combinations may be clearer in tabular form, as follows:

	Weight.	Cost.	Cal.
2 eggs	4 oz.	4c.	161
White Sauce:			
1 C. milk	8 oz.	2c.	162
Butter	1 oz.	2c.	217
Flour	½ oz.		51
Cheese	2 oz.	2c.	246
Ham	2 oz.	2c.	207

It would be interesting to trace the history of egg cooking and find who first discovered that eggs cooked in milk, sweetened and flavored, made the palatable compound we know as custard; or who first discovered the delicious sponge cake or "diet bread," as our foremothers called it.

Sponge Cake

All our modern recipes for sponge cake, angel cake, lady-fingers, and sponge drops, are but slight variations from the recipes to be found in old cook books, which call for the weight of the eggs in sugar and half the weight of the eggs in flour.

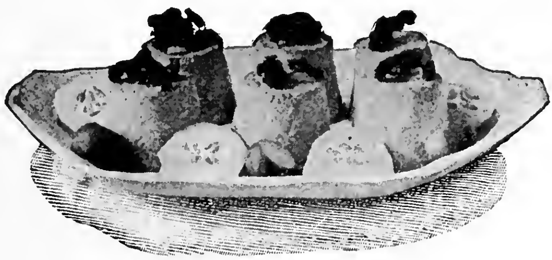
The tendency of the artistic cook is to separate the two parts of the egg, using the yolk to produce certain effects and the white for others.

The proportions are about the same in the angel cake as in the sponge cake, but the egg whites only are used. The egg yolks, left from such cakes, are more desirable than the whole egg for many custards and sauces, producing a richer and more creamy effect, since the yolk of egg contains considerable oil.

Eggs in Doughs

Eggs in doughs may better be studied here with other qualities of eggs rather than later with doughs.

Under this head may be included noodles, popovers, Yorkshire pudding, cream puffs, eclairs, tim-



EGG TIMBALES.

bale cases, fritters of many varieties, as well as sponge and angel cakes and macaroons.

From a study of these distinctly egg doughs we may see why eggs are added to muffins, puddings, etc.

Classes of Egg Doughs

These may be divided into three classes: (1) When the egg is used merely to stick flour together, such as noodles and timbale cases. (2) When the cake resulting is to be hollow like popovers and puffs, then the egg is beaten with the other ingredients. (3) Where a spongy texture is desired, the eggs are separated and beaten separately.

For such mixtures as the first class lightness is not essential, is really undesirable; hence, the eggs are beaten only enough to blend yolk and white, and not to mix air with them. In noodles, which are a kind of egg macaroni, the egg supplies liquid as well as aids in sticking the particles of flour together. After a stiff, smooth dough is made, it is rolled much thinner than would be possible if it did not contain egg. Then it is

Noodles

Pop Overs—an Example Dough Raised by the Expansion of Air.

cut in strips or fancy shapes and may be cooked at once or dried and used like macaroni.

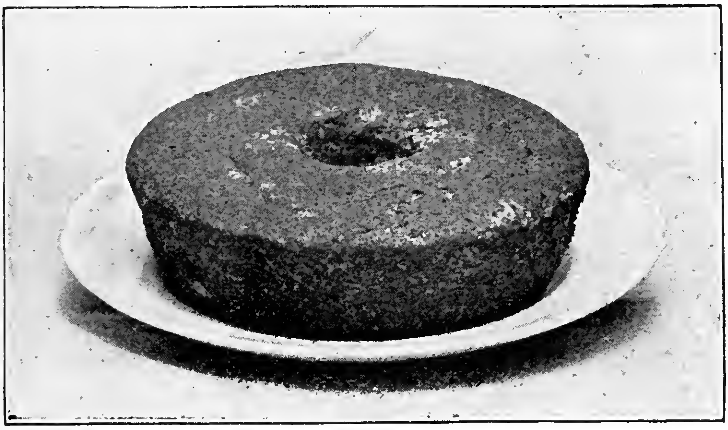
Timbales

The timbale cases are made from a thin batter, in which, to egg and flour, milk and small quantities of fat and sugar are added, and the whole beaten together until smooth. If the batter is then allowed to stand until the air bubbles escape, the timbale cases will have fewer holes in them. The hot timbale iron is then dipped into the batter and the coating adhering is fried until crisp.

The second class should be hollow, and to secure this result the eggs are beaten without separating yolk and white, or better still, are dropped in with the other ingredients and all beaten together.

Popovers

Popovers are the result of a very thin batter, usually one cup each of flour and milk, one egg, and a little salt. This is beaten thoroughly together with a Dover



SPONGE CAKE.

beater, poured quickly into greased cups, iron or earthen, and baked until thoroughly done. Yorkshire pudding is a similar combination.

Cream Puffs

Cream puffs have a cooked foundation of water, butter and flour; to this when cool the eggs are added and beaten into it one by one. Because of the scalding of the flour this is a stiff mixture and will keep its shape when dropped on flat pans, and will puff while baking. The same mixture, fried in deep fat, produces a hollow fritter which may be filled like a cream puff.

Spongy Mixtures For the third class of egg doughs and for meringues and puffy omelets, the whites of eggs are beaten by themselves and mixed with special care into the other ingredients that none of the air which has been entangled may be lost. This air expands when heated, producing the delicate lightness of the meringue, or sponge, or angel cake.

Beating Eggs The use of a whisk on a platter is the best way of quickly converting the slippery egg white into a frothy, flaky mass, so firm and dry that it may be turned upside down without slipping from the platter.

Egg beaters are not absolutely essential, for the work may be done with a fork in time. The whisks are best for beating whites alone—those with cog wheels for the whole egg or for beating batters.

When yolk and white are mixed, it is impossible to beat in as much air as into the white alone, probably because of the oil contained in the yolk. Even a very little of the yolk will prevent the whites from becoming a stiff froth.

Cooking Popovers, meringues, and sponge cake, like other articles containing large proportions of egg, require long cooking at moderate heat. When taken from the oven too soon they shrivel out of shape.

It is not wise to make cheap cakes and try to make baking powder take the place of eggs in making the mass light. When eggs are cheap, make good cakes and custards, but when they are high in price, depend upon desserts where they are not required.

FISH, FOWL, AND FLESH.

Two important animal products, milk and eggs, have been studied, and we come now to a consideration of the flesh of animals as food. The cooking of the flesh in any way is a comparatively simple matter once we have mastered a few fundamental laws which are practically the same as in cooking eggs.

The choice of different sections of a creature for different purposes and the decision as to best ways of cooking whatever cut happens to be available, are less simple.

The primitive cook applied heat to his fish, fowl, or section of meat and consumed it when cooked. The modern marketmen first divide and clean, then the chef seasons and applies the heat in different ways to the various portions. One part is naturally tender and ready for immediate cooking, another will be better if kept a week or a month, others will be improved by salting or smoking.

Savages have fewer kinds of food and simpler methods of preparation than civilized man. Because of greater abundance it is a natural tendency in civilization to discard as refuse certain portions formerly eaten. On the other hand, business competition makes it necessary to save all by-products and every portion of an animal is used for some purpose and brings some money return, even though small. Were it not for this, our animal foods would be higher in price than they are. As it is, they are the most expensive part of the daily food.

Meat a Secondary Product

This is partly due to the fact that the flesh of animals is a secondary product. Animals consume grains and require additional human care, and thus must cost more than the grains, themselves, alone. Moreover, it has been learned by dietary studies that average families in the United States obtain from half to two-thirds of the protein in their food from animal source, and the cost of food is usually proportionate to the demand.

Comparative Composition of Animal Food

The composition of all animal foods is similar. Milk is mainly water, but contains some of each of the food principles. Eggs have less water than milk, and no carbohydrates, but furnish larger proportions of fat and protein. Fish would average about the same proportion of protein as eggs, but rather less fat. Poultry yields more protein than eggs, but about the same amount of fat. The flesh of the larger animals will average about two-thirds water, the protein and fat being in varying proportions according to the age and condition of the animal.

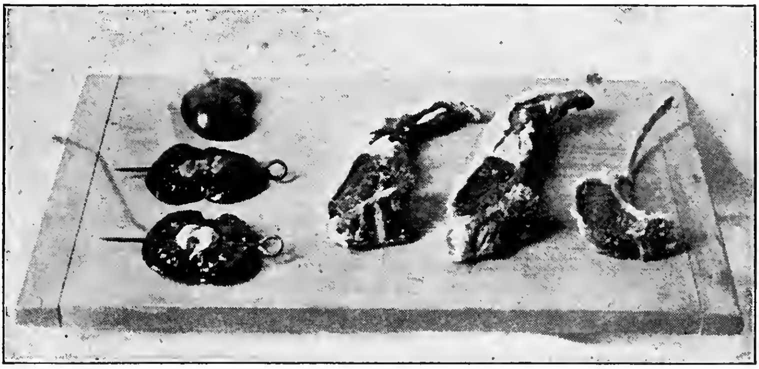
Costs of Meat

Without regard to the names given by marketmen of different localities to the cuts of meat, we may learn the location of the choicest pieces. Cuts which offer tender muscle or large proportion of muscle will naturally command the higher prices.

In any of these animals the framework of bone is practically the same. The larger portion of bone is in the forequarter. This is one reason why the forequarters are cheaper than hindquarters in our markets. Consequently, there is less nutritive value per pound and what there is is less accessible, for the meat is not easily carved unless boned before cooking.

Judging Meat

Meat of any kind should have little odor when in good condition. It should be firm and dry rather than



LAMB CHOPS AND KIDNEYS.

moist, and should be well marbled with fat.

The lower part of the legs will have little muscle in proportion to the bone, and there will be tendons holding the muscle to the bone.

Toughness

Muscles getting little motion or exercise will be tender, while those which are active will be tough, though juicy. The neck and legs, therefore, will be suitable for broths but not desirable for roasts.

A general rule is this: the market value of meat increases backward from the head, but decreases downward toward the legs. This brings the choicest cuts in the back upper part of the creature and includes the rump and loin.

The muscle of good beef is dark red when first cut and grows brighter when exposed to the air for a short time. The fat is yellowish white.

Mutton and Lamb

Mutton and lamb have a hard white fat. The flesh of mutton is a duller red than beef. The lamb is pinkish in tinge. The bones of veal and lamb are smaller than those of beef and mutton. Veal and fresh lean pork are somewhat the same shade of dull pink, but the pork has more fat mixed with it.

Meat from young animals is tender but not so nutritious, and does not keep so well as that from older ones.

The heart, liver, sweetbread, kidney, tripe, are also used as food and the same general laws govern the methods of cooking them.

The chef may not recognize the same elements in meat that the chemist does, yet his choice and preparation of a cut of meat are based upon its composition. From this point of view, meat consists of three parts: lean muscle, fat, and bone, and the market value of any cut is based upon its relative proportion of these.

Lean meat is most desired and tender fibres command the higher prices. Some fat is utilized with the meat, but a large part goes to the manufacture of artificial butter, lard, and soap. Much of the bone is refuse, but some of its substance may be extracted by right treatment.

The lean portion of meats is about one-fifth or twenty per cent. protein about five times as much as in an equal weight of milk.

Preparation The muscle or the lean meat may be freed from skin, gristle, bone, and fat, wholly or in part before cooking. It is easier to serve when this is done, and there is no waste at the table, but there may be loss of flavor. Raw meat may be digested readily, but we cook it to make it more attractive in appearance and more appetizing in flavor.

Some Fat Needed Some fat is required to keep the meat from drying during the cooking process. Often the muscle is so closely associated with bone, tendon, and gristle, that to remove them would cause serious loss of juice. In any case, when the tougher portions are removed they should be used for stock and their flavor returned to the muscle as a sauce or used for soup or other good purpose.

Tender muscles may be cooked quickly—steaks and roasts—and should be exposed to intense heat at first.

Tough Meat Tougher portions may be made more palatable by pounding to separate the connective tissue, but this is often accompanied by loss of juice, or they may be put through the meat chopper or cooked slowly for a long time in a gravy, or both.

Browning By browning tough meat first we give it a good flavor and sear the surface so that more of the juice will be retained than if raw meat were used. Some scraps of fat may be browned, an onion sliced and fried in the fat, an equal measure of flour added, and when it is mixed smoothly with the fat, water is put in, in the same proportions as for white sauce. The meat is put in the gravy and left covered on the back of the stove to cook slowly, later vegetables are added.

Braising Braised meat and pot roasts are similar in effect, but large pieces of meat are used and more time is required. All the trimmings, except the fat, are put with the bones, covered with cold water and the kettle is set on the stove to heat slowly.

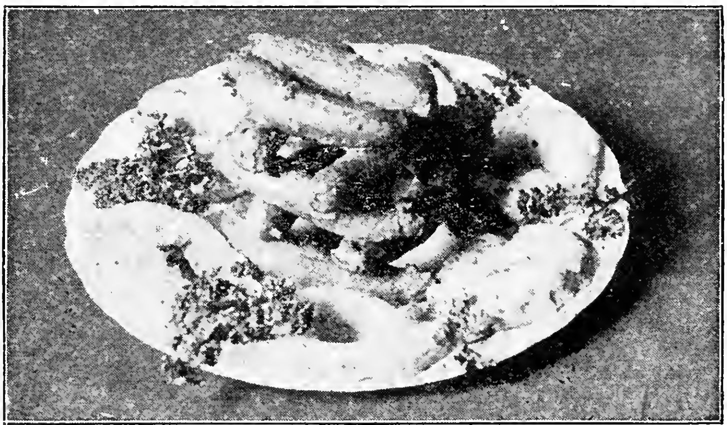
Salt Meat Salt meats should be cooked slowly in plenty of water until tender. When the meat is very salt, it should be put on in cold instead of boiling water.

Fatness Wild animals usually are less fat than those that have been raised for food. Excessive fat may mean disease. Young animals have but little fat compared with older ones. Half the weight of a pig may be fat and a fourth of a fat sheep or ox. Some portions of a creature will contain much more fat than others. Layers of fat occur around the inner organs of animals. Some fish have fat or oil in the liver and little or none elsewhere. Fat mingled with the lean tissues is partly visible, partly detected only by chemical methods.

To a certain extent fat takes the place of water in the tissues. In fat meat the purchaser gets the same amount of protein but buys fat instead of water.

Saving the Fat

The surplus fat purchased with meats should be turned to good account by clarifying it for shortening or frying. It should be freed from the protein matter as far as possible by trimming and soaking in cold salted water. The water should be changed often, and the fat, after being cut in small pieces, may soak from twelve to twenty-four hours. Then it is drained and



SAUSAGE AND FRIED APPLES.

heated slowly to separate the clear fat from the heavy, honeycomb-like tissues which contain it. At the end of several hours the fat will have melted and may be strained from the crisp brown tissues. If raised to too high a temperature the fat is less wholesome and well flavored.

In the average household, trimmings of beef, pork, veal, lamb, and poultry, may be prepared together for fry fat, and where much meat is used will keep a supply in the frying kettle.

Frying in Deep Fat

Frying in deep fat is a satisfactory method of securing a crisp, brown crust. When the process is properly conducted very little fat is absorbed by the food.

The temperature of fat suitable for cooking is much higher than that of boiling water and ranges from 300° to 400° F, according to the nature of the article to be cooked. For doughs which should rise, and fish which must be cooked through, a lower temperature and longer time are required than for fishballs or croquettes, already cooked and only to be browned.

If many pieces of cold food are put into the kettle of fat at one time, the temperature will be lowered so much that they may absorb fat and even fall to pieces.

Testing Temperature

A bit of bread dropped into the kettle will brown in one minute if the fat is right for frying doughs, and in less time if it is ready for croquettes.

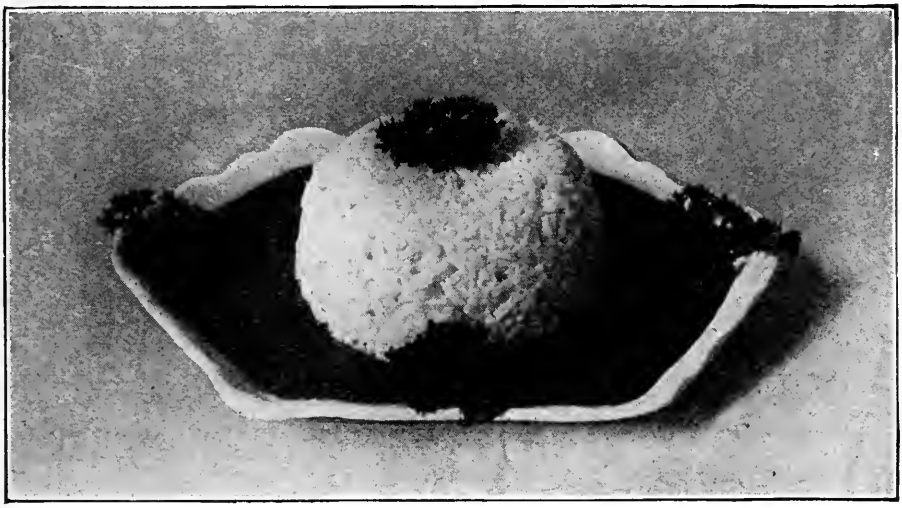
Fat by itself does not boil, but when moist food is put into it large bubbles of steam begin to form. At first the foods being cold and heavy sink to the bottom of the kettle; as they warm and the water escapes, they rise toward the top.

As soon as the food is brown it should be removed from the fat and drained on soft paper before serving.

Bones

The bones of animals yield considerable nutritive material if we use proper methods to extract it. Marrow is found in the leg bones, but they have not so much protein matter as the spongy rib bones. When meat is boned before cooking, bits of meat cling to the bone. By soaking in cold water, then cooking gently, a large part of the flavor and nutritive part of the bone is dissolved in the water. Cartilage, gristle

Extracting Nutriment

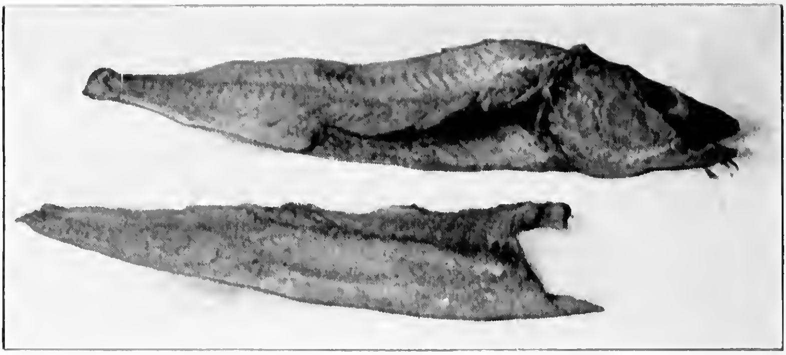


MEAT LOAF IN RICE.

and tendons are also somewhat soluble when exposed to moisture and heat. The smaller the pieces into which bone and meat are divided the greater the surface exposed to the dissolving action of the water. The flavors of meat which are drawn into the water are known as extractives and are stimulating rather than nourishing.

Soup Stock

This process of extraction from portions unsuitable to eat is known as making soup stock. Bouillon and beef tea are made from tough lean meat with little



FILLET CUT FROM SIDE OF FISH.

or no bone. Consommé is made from meat and poultry together. Anything that would give a strong flavor must be removed. The skin of lamb or beef should be thrown away.

Names of Soups

The flavoring of the soup or the garnish served in it gives its distinctive name. All meat, poultry, and fish soups have as their basis a stock made from the portions undesirable to use in any other way.

Yet stock contains but a small proportion of the nutriment of the meat, and fibre of the meat from which stock has been made may be used for hashes, with herbs, etc., to give flavor.

FISH.

Proper Appearance

Fresh fish have full lifelike eyes, red gills, silvery, not slimy skin and scales, firm tail, not flabby and drooping, and firm flesh. Plump short fish are better than long thin ones of the same variety. The time of their transfer from the water to the table should be as short as possible. While fish as a whole is not so nutritious as meat, it may often take the place of meat on our tables. It is the province of the cook to supplement the fish with such sauces as will supply both flavor and nutriment.

Methods of Cooking

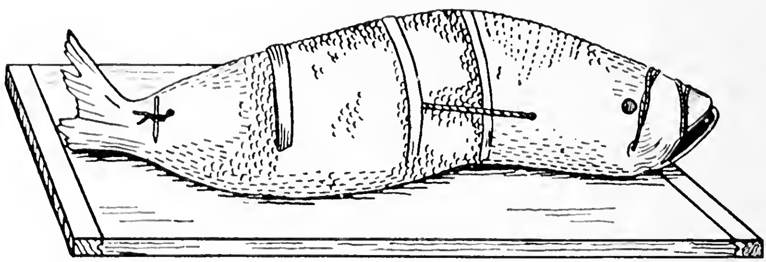
In general, the methods of cooking fish are the same as those followed in cooking meats. The flesh should be thoroughly cooked, but not overdone. Oily fish, like

PREPARATION OF FISH.

For Fish Stock. Ready to Fry.

salmon and mackerel, are best broiled. Almost any fish may be baked whole or in fillets. Boiling is an extravagant method of cooking unless the water is used for a soup or a sauce. Steaming is better than boiling, as more of the flavor is retained in the fish. Frying in salt pork fat is a desirable way to cook fish lacking flavor or fat, but for uniformity in cooking the kettle of deep fat is to be preferred to the thin layer in a shallow pan.

If a fish lacking in fat is brushed over with oil or melted butter and broiled under gas, the result gives the best effects of frying without the disagreeable odors.



FISH STUFFED AND TRUSSED FOR BAKING.

Fish stock may be kept for several days if convenient, or it may be used as the basis of a sauce to serve with the fillets of the flesh.

Sauces with Fish

Since so many varieties of fish lack fat, rich sauces are generally considered a necessary accompaniment. The composition of the fish and the way in which it is cooked should decide the kind of sauce to be served with it. Acids like lemon juice, pickles, and tomato are often agreeable additions to a fish sauce.

POULTRY

Judging

Young birds are to be chosen for broiling and other quick cooking, but full grown fowls are more nutritious for broths and stews. A fowl is usually fatter than a chicken, the skin is tougher, and the bones—especially the tip of the breast bone—are harder. In the skin of the young bird there are usually pinfeathers, the feet are smoother, and the muscles or flesh are less well developed than in the fowl.

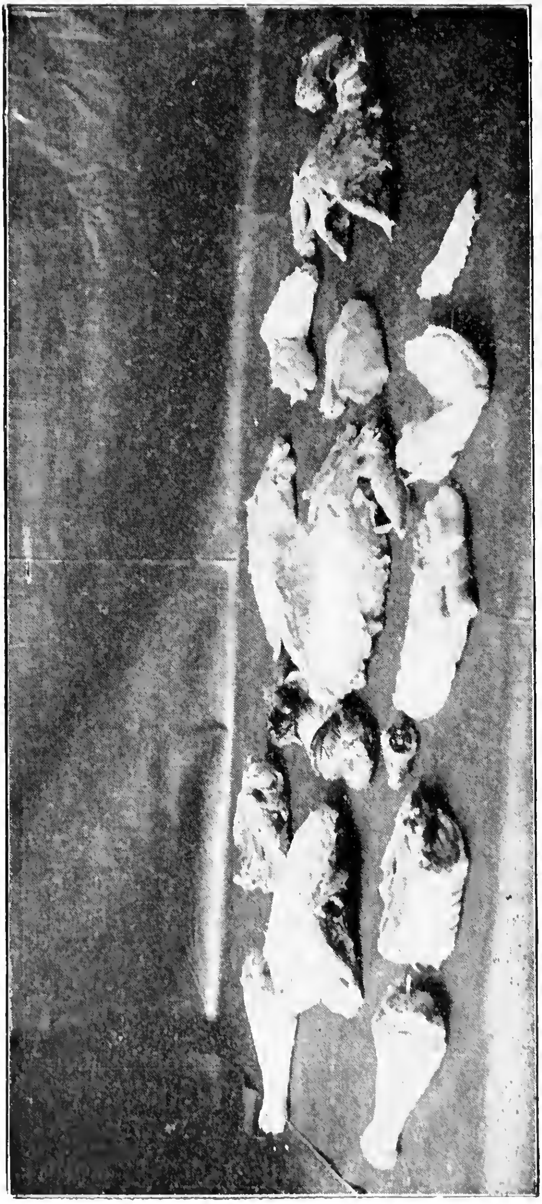
Preparing Fowl for Fricassee

To prepare poultry, pick out pinfeathers, singe and rub off the hairs and wipe clean. Cut through the loose skin on the back, pull away from the neck, take out the crop and windpipe in front, cut off the neck.

Cut through the skin on the legs about an inch below the joint, break the bone, twist the leg and pull out the tendons one by one. Take off the wings and cut through the loose skin on the sides and separate the leg and thigh joints.

From backbone to tip of breastbone cut through thin muscles on either side. This exposes the interior organs so that it is easy to learn their relative positions. Then one knows how to proceed when preparing a bird to roast when the opening is small.

Loosen the membranes which attach these organs to the body, following the breastbone with the fingers until the point of the heart is felt. Then remove heart, liver, and gizzard together. The gallbag is protected by the liver, so there is little danger of breaking it if



A FOWL CUT UP FOR FRICASSEE.

they are not separated. The intestines should be removed when the fowls are dressed for market.

Next detach the lungs from the backbone near the wings, and the kidneys, which are lower down in the back. These are not used.

Separate the gallbag from the liver without breaking, and cut away any portions of the liver which are tinged with green. Cut across the larger end of the heart and slip it out of the membrane enclosing it. Cut through the gizard on the wide side and take out the inner portion without breaking, if possible.

Order of Removal

Learn the order of removal of these portions from the body, and then nothing will be forgotten when preparing a bird for any purpose,—the crop and windpipe from the neck.

The heart, liver, and gizzard, together, from an opening near the tail.

The lungs and kidneys from the hollows in the backbone.

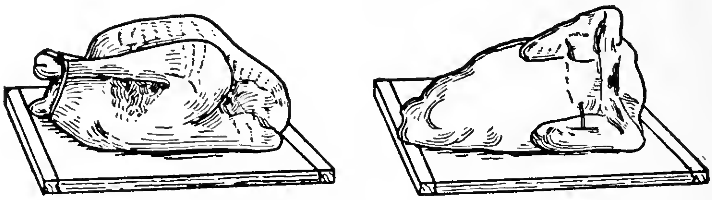
The oil bag on the upper part of the tail.

The backbone can now be divided near the middle, and by slipping a knife under the sharp end of the shoulder blade and then cutting through the ribs from the point where the wings come off, the upper part of the back is separated from the breast.

If desired, the fillets of white flesh can be separated from the breastbone and wishbone by running the knife close to the bones.

Never soak a fowl in water, as is often the practice. If any parts need washing rinse them off quickly one by one.

The breastbone, upper part of back and neck, and sharp ends of wings should be put in cold water and



CHICKEN STUFFED AND TRUSSED FOR ROASTING.

heated slowly; thus more flavor is extracted from these portions which have but little meat.

Put in Boiling Water

When the water is boiling hot the other sections are put in and the hot water coagulates the juices on the outside and thus more flavor is retained. To accomplish the same end, the joints are often browned in hot fat and then are stewed afterward.

VEGETABLES AND GRAINS.

Like the foods already studied, vegetables are mainly water, but all the five food principles may be obtained from the vegetable kingdom. Here we secure our supplies of starch and sugar, or the carbohydrates, but the proportions of proteid and fat are, as a whole, smaller than in the animal foods. From fruits, vegetables, and grains we obtain mineral substances valuable for making bones and teeth and keeping the whole system in good condition.

Softening Cellulose

The woody fibre or cellulose, abundant in vegetable structures, is the great obstacle to be overcome by cooking. Plants growing rapidly with plenty of water and sunshine usually have less of this fibre, and it is the aim of the gardener to eliminate it as far as possible. By improved methods of cultivation the agriculturist has removed the acrid flavors of the natural vegetables and has reduced the proportion of woody fibre.

The cell walls cannot be separated wholly from the nutritive substances they contain, and unless softened by cooking may irritate the alimentary canal so that the whole is hurried through before digestion is completed. Cellulose, though of little food value, may aid digestion by providing the necessary bulk for its mechanical processes.

Experiment. To get a clear idea of the structure and composition of vegetables, grate a portion of a potato or turnip. Let the pulp fall from the grater into a strainer placed over a glass and press out all the watery juice possible. Some of the starch of the potato will settle from the juice, and more may be washed out of the mass remaining in the strainer. The presence of sugar in the juice of a carrot may be recognized by tasting it after evaporation.

By examination of the woody fiber left in the strainer, we see how closely it is connected with the starch and sugar, how impossible it would be to separate it, and the necessity for softening it that we may be able to digest the nutrients.

We discard portions of vegetable foods, the pods, husks, cobs, etc., because of our inability to cook them so they can be digested.

Chopping and straining aid the cook in dividing the cellulose so that the particles are less irritating and the nutrients are more accessible.

Parts of Plants Used for Food

It is interesting to note the different parts of plants which are used for food—the roots, tubers or bulbs, stems, leaves, fruits, and seeds. The last are used mainly in the dry form, and absorb much water in preparation. This must be remembered when studying analyses of dried legumes and cereals.

The botanical grouping of plants is helpful. Once we have learned how to prepare and cook one member of a plant family we have something to guide us with its relatives. Among the principal classes to study in this way are the pulses, the grains, and the cabbage family.

There are many kinds of each vegetable offered by the seedsmen. Moreover, any vegetable differs materially in different years and at different seasons of the year.

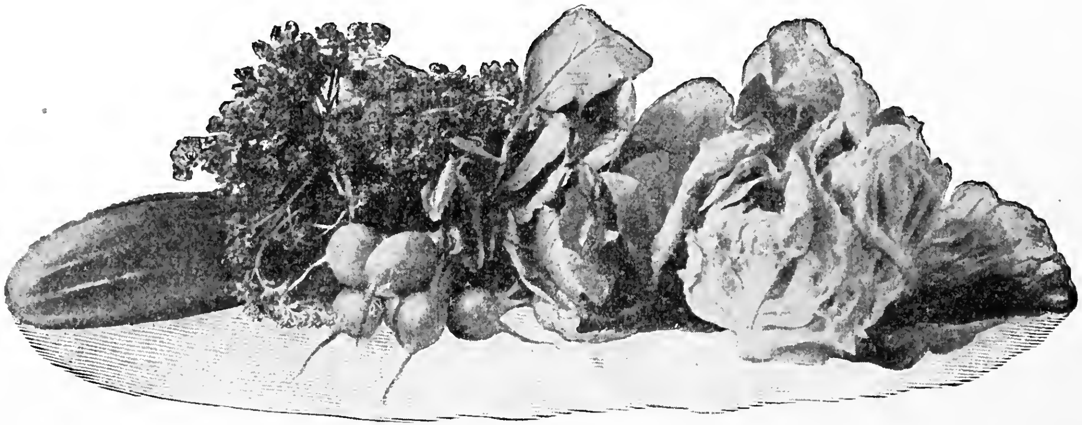
From the standpoint of the cook a convenient classification of vegetables may be made according to the general preparation, the time, and the amount of water required for cooking them.

Dried Vegetables

Dried vegetables must have abundant water supplied and must be allowed time to soak, thus absorbing an amount of water similar to that lost in the drying process. There is little difference aside from the fat added in cooking, in the analysis of the dry bean which has been soaked and baked, and that of the green shelled bean. Sometimes we try to hasten this process of absorption by heat, but the best results are attained when dried fruits or vegetables are soaked until at least double in size before cooking.

Strongly Flavored Vegetables

Old or strongly flavored vegetables, such as potatoes, turnips, and onions, will be improved by the removal of the skin and any imperfections before cooking, and by soaking in cold water for an hour or two. Inferior onions may be scalded in soda water before cooking, and by changing the water once or twice during the cooking process will be rendered less strong in flavor. It is wiser to make the vegetable palatable



SALAD PLANTS.—Cucumber, Parsley, Radishes, Cabbage, Lettuce.

at the risk of some loss of nutriment than to retain everything and have it uneatable.

Young Vegetables

Young vegetables in summer and those having sugary juices, like squash and beets, should be cooked in little water or by steaming or baking, so that all their sweetness may be retained, unless the water is reserved for soup or used in a sauce for the vegetable itself.

Wilted Vegetables

Slightly wilted vegetables may be improved by washing and soaking or by wrapping in a damp cloth and placing in the refrigerator or by hanging in a draft of air.

Pulses

The pulses or leguminous plants include the bean, lentil, pea, and peanut.

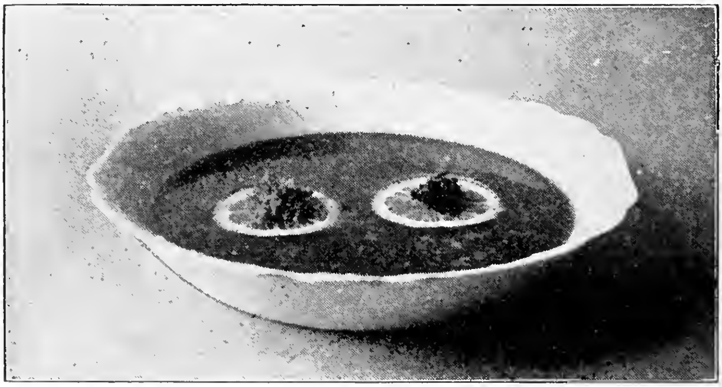
In the bean we have an example of a vegetable which differs much at different stages of growth. We may use the pods before the seeds they contain have reached their normal size, the full grown seeds may be cooked green, or dry after first being soaked.

This class of plants is of great value where people must be fed at small expense. They are staples in in China, Japan, Southern Europe and Mexico, are invaluable in prisons, charitable institutions, and for the pioneer or logger. Because they lack fat, cream, butter, or pork are added before eating.

Fat Contents

Some varieties like the Japanese soy beans, contain as much as sixteen per cent of fat, and peanuts are more than one-third, or about forty per cent fat.

Digestibility Though rich in nutrients this class of vegetables appears to be slow of digestion. The ease and completeness of digestion are aided by thorough cooking and by removing the skins, grinding, mashing, or straining. Long, gentle cooking develops new flavors and removes the peculiar granular texture present in beans and peas insufficiently cooked, even after straining.



Black Bean Soup Garnished with Lemon and Parsley.

The main object in cooking beans, like all vegetables, is to soften the tough fibres of the pods of the string beans and the skins and cellulose of the dry ones.

Peas Split peas have the skins removed and thus are more readily digested. The skins of the larger beans may be rubbed off after soaking and parboiling.

Hard water retards the cooking of beans and a bit of soda is often added to soften the water and loosen the skin—this water is poured off when the beans are partly cooked.

Beans

Few people use the variety of beans they might, as the black beans for soup, the limas or red kidney for stewed beans, the pea bean and yellow eye for baking and the French flageolets for salads.

Potatoes

Potatoes are generally liked because of their lack of pronounced flavor, and for the same reason, may be combined with many other foods.

A peck of potatoes may cost from fifteen to seventy-five cents, according to the season of the year, and the abundance of the crop. This quantity will weigh fifteen pounds and will average from fifty to sixty potatoes. That is, one pound will be about four potatoes of medium size, and will cost from one to five cents.

Loss in Preparing

If pared before cooking and all bad places removed, average potatoes will lose from twenty to twenty-five per cent, or one of the four potatoes in a pound. From selected potatoes the government experts scraped the skins, removing as little flesh of the potato as possible. This was about eleven per cent of the weight. In potatoes as usually purchased, the green ends, decayed places, and the potatoes gashed with the hoe easily bring the total loss up to the higher percentage.

It may be a profitable loss to pare old and inferior potatoes before cooking. The main point to notice in the cooking of the potato is to let out the steam, or to pour off the water as soon as the fibre and starch are softened.

Potatoes with Meat

Because the potato is lacking in protein and fat, the instinct of man has taught him to eat it with meat, since it gave him the food principles the meat lacked, and also the bulk desirable for the process of digestion.

The art of the cook has devised many methods of combining butter, oil, milk and eggs with the potato and other vegetables to supply protein and fat. The fried potato absorbs fat while cooking; the white sauce of creamed potato adds both fat and protein; a potato soup is creamed potato with more milk; the potato croquette contains egg and is cooked in fat; a potato salad has oil and often eggs.

Such additions, though increasing the cost of the food, make the result equivalent to vegetables with a moderate allowance of meat. Hence vegetable soufflees, or croquettes, may be served when the meat supply is limited.

Combinations

Almost any vegetable, by due combination with milk, butter, and eggs may appear as soup, fritters, croquettes, soufflees, or salads. For these complicated dishes, it is essential that the vegetable first shall be perfectly cooked in a simple fashion.

Cooking Vegetables

The methods of cookery applied to vegetables are similar to those used for meat, but must be adapted to the composition and condition of the individual specimen.

It is impossible to give the exact time for cooking any variety of vegetable, for every sample will differ. They are unpalatable when underdone and also at the other extreme.

There is usually some way of cooking best for each vegetable, but if one kind only is available it is necessary to serve it in a variety of ways. This, perhaps, explains why the average cook book gives more receipes for the potato than for all other vegetables. Suitable utensils are essential; vegetables should not be cooked in iron kettles when others are attainable; strainers, mashers, cutters, ricers and presses are desirable.

Preparation

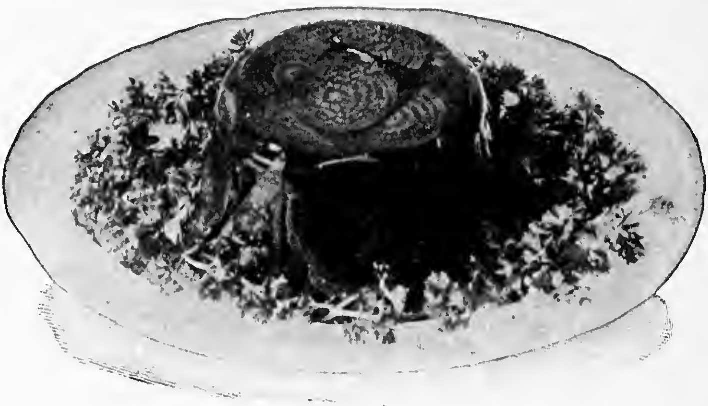
Strong flavors frequently are due to careless preparation. Careful trimming and thorough washing are essential. Wilted vegetables are improved, as has been said, by soaking. Salad plants need especial care in washing to remove parasites and insecticides.

Any portion of a root or tuber grown above ground becomes green and strong flavored and will impart its flavor to other portions with which it may be cooked. A decayed bit, or the scorching where the water evaporates, may often ruin the flavor of all.

Young, tender, well flavored vegetables should be cooked and served in the simplest manner. Inferior specimens, like tough asparagus or celery which has lost its crispness, by boiling, straining, and flavoring may be made into palatable soup when they would be worthless under simple treatment.

Vegetable Soups

Vegetable soups are of two types;—for one, the vegetables are cooked till tender, cut in convenient bits and added to a meat stock. For the other, by long cooking in water a single vegetable or several together are made into stock, and all that is soft enough is rubbed through a strainer and then put with about an equal quantity, according to the strength of each, of



TOMATO JELLY WITH BEETS.

meat stock or thin white sauce. Thick, pulpy stock, like that from peas, beans, or potatoes, needs a much thinner sauce than would celery or asparagus. Unless some thickening of flour is used, the solider portions will settle, leaving the soup watery on top.

Preparation and Digestibility

In one of the publications of the United States Department of Agriculture the difference in digestibility of the same food cooked in various ways is thus stated: Whole peas soaked and cooked, 60 per cent digested;

peas cooked a long time and strained, 82.5 per cent; pea flour cooked with milk, butter and eggs, 92 per cent. This would seem to prove that the portion of vegetable food considered undigestible can be reduced by right methods of cooking.

Mashing

Mashing is a form of preparation suited to squash, turnip, parsnip, and potatoes. A seasoning of cream,

INDIVIDUAL APPLE AND CELERY SALAD.

or butter, and salt and pepper, is usually added. Fritters and croquettes usually have mashed vegetables as their foundation, or small bits are mixed with a thick cream sauce.

Creamed Vegetables

The white sauce is a useful additon to vegetables since it increases their nutritive value and modifies strong flavors. Almost any cooked vegetables may thus be "creamed" or "scalloped" by adding both the sauce and buttered crumbs and baking. This is an excellent way to reheat something left from a previous day.

Salads Salad is a term belonging especially to a class of uncooked vegetables and in all cases implies a vegetable foundation though meats or fish may be added. The dressing of oil and vinegar is likewise of vegetable origin.

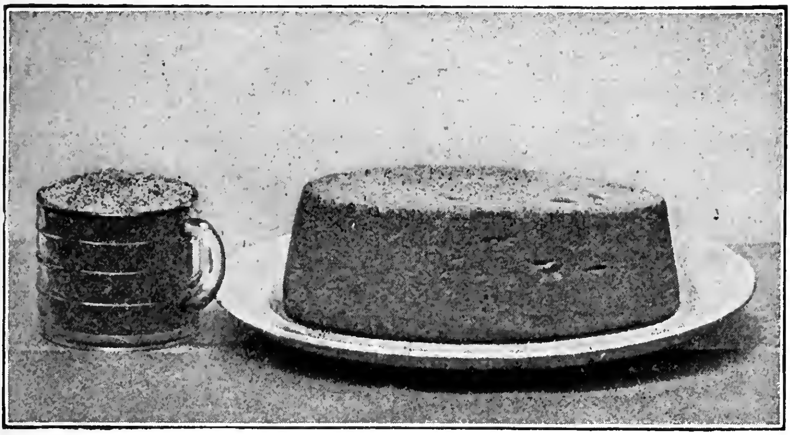
Here is another of our attempts to bring together the five food principles in a single compound. Water and mineral matter, protein, fat, and carbohydrate are usually blended in fairly balanced proportions. This is especially true of salads containing eggs, fish, or meat and eaten with bread.

GRAINS

The grains or cereals are the main dependence of the human race for food and have been known from very early times. Some member of this family of plants is found in every section of the world. Rice, wheat and corn are most largely used as food, while oats, rye, barley, and millet follow closely. Animals can eat these grains or grasses as they grow. For the human stomach the coarser portions must be removed. All are similar in composition, being from two-thirds to three-fourths starch. The protein ranges from 7 to 15 per cent; fat varies from 1 to 10 per cent; there is about 1 per cent mineral matter and 10 to 12 per cent of water.

Addition of Water Before we can eat and digest such foods a large amount of water must be combined with them. Analyses have shown that the percentage of water in mushes, boiled rice, macaroni, and mashed potato is nearly the same.

When we buy cereals in paper packages we pay a little more for them than when they are bought in bulk, but that is a convenient, clean form in which to keep them. All cereals should be looked over before cooking since they are liable to attacks from insects.



A Cup of Corn Meal, and the Amount of Mush It Will Make.

To make mushes start with the desired proportion of liquid, as that regulates the final amount. If too much water is used it can seldom be drained off, as it might be from potatoes, and if there is too little at the beginning it is practically impossible to add more without making the mush lumpy and pasty. A double boiler, a dish set in a steamer or a covered pail in a kettle of water, are the utensils suitable for cooking mushes. **Mushes**

Cooking Cereals

The coarser the grain, the more water required, and the longer will be the time of cooking. Whole grains are improved by soaking in cold water, finely ground preparations must be mixed with cold water to prevent the formation of lumps. All others should be put into boiling water. Add one teaspoonful of salt to each quart of water. Ordinary oatmeal and granulated wheat need four times their bulk of water, cracked wheat and hominy require more. The rolled grains require but twice their bulk of water.

The cooking at first should be rapid and the upper part of the double boiler should be placed directly on the stove for five minutes. Then put it over the other part, cook closely covered and do not stir. Such foods are not injured by cooking for a longer time than the usual directions allow. Coarse hominy, oatmeal, or cracked wheat for breakfast should be cooked several hours the previous day.

Rice

Rice may be boiled in a quantity of water which is afterwards drained off, but this is wasteful unless some use is made of the liquid.

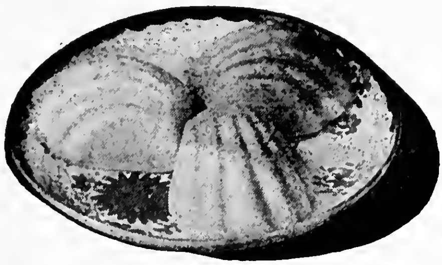
Macaroni and tapioca are not strictly cereals but conform to the same rules of cooking.

Fried Mush

Most mushes or cooked cereals may be moulded and served cold for variety, especially in warm weather, or be packed smoothly in oblong pans or round tin boxes and when cold sliced and fried to serve with syrups or to eat with meats.

A portion of cooked cereal may be added to the liquid used in mixing muffins.

Manufacturers of the present day seem to be trying to see in how many different forms they can prepare the few standard grains; they are left whole, are cracked, are crushed into flakes, or broken into granules. As the result of this variety of preparations and



Cereals shaped in Fancy Moulds.

the generous way in which they are advertised cereals are used more and more.

"Ready to Eat" Cereals

During the last few years they have been cooked in the factories and prepared in forms ready for immediate use. These forms have many merits though not all that are claimed for them. In some respects they resemble the primitive forms of unleavened bread which were the first attempts among all races, the bannock, the hoe cake, the tortilla.

PRINCIPLES OF COOKERY.

PART II.

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. *Do not copy answers from the lesson paper.* Use your own words, so that the instructor may know that you understand the subject. Read the lesson paper a number of times before attempting to answer the questions.

1. In what ways are eggs used in cookery?
2. What substances are naturally combined with eggs and milk, and why?
3. What is the fundamental principle in cooking articles containing a large proportion of egg?
4. Mention five dishes where egg is an essential ingredient, and five others where it may be used or omitted. Explain why.
5. If we find it necessary to reduce the number of eggs in a cake or custard, what other changes would be necessary?
6. Make a two days' menu for the season when eggs are at the lowest price, and two days' menu for the season when they are expensive.
7. Which forms of animal food are the most expensive and why?

   Which most economical and why?
8. What portions of meat are best for soup stock? What should be discarded? Describe the process of making soup. Has the extracted meat nutritive value?

9. Why is less fat absorbed by food in frying in deep fat than in sautering?
10. Give methods of preparing tough meat so that it is palatable and nutritious.
11. Give the names of soups which have (a) little, (b) much, and (c) great nutritive value.
12. Why do we add stuffing and sauce to meats and fish?
13. What is the greatest obstacle to be overcome in cooking vegetables?
14. Give methods for cooking fish. What is the proper appearance of a fresh fish?
15. Plan a rotation of different cereals for five breakfasts in winter and five in summer, giving reasons for your choice.
16. How may different methods of preparing a vegetable change its nutritive value?
17. Describe your own method of roasting meat.
18. Give the names of the vegetables and grains used in your household. Name some that are not used.
19. Is there any question you wish to ask or subject you would like to discuss relating to this lesson?

NOTE.—After completing the test, sign your full name.

STEAMED PUDDING, CHRISTMAS DECORATIONS

PRINCIPLES OF COOKERY

PART III

BREAD AND OTHER DOUGHS

Order of Mixing Ingredients

Having considered the whole grains we must learn how to use them when ground into flour. Although some forms of bread like hoe cake and tortillas can be made from cracked grain without making it into a flour, most people depend upon flour for a large part of their daily food.

In the best cook books the ingredients are mentioned in the order in which they are to be put together to secure the best results and to save dishes; the dry cups and spoons are used for the flour and spices, then for the shortening and liquids. The flour is sifted before measuring and sifted again to mix the other materials with it.

General Proportions in Doughs

There is such variation in flours that it is impossible to give exact recipes for doughs, but it is easy to learn certain general proportions and experience must teach the rest. A simple formula will be helpful in interpreting old recipes in which the exact quantities of flour or liquid are not stated, or in analyzing recipes to decide whether they are doughs or batters.

One measure of flour to one of liquid makes a batter.

Two measures of flour to one of liquid gives the usual muffin mixture.

Three measures of flour to one of liquid makes a soft dough, but one that may be kneaded.

Four measures of flour to one of liquid is the usual proportion for doughs to be rolled thin like pastry or cookies.

Batters and muffins can be stirred with a spoon. Doughs are mixed more thoroughly and easily with a knife.

Doughs are made light because thus they are more palatable and digestible.

Making Doughs Light

The almost endless variety of breads, cake, and pastry may be classified according to the means used to make them light. Yeast has been known to the human race from a very early period, the others are much later inventions.

The principal means are these:

The mechanical introduction of air, as by beating or by the addition of eggs or by the folding of pastry, or in the aerated or Daughlish bread.

The use of yeast, the growth of a plant filling the dough with gas.

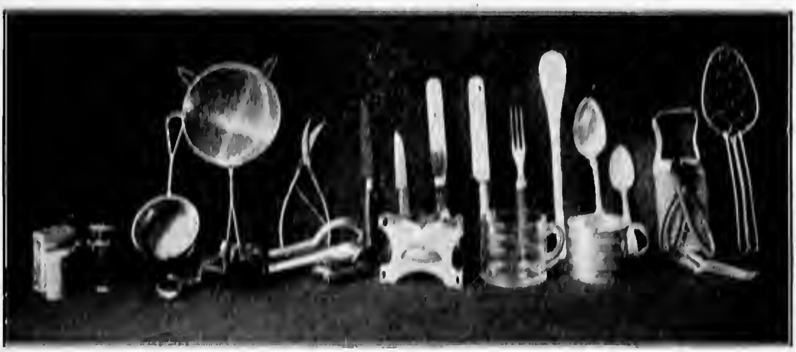
The chemical combination of a bi-carbonate of soda, with some acid substance.

Yeast

For practical use in every-day life it is essential to remember that yeast must be treated like other forms of plant life and if we want it to grow, we must provide the right kind of soil, sufficient moisture, and suitable temperature. After its work is done, the vitality of the yeast must be destroyed by heat.

It may be desirable to know how to manufacture yeast at home and how to utilize the dried yeast cakes in emergencies, though compressed yeast cakes are now so generally used that it is hardly necesary. A compressed yeast cake should be firm and solid, not soft and pasty; it should look something like fresh cheese, not dark colored and moldy. When only part of a

Yeast Cakes



USEFUL UTENSILS.

yeast cake is to be used, it should be cut off squarely and the remainder wrapped smoothly in tin foil again, when it may be kept a few days longer.

BREAD

The essential ingredients in bread making are yeast, liquid, and flour; the proportions may be varied according to conditons.

Sugar and shortening are commonly used, but if they were omitted wholly it would be possible to have palatable, nutritious bread. Salt is essential to suit the taste of most persons, but as bread is usually combined with salted butter its absence would be less noticeable, and bread might be made without it. Fermentation is hindered by the presence of salt, a small amount of sugar hastens the process.

Causes of Slow Rising

Sugar in large quantities makes the dough dense and the yeast cannot expand so readily. An excess of shortening has much the same effect. If a dough is made stiff with flour it rises more slowly. A stiff dough usually has small air cells and is finer grained than when the dough is made softer.

The liquid may be milk, whole or skimmed, or water, or half of each. The milk supplies some sugar, fat and nitrogenous matter and produces a more nourishing loaf than that which is made with water. Mashed potatoes or sifted squash or cooked cereals are sometimes added to a bread dough for variety, but the process is not changed by such additions.

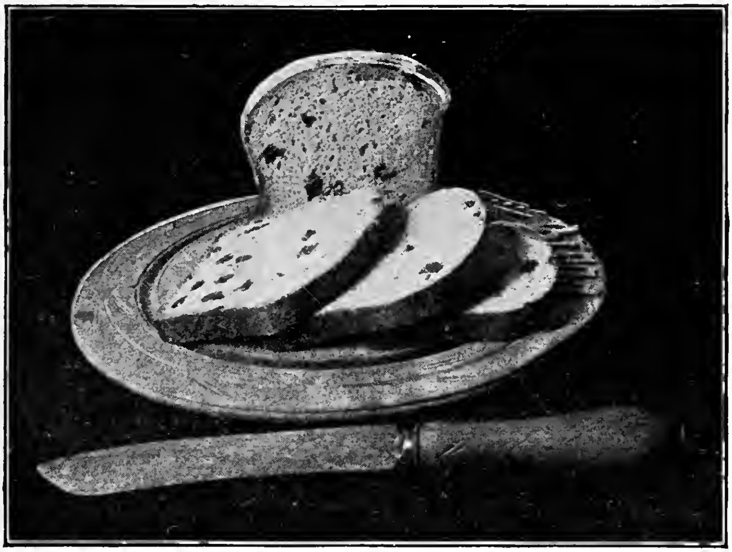
Kinds of Flour

The best bread flour is made from spring wheat and pastry flour from winter wheat, though they may be used interchangeably if necessary. The spring wheat flour contains more gluten and less starch, so that less of the bread flour is required to produce a dough of a given consistency.

The entire or whole wheat flours provide more bone making materials than white flour, otherwise there is little difference in the nutritive value of the better grades of each.

The presence of gluten makes wheat the favorite flour for yeast dough. Gluten is adhesive when moistened and thus retains the gas bubbles formed by the yeast in somewhat the same way that egg-whites hold air when they are beaten.

Old recipes for mixing yeast bread usually give directions for rubbing shortening into the flour and then **Order of Mixing**



"BREAD CAKE" OR BUN BREAD.

adding the other ingredients with liquid to make a dough that can be kneaded. The best authorities to-day reverse the order, thus saving time and energy and producing a better result.

The liquid is warmed that the fat, sugar, and salt may readily blend with the other ingredients and that the dough may rise more rapidly. When it is below 100 F, or cool enough to avoid cooking the yeast, that **Liquid Warmed** is added and well mixed through the liquid. Sufficient flour then is mixed in to give the desired consistency for kneading.

At first the mixture may be stirred with a spoon, but as it becomes stiffer a knife will more easily serve to produce a smooth dough.

Double Process Bread

The process of mixing bread may illustrate the batter and drop batter or muffin mixture as well as the dough. To make a sponge, half the quantity of flour to be used is mixed with the liquid and this allowed to rise till foamy, when the remainder of the flour is added. The advantages of this double process are that a trifle less flour is required since the first has time to expand before the second is put in, and that the process is somewhat shortened because in the first stage there is less resistance for the yeast to overcome and the whole sponge becomes full of yeast for the second stage.

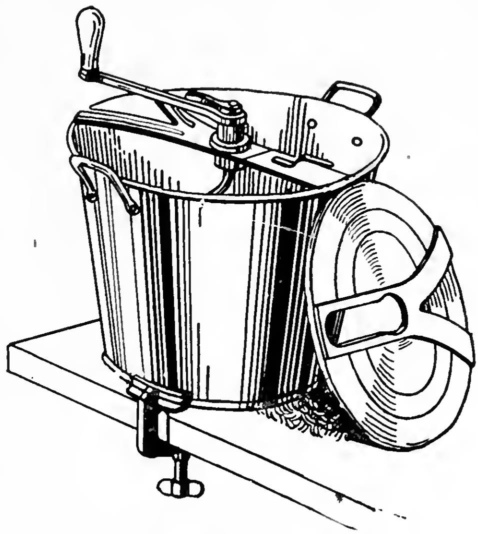
Amount of Yeast

Sometimes it is more convenient to use a small portion of yeast and allow the dough to rise for a longer time, and again to use more yeast and thus do the work more quickly. Until the scientists decide which is really the better method, the housekeeper will find it desirable to vary the quantity of yeast according to her conditions. Time, temperature, and quantity of yeast must be considered,—if one must be diminished, the others should be increased.

Short Process

For common use, a short process is to be preferred to the old custom of letting the dough rise over night.

When it rises by day we can regulate the temperature and stop the process at the right time. One yeast cake to one pint of liquid and about three pints of flour, will make two medium-sized loaves of bread, which can be completed inside of six hours.



BREAD MAKING MACHINE.

Holding Dough in Check

When necessary, a dough well risen and ready to shape may be cut down and put in a refrigerator or other cold place and thus held in check for several hours without injury. Sometimes half the bread may be shaped in a loaf and the remainder in rolls and the pans containing the latter set away in a cool place for several hours before baking that they may be hot for a later meal.

Rising

When first mixed, dough is kneaded just enough to blend all ingredients, then it is put back in the bowl, brushed over with water or with melted fat and covered while it is rising. Such precautions aid in preventing the formation of a dry crust caused by the evaporation of the water on the surface during the process of rising. The bowl containing the dough may be set in a pan of warm water which is changed often enough to keep the temperature even. When the dough must stand over night in a cool kitchen, the bowl may be wrapped in a blanket to prevent the escape of heat.

Kneading Much time is doubtless wasted in kneading doughs, though it seems to be agreed that this process works all ingredients together and thus give a better texture to the bread. To knead work the edges of the dough little by little toward the center, pull it over, press down into the mass and press it away with one hand while turning the whole around with the other. When the dough is smooth, elastic, and rises quickly when pressed and does not stick to the hand then it is done.

After the dough is double in bulk it should be kneaded enough to redistribute the air bubbles which have run together and formed larger ones, and to shape it for baking. At this stage no flour should be added, for here much time would be required to work in a little flour, and that is why long kneading has been thought necessary. Dip the fingers in soft fat if the dough inclines to stick, as one would do when pulling candy.

Shaping To shape biscuits or rolls, first make smooth round balls, then by gentle rolling and pressure make the finger rolls—then farther extend till the strips can be twisted or left as sticks for soup. Thus one form may be developed from another.

When rolls are to be cut out and folded, the pressure of the rolling pin will equalize the air bubbles without previous kneading. Instead of making the dough for rolls rich with butter or lard, it is wiser to brush over the outside of the rolls with melted fat when they are put in the pan.

BUNS—SEPARATE AND IN LOAF.

Again the dough must be allowed to double in bulk and then it is ready to bake.

To summarize the points already covered.—The time Summary
required depends upon the quantity of yeast used, and the temperature at which the dough is kept. One measure of liquid to three of flour is the usual proportion. For fancy breads make a sponge first, and let the mixture rise three times. Large quantities of sugar and butter tend to retard the growth of the yeast plant. For bread add all the flour at once. Small shapes are

preferable to large ones, as thus more thorough cooking is insured.

Baking of Bread

The baking of bread is not easily disposed of in a few words. Yeast doughs having risen before being put in the oven will bear rather a higher degree of heat at first than other doughs. A more moderate oven is required for loaves than for rolls that the heat may penetrate evenly, but the loaf must remain a sufficient time to raise the center to a degree of heat that will insure the destruction of the yeast. A moderate temperature might allow the dough to continue rising and even to sour from the growth of bacteria when in the oven.

When thoroughly baked, a loaf of bread will seem light and hollow and no steam will come from it to burn the hand as it is turned from the pan.

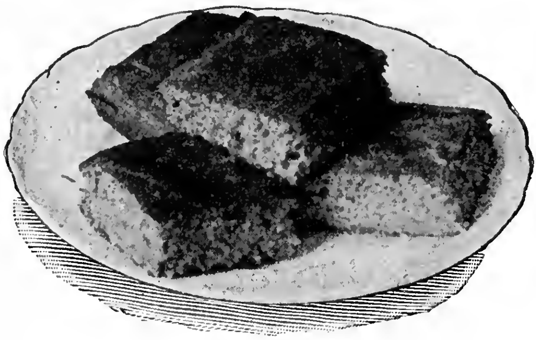
The usual temperature for baking bread is about 400° F, though a good result may be reached by a more moderate heat continued for a longer time.

Cooking Soda with Acids

Experiment. Three or four glass tubes or common tumblers are all the apparatus needed for some practical experiments which will make the use of these leavening agents much clearer than does the ordinary cookbook. Dissolve some soda in half a tumbler of water; in another tumbler dissolve some cream of tartar, in a third have a little molasses; in a fourth place some sour milk, and in a fifth some vinegar.

Now put a part of the soda water into each of the other glasses, stir well, and watch the result. Leave these till later to see how soon the gas escapes and that it cannot be revived. By tasting soda and cream of tartar we shall see that it is desirable to combine them in such proportions that each may neutralize the other. This is done in baking powders.

In another glass dissolve some baking powder, first in cold and then in warm water to show that the gas escapes more rapidly at a high temperature.



CORN BREAD.

These experiments show us why we should sift cream of tartar and soda or baking powder with the flour instead of dissolving it in liquid. The gas which is to make the dough light begins to escape from the soda when it comes in contact with an acid liquid.

Soda and Cream of Tartar

Some baking powder manufacturers try to convince us that their product is so perfect that it is useless for the housekeeper to continue to keep soda and cream of tartar in her store closet. But much as we owe to their perfect methods of grinding and sifting and combining these substances in the right proportions, there are times when we must use them separately.

Angel cake, for example, requires the addition of cream of tartar to stiffen the egg-white which is its foundation. This aids in holding up the spongy mass until it is made firm by heat. In any case where there is a large proportion of egg-white a slight excess of cream of tartar is desirable.

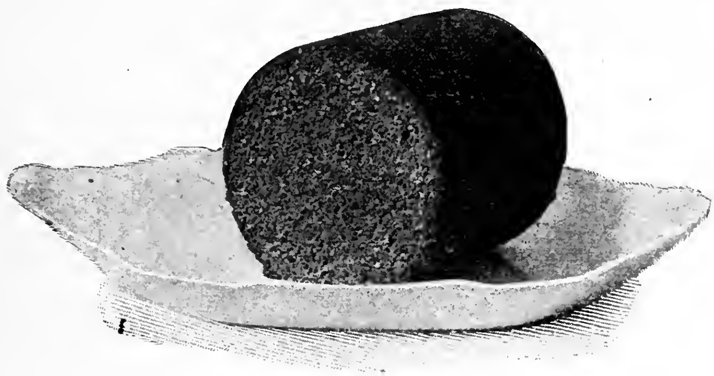
Molasses and Soda

That molasses is acid in spite of its sweetness is evident by testing it with a bit of soda. For this reason soda is added to molasses candy since if it is filled with air bubbles it will be more brittle. The acidity varies in different grades of molasses, and modern methods of manufacture and quick transportation give us a less acid product than that of the past. This explains why many of the recipes of our great-grandmothers called for such large quantities of soda in gingerbread, etc. In such recipes it is usually wise to reduce the quantity of soda and use a small amount of baking powder. Brown bread and all cakes and puddings containing molasses, because of its acidity, are usually more palatable if some soda is used to make them light instead of baking powder only.

Butter contains so much buttermilk that, unless it is washed before using, a bit of soda is essential for all rich cakes and cookies which are to be kept for any length of time.

Sour Milk and Soda

Because of the tendency to use an excess of soda with it, the use of sour milk has been condemned. But thick, sour milk is not very variable in acidity, and the use of one even teaspoonful of soda with each pint of sour milk is safe. Soda is inexpensive and sour milk is also, while cream of tartar and baking powder are costly. One half level teaspoon of soda is usually enough when one cup of molasses is used, as it is with one cup of sour milk. When it is more convenient to



BOSTON BROWN BREAD.

substitute sweet milk for sour, we retain the soda and add one slightly rounding teaspoonful of cream of tartar.

Strength of Baking Powder

Baking powder contains some starch, but two or three level teaspoonfuls of baking powder are equal in effect to one rounding teaspoonful of cream of tartar and the half level teaspoonful of soda.

Just why some good old recipes recommend dissolving soda in hot water before adding it to the other ingredients, or mixing it with hot molasses, is uncertain. Perhaps the housewives wanted to "see with their eyes" that action would result. Or the habit might have been the result of the impure quality of the alkaline substance. The "pearl ash," as saleratus was called, was not as finely pulverized as is the soda of today, and may not have been as thoroughly purified from other ash. Hot water would dissolve it quickly, any impurities would settle, and even if some gas escaped enough was left to do the work of puffing up the dough.

Mixing Baking Powder

Such small quaniities relatively of soda, cream of tartar, and baking powder are used in a dough that it has been a question how they should be mixed with the other ingredients to secure the most perfect result. The dough should be light throughout, not here a solid streak, and there large bubbles.

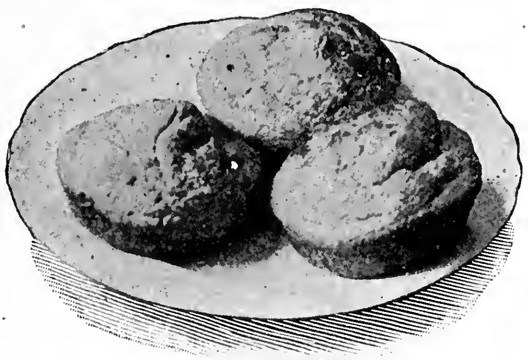
Some teachers of cookery have recommended sifting the one or two teaspoonfuls of baking powder over a cake after it was mixed and beating thoroughly just before pouring into the pan in which it is to be baked. But as soon as the powder comes in contact with the moist surface of the dough some gas will be lost, and moreover, it is doubtful whether two teaspoonfuls of baking powder can be evenly mixed through a quart of cake batter without much beating which does not improve the quality of the cake at that stage and delays the baking.

The accepted plan at present is to sift with the flour the baking powder or cream of tartar and soda or the soda alone when it is to be used with some sour milk or molasses.

The sooner the process is completed after the acid and soda meet each other the better. Therefore we keep all the materials dry until the last moment, then mix quickly and bake at once.

General Directions

Similar recipes are found in all cook books, and once the general proportions and the office of each ingre-



RYE MUFFINS.

dient are learned, it is easy to make many variations. The process of mixing is practically the same in all cases. Prepare the fire and dishes for cooking, before mixing any of the ingredients measure everything, sift all dry materials together, add liquids, mix all thoroughly, and cook immediately.

Manner of Mixing

Changes in the proportions of materials often lead to a change in the manner of mixing them. For example, when a small quantity of shortening is used in batters, it may be melted and beaten in, but if a large proportion is required, it should be rubbed till creamy and blended with the sugar as for cake, or mixed into the flour as in pastry making. For stiff doughs which are to be rolled, it is essential that the fat should be put in cold since even a small quantity, if warm, will tend to make the dough soft and sticky. We grease pans, griddles, etc., because fat prevents adhesion; in the same way fat in a dough keeps the particles separate and makes it break apart readily, so that we call it "short" or "tender." Hence shortening is any form of fat that will accomplish such a result. To give like results, more shortening is required with bread flour high in gluten than with pastry flour low in gluten.

"Shortening"

Eggs in doughs, as in other cases, have the quality of making particles hold together, just the reverse of shortening. Any dough containing much egg will be elastic and spongy, and if cooked too quickly will be tough. Doughs to be made rich with butter, like pound cake, may be saved from heaviness by the use of eggs.

PASTRY AND CAKE

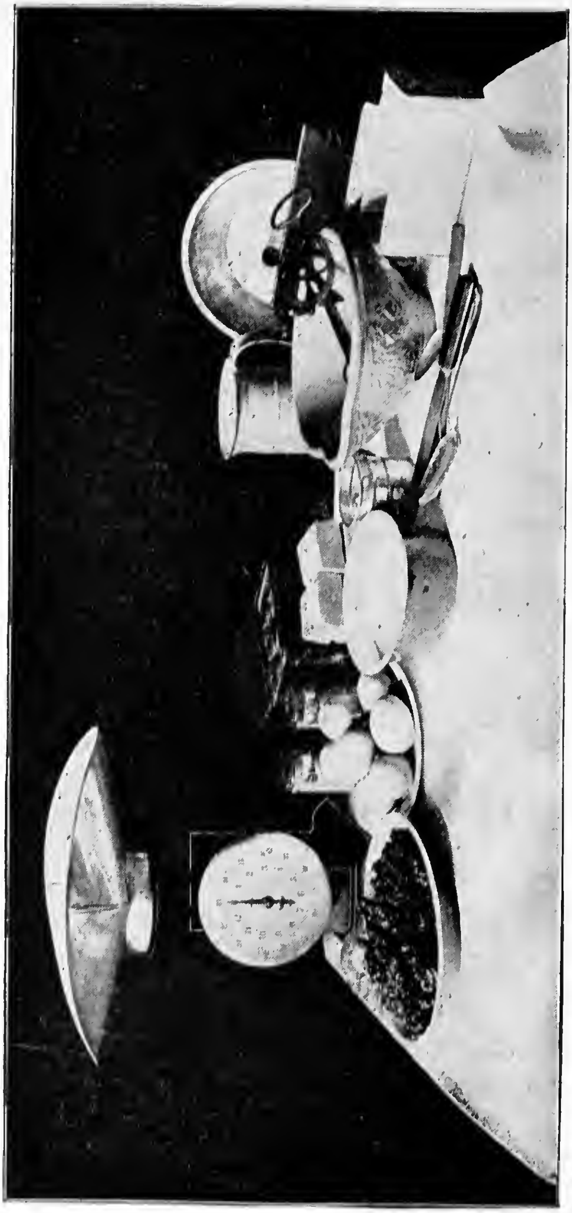
Shortcake and pastry are illustrations of the use of much fat in doughs and the result is brittle and tender. Success in pastry-making depends more upon keeping the ingredients cold and handling the dough deftly than any special formula or order of mixing. When but a small amount of shortening is used, a small quantity of baking powder is helpful; this, of course, is omitted in puff pastry, in which the weights of the flour and butter are equal, and it is not essential in other cases.

Few doughs require a smaller number of ingredients than pastry; flour, salt, shortening, and liquid are the essentials, and air is incorporated in the process of mixing. When the flour and shortening are warm they stick together so that less air is mixed into the dough. Pastry

APPLE PIE IN DEEP PLATE.

The process of rolling and folding is a device for catching more air in the dough. This air, when heated, expands and puffs the layers apart. The colder the air mixed in the dough the greater its expansion in baking.

In cake-making a single, well proportioned formula may be made the basis for a great number of varieties. Therefore, it is essential that the fundamental principles be understood, then the variations can be accomplished easily. Cake Making



MATERIAL AND UTENSILS FOR MAKING CAKE.

The principles underlying sponge cake were explained in the section on eggs. The main points in such cakes, which contain no butter and are made light by eggs only, are to mix carefully that sufficient air may be entangled in the dough to make it light, and then to bake slowly but thoroughly. Sponge Cake

The shape in which cake is to be baked should decide the proportion of flour to be used. Layer cakes or small cakes require less flour than large loaves. This is probably because the small cake is stiffened more quickly by the heat, while the large mass must be stiffened with flour to hold up the air cells until the heat can penetrate the whole. Variations in cake are easily obtained through changes in flavoring ingredients. To mix chocolate in the cake melt it and mix with the sugar and butter. Such a cake might have a white frosting flavored with vanilla.

A cake flavored with almond may have a few shredded almonds sprinkled over the top just before the cake is put in the oven. Almond paste can be rubbed into the butter and sugar in making cookies; it is rather rich and heavy for a cake. Desiccated cocoanut, chopped nuts, raisins, currants, dates, citron, candied orange and lemon peel, singly or in various combinations, serve to give us many cakes from a single recipe. Flavoring

The ingredients mentioned for pastry are common to all cakes as well, but further variety is gained by the addition of sweetening and seasoning. Air or gas to make the cake light is obtained by the use of Ingredients beaten eggs and of baking powders, etc., as well as by creaming butter and beating the blended ingredients. The shortening for this class of dishes may be lard, dripping, nut oil, cottolene, butter, or cream, each having its own special characteristic. When these are known, combinations and substitutions are possible to adapt a given formula to the available materials.

Sweetening

The range of sweetening is limited to sugar and molasses, but the quantity to be used in a cake should be

SPONGE CAKE STUFFED WITH CREAM.

reduced if a frosting or sweet filling is to be added later.

When we consider the long list of spices and extracts and fruits and nuts available for seasoning the cake, we can see how it is possible to make many varieties of the same cake.

Relative Proportions in Cake

There is a certain relative proportion to be followed in the use of these ingredients which, once learned, enable us to decide whether a recipe is reliable. In butter cakes there is usually less butter than sugar, and less sugar than flour. When baking powder is used less is required than would be necessary for a dough where there are no eggs. Thus two even teaspoonfuls of baking powder is enough for three cups of flour for a cake in which three or four eggs are use. Some cooks use from one to two teaspoons of baking powder for each cup of flour in all cases, forgetting that the eggs alone would make a cake quite light. When there is an excess of baking powder, the cake is liable to be coarse grained and will dry quickly.

Cottage Pudding

Dutch apple cake and cottage pudding are similar to the common muffin mixture in the proportions of flour, liquid, etc., but are made richer by increasing the quantity of fat and sugar.

Doughnuts

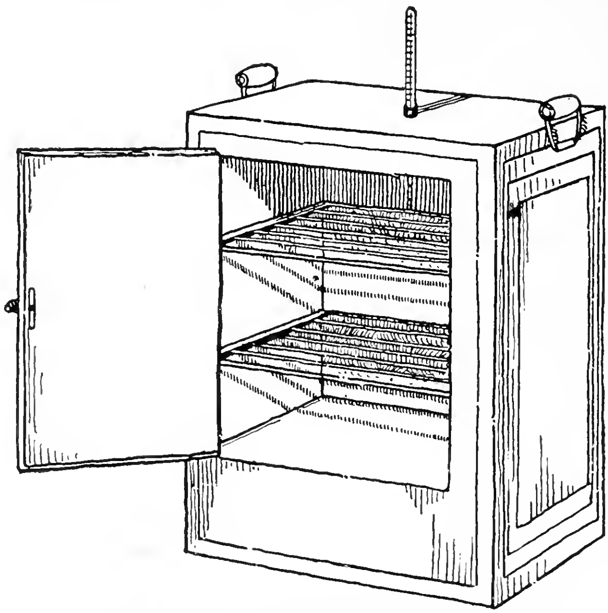
The ordinary doughnut mixture is not unlike a cottage pudding dough, with the addition of flour to make it stiff enough to roll easily. Or it is similar to the quick biscuit dough with the addition of sugar, egg, and spice. Because doughnuts are cooked in fat, less shortening is required than for most stiff doughs.

Cookies

Cooky doughs are more like pastry with the addition of sugar, spice, and egg, and the same care should be given to keeping the dough cold in order to roll and cut it without adhering to the board.

COOKING OF DOUGHS

Doughs are steamed, baked in the oven, or on a griddle on top of the stove. Such mixtures of many different ingredients are more difficult to cook than the separate substances of which they are composed, though heat affects each ingredient in combination much as it does singly. Sugar carmelizes and this aids in producing a golden brown color in the crust of anything



AN ACCURATE OVEN THERMOMETER.
Punch a hole in a common gas stove oven and insert thermometer, which will register to 600 degrees F, wrapped with asbestos and wire where it passes through the top.

containing it. Since it burns readily, cakes and cookies are more liable to be scorched than unsweetened doughs. Flour browns when exposed to dry heat.

Eggs cook at a low temperature. Butter melts, hence doughs containing much must contain more flour than those that have little or none.

Heat Required

The heat applied should conform to the way in which it affects the principal ingredients in any dough. Those containing many eggs need moderate heat, etc., etc. The size and shape of the article are also to be considered. In general, small thin portions require less time but will bear higher temperature than larger portions as with bread doughs.

Temperature of the Oven

There are various tests for the heat of the oven. Oven thermometers are valuable aids, showing comparative if not actual degree of heat. When a thermometer is inaccessible, a piece of white paper or a teaspoonful of flour if charred from a five minutes' stay in the oven indicate too great heat and other degrees may be gauged accordingly. All parts of an oven are not equally hot and each housekeeper must study her own.

The lower part of a gas oven is very hot because the full force of heat is below; in the wood or coal range one side is usually hotter than the other because of the position of the firebox.

FORM AND FLAVORS

Thus far we have studied the fundamental principles of cooking and have seen that some knowledge of the chemical composition of each food is necessary before we can secure the best result through the application of heat and moisture. But this is only the foundation of the art of cookery.

Variety

The form in which our food is served may attract or repel, and the flavor may make it appetizing or the reverse. We must depend mainly for sustenance upon a few kinds of meat, vegetables, grains, and fruits, and unless variety were secured in some way we should quickly tire of them.

Through the ingenuity of cooks of all times and countries, so many combinations have been devised, by changes in flavor and form, that some of our common foods might appear in different guise every day in the year.

The multiplicity of formulas in our cook-books, even when well classified, are puzzling to the beginner who has not learned to analyze each recipe and thus find the simple processes of which it consists.

'Fancy" Cookery

What is generally termed "fancy" or "high-class" cookery is merely the application of the simple processes to costly foods or a further complicated preparation to foods which have first been cooked as perfectly as possible, according to the principles already outlined.

For example, if we have learned how to make a white sauce and how to cook meats and vegetables, we do not require separate detailed recipes for creamed chicken, creamed oysters, creamed potatoes, creamed cauliflower, or creamed asparagus; we only need to make the sauce a little thinner or thicker to offset the

Creamed Dishes

CREAMED FISH IN RAMEKINS.

dry or watery nature of the article with which it is to be put and to vary the flavor slightly to adapt it to another material.

Variety in Serving

Furthermore, any such creamed meat or vegetable may be served plain, or on toast, or in timbale cases, or combined with buttered crumbs, as a "scallop," or by the addition of stiff egg whites it becomes a "soufflé" when baked. When the sauce is made of double thickness, and combined with the meat or vegetable and chilled, the mass may be shaped into croquettes or cutlets which are then coated with egg and crumbs and fried.

Thus any intelligent woman knowing something of the nature of foods and the effect of heat and moisture may to some extent make her own recipes or adapt others to the supplies available at the moment.

Adaptation

No cook-book can be sufficiently expanded to provide for great variation in climate, food materials, and utensils. The cook must constantly adapt to her conditions, she must be observant of the changes of temperature and learn when one food material or flavor may be substituted for another.

Principle of Contrast

If uncertain about the wisest combination of articles of food, whether in a single dish or for the different courses in a menu, it is safe to follow the plan of contrast. Thus the cream soup is served with crisp crackers or croutons, the creamed fish is covered with buttered crumbs and baked till crisp, the croquettes are crisp outside and creamy within.

Another point is to add to any food, substances supplying any of the food principles it lacks. Potatoes are mashed with cream or butter because they lack fat, are blended with egg for croquettes or soufflé because they lack protein. Eggs lack starch, so we serve them on toast or use them in puddings with rice, tapioca, etc.

Made Dishes

Composite preparations of food, often classed as entrees or made dishes, are known by many names derived from different languages, especially from the French.

Here is no place to attempt to define all the terms used on a menu card, but we may group some of these compound dishes under a few general heads and study their characteristics. Names

Soups have as their basis either animal or vegetable stock or both combined. Stock is secured by the aid of heat and moisture from portions of meat and vegetables too tough to be used in other ways. Flavor and some nutriment are soaked, cooked and strained out, and this water is the stock which is then further flavored and garnished by the addition of some contrasting substance. Thus a meat stock is usually garnished with grains or shreds of vegetable, and a vegetable stock is often combined with milk and thickened. Soups

Stews are thick soups containing larger portions of the meat and vegetables. These are also known as chowders, ragouts, salmis, etc., etc. Sometimes a stew has dumplings steamed over it, sometimes it is covered with a crust of pastry, mashed potatoes, or cooked cereal and baked as a pie. Here again are combined contrasting food principles. Stews

Hash is a term that also may include the assortment of foods known as scallops, timbales, etc., since the substance giving a specific name to each of these is minced or chopped fine before it is combined with other materials. Meat and fish are put on toast or mixed with potatoes or bread crumbs or encased in rice or in a pastry shell. The exact proportions of the con- Hash trasting ingredients is of less importance than their proper moistening and flavoring.

The *scallop* owes its name to the shell in which it is often served. *Au gratin* is another name for the same combination of a meat or vegetable with sauce and crumbs. The *croquette* gets its name from its crisp crust, the *timbale* from its thimble-like shape. *Rissoles* and *kromeskies* are kinds of fried meat pies or croquettes in a pastry crust.

Souffles *Soufflés* have as a foundation fruit or vegetable pulp or minced meat in a sauce and are puffed up by the introduction of stiffly beaten egg whites. The name is sometimes given to cold dishes where a similar effect is gained by whipped cream.

Salads *Salads* may consist of cold cooked meats, fish, etc., vegetables cooked or raw, fruits and nuts. Almost any food may be served in a salad, singly or in combination. The distinctive feature of a salad is the dressing of fat, oil, butter, or thick cream, which is variously flavored.

Left Overs Many of the most satisfactory of these made dishes doubtless had their origin in an effort to use left-overs.

Milk surplus may be used in many ways. Skimmed milk answers as well as full milk for soups and doughs when fat is also used. Even if otherwise likely to curdle in heating, the addition of a little cooking soda makes it possible to scald milk, and then it may be used for custards, puddings, etc. Sour milk is available for doughs and cheese, and cream may be substituted for butter and milk in simpler cakes and cookies.

Eggs left at the table in a soft-boiled condition may be cooked again until hard and then combined with sauces and served on toast or used as a garnish in soups or salads.

Meat left-overs should be carefully sorted.

Meat Left Overs

The obloquy heaped upon hashes is due to carelessness. All uneatable portions,—bone, skin, and gristle, should be removed, but may yield a little stock if put in cold water. The clear lean may have about one-fourth as much fat with it if it is to be used in the combination with potatoes, bread or cereal. There may be two grades of the lean, one cut in pieces of uniform shape an inch or more across, to be served in a sauce or moulded in a jelly; the other to be chopped fine for hashes, croquettes, etc.

Vegetables. Cooked vegetables spoil quickly but often may serve as soup, or a scallop, or a salad for a second meal.

Fruit Combinations

Fruits. It seems practically impossible to put together several kinds of fruit without good results. Combinations of left-over fruits, raw or cooked, will serve as the basis of a gelatine dessert made like the jelly described elsewhere, or may be frozen alone, or combined with cream, or thickened for a pudding sauce, or diluted with water for a fruit punch. Add sugar as desired.

Bread. No scrap of bread of any kind need be lost. Brown bread and muffins of different kinds are sometimes wasted when they might be steamed, or toasted and served in cream sauce, or made into puddings like a baked Indian pudding. Slices of stale raised bread, dried, gives us croutons, cut in cubes, or crumbs white and brown, coarse and fine, to use for scalloped dishes, stuffing for fish and poultry, and for many kinds of sweet puddings.

Attractive Form

The use of gelatine is an instance of our endeavor to make foods attractive in form. It has doubtful food value and no agreeable flavor, but it gives solidity to fruit juices, or in aspic jelly to soup stock, and in such jellies we may mould fruits for dessert, or meat and vegetables for salad.

Garnish

Garnish is often desirable to make foods more appetizing, but it is a question whether this purpose is served by the addition of unedible materials which must be laid one side before the food itself is accessible.

The truest art does not waste effort on useless things.

Shapes

The form of foods is further varied by utensils producing different shapes, the meat choppers with adjustable knives for particles of different sizes, the fancy knives for making thin slices or balls of vegetables and fruits, the muffin pans, waffle iron, the timbale iron, the many cutters and moulds for puddings, etc. The tendency of the present day is plainly towards small portions for individual service, and here again a new recipe is not required, only the necessary changes in time of cooking which would result when a mass was divided into several portions. Moulds in which a food is to be cooked should be greased, but rinsed with cold water when the food is only to be cooled in them.

Weighing

Scales and measures are lacking in many kitchens and accurate work is impossible without them. The

SALMON LOAF.

average kitchen need not be furnished with many special utensils, but there should be a full supply of "general purpose" articles of the best grade of material and finish.

Utensils

The utensils should be adapted to the size of the family and to the physical ability of those who are to use them. The saving of human life and energy is more to be considered than the durability of implements.

FLAVOR

The art of cooking shows us many ways of developing the appetizing flavor of foods.

Preparation *First,* by the removal of whatever might produce bad flavors, such portions as skin and tainted bits of meat, decayed parts of vegetables, and over brown portions of bread and cake.

Right Heat *Second,* by the right application of heat and moisture to bring out the natural flavors in each food. The steeping of tea instead of boiling, the browning of the coffee berry and cocoa bean before they are ground, the flavor developed by long cooking in cases like the baking of beans and steaming of puddings and brown bread. Sometimes a portion of the nutritive value is sacrificed to flavor, as in the browning of the outer surface of the steak or roast.

Third, by the use of many additional flavoring materials to intensify natural flavors to supply deficiencies and to produce variety.

Common Salt Salt is useful as a preservative, seems to supply a need in the human system and therefore is an agreeable addition, but it also serves to bring out natural flavors. As an illustration of this power, taste of a meat or chicken broth that is unsalted, and again after salting, when the flavor of the meat will be much more apparent. For this purpose salt is often eaten with fruits, is added in minute quantities to lemon and other jellies made with gelatine, to custards, ice creams, and often even to coffee.

Lemon juice is also an aid in extending other flavor and is acceptable with many foods, especially fish.

Salt, pepper, lemon, and onion are the extent of the flavors used in some households, and food need not be insipid if no others are tried, but it is wiser to make occasional use of the long list of condiments and spices. **Common Flavoring Material**

The distinction as usually made is that the condiments pepper, mustard, etc., are used with meats, while spices, cloves, ginger, cinnamon, nutmeg, etc., are associated with fruits and sweets, but this classification has exceptions. Spices are neglected nowadays and it often seems as if people hardly were acquainted with any other flavor for dessert dishes than vanilla. The list of flavoring herbs is a long one, running through sage, thyme, majoram, summer savory, bay leaves, tarragon and parsley, which are used dry or fresh, to the green mint, cress, and salad plants which are condimental rather than nutritive. **Condiments and Spices**

There are many compound flavors which every housekeeper should keep in her store closet, and use in her cooking instead of supplying a single perennial catsup on the table, such are curry, tabasco, tarragon vinegar, mushroom catsup, poultry seasoning, etc.

Onion, celery, cheese, chocolate, coffee, meat extracts, each may have an important place in our list of flavors.

Sugar is an important food and also must be looked upon as a flavor, since it will often bring an insipid vegetable up to its normal condition. **Sugar as Flavoring**

Blended Flavors French cooking excels in that blending of flavors which produces an agreeable effect, though no one is apparent.

Adding Flavoring The best results are usually reached when the flavoring is combined with the food in the process of cooking, but there are right and wrong ways of doing this. If salt is put on the cut surface of a roast, juice will be drawn out, but if sprinkled over the fat will gradually flavor all. Whole herbs and spices, tied in a bit of cheese cloth may be left to cook in a soup stock or brown gravy until the desired flavor is attained and then withdrawn, leaving the stock clear. Ground spices would give a cloudy effect.

Reasons for the Use of Flavoring The use of flavors is economic, for thus inexpensive foods are varied and made palatable. It is a part of the art of cooking, since nowhere are greater skill and intelligence required than in the distribution of these elusive yet powerful substances, and by discrimination in the use of condiments and spices our foods may be made more healthful.

FOOD FOR THE DAY

In the preceding pages the most important foods, their composition and preparation for the table have been considered. Our study would be incomplete without some reference to their best combination for the daily meals that they may appeal to the palate and promote health without exceeding the bounds of moderate incomes.

There are three important divisions in the preparation of food for a family, wise buying, good cooking, and careful serving. When buying foods the housekeeper should know the sum available for feeding each person for the day or week, she must note the season of each food, and also adapt her choice to the climate and weather. She must remember the individual needs of each member of the household, depending upon age, health, and occupation. **Buying Cooking Serving**

The art of cookery finds its field between the choice of food and the serving of the cooked dishes at the table. As with other arts perfection can come only through constant practice in manipulation, and from continual adaptation of conditions to the desired end. No formulas for combinations of foods can be devised so complete that continuous care is not required in every step of the process. **Art of Cookery**

Cost of Food

Few housekeepers have the time or take the trouble to keep their accounts in such a way as to know how much it costs to feed each person in their charge for a day, week, or month; fewer still know anything of the relative proportion of protein, fat, and carbohydrate which is placed on the family table week by week.

When purchasing clothing we take note of its wearing qualities and the ability to keep us warm, but we seldom apply the same reasoning to our foods, although it is quite as necessary.

Some one has estimated that in the average household one-tenth of the sum spent for food will go for flour, a tenth for butter, another for sugar, another for milk, one-fifth for meat, one-fifth for fruit and vegetables, and the remaining fifth for sundries.

"Constants"

There are certain articles of which equal quantities will be used each week or month, and by an examination of previous bills it is easy to estimate the amount required for a given period. Many of these "constants" like butter, sugar, and flour, can be bought in quantities sufficient for a month, then the housekeeper knows how to apportion her money for the variable supplies.

It is not necessary for the housekeeper to attempt to estimate the proportion of food principles in every dish she serves, but once a month or a quarter, if her accounts are well kept, she can see how nearly she approaches such daily estimate as the one below for each member of her family:

A DAY'S RATION

	Ounces.
Meat and fish	12 to 16
One egg	2
Butter	1 to 2
Milk, 1 gill to 1 pt.	4 to 16
Sugar	2 to 3
Dry fruits	1
Legumes	1
Fresh vegetables and fruits	6 to 8
Potatoes	8 to 12
Flour and grains	12 to 16

Multiply this by thirty and we have a fair allowance for one person for one month. Multiply this by the number of persons in the family, or, to be more accurate, by the fractional parts of a man's rations, usually allowed for women and children, and we have an ample supply for one month for the family.

If the larger quantity of potatoes has been used the smaller amount of flour would have been ample, while if eggs were cheap and two or more consumed by each person daily there should be a corresponding reduction in the amount of meat and fish.

Refuse and Waste

Of the amount purchased there will be not far from 10 per cent refuse and waste. Refuse in the form of bones, skin, and parings, waste of what is left on individual plates and odd bits that are spoiled and are thrown away. Much fat also is thrown away, but it should be remembered that fat is worth more than twice as much as the carbohydrates in keeping the body warm.

A Day's Alowance Twenty-five cents a head a day is a fair allowance for an abundance and variety of wholesome, satisfying food. Life may be sustained on half that amount, while fifty cents daily cannot nourish more completely, but may provide luxuries and foods out of season.

Cost of Labor The actual cost of table board appears, from studies made under different conditions, to be about equally divided between the raw material and the labor required for the preparation and service. It may be cheaper to pay a little more for a prepared food than to use one's own strength or pay for service to get ready a less expensive article.

The woman who has time and strength and no other way to earn should choose the cheaper grade of food. Cheapness does not always indicate meanness, it may mean an abundant supply or less human labor in preparation.

Prepared Food There is a growing tendency toward the fuller preparation of food outside the home, but there is the more need that the housekeeper should be familiar with processes of manufacture that she may know when she is well served.

Buying The housekeeper who never goes to grocery and market and does not study the market reports in the papers is rarely an economical buyer. She is liable to go on in the same old routine instead of varying her menus with the little surprises that may be found by visiting the markets. There are bargains to be had in foods as well as in clothing, when the market is overstocked, or some odd lot is left over. Cuts of meat cannot be made to order and the first choice falls to the early visitor to the market.

Planning

Where one woman must take entire care of a family, she must plan carefully if she would have a well balanced household. Elaborate cooking and meals of many courses are out of the question even if they were desirable. Meals should be planned several days in advance and the buying done accordingly, though such plans will be much modified in the performance.

A reserve store of canned foods, etc., is a great aid in the emergencies that arise in all households.

System

By wise use of outside supplies and by making one's head do more work and hands and feet less, the food for a family may be provided without exhausting the energy of the housekeeper.

The actual cooking necessary for a family through a day may be done in a shorter period than is usually allotted to it if the work is planned wisely. The detail of arrangement depends upon the kind of fuel used, and whether the chief meal is served at noon or night.

Breakfast

The breakfast should be a simple meal—fruit, raw or cooked, cereal or warm muffins, (seldom both at the same meal), and eggs, bacon, creamed salt fish or some cold meat. When the meat is cold the bread is warm, while with bacon or omelet toast may be served.

Some one must be in the kitchen for some time to prepare and serve even a simple breakfast, especially if there are tardy members of the family. With the same supply of fuel required for the muffins, it is not difficult for a woman of average ability to bake a cake or pudding which will then be ready for the noon or the night meal. Or at this time the vegetables may be cleaned, fruit picked over and little details attended to which save much time later.

Dinner

Noon dinners usually are considered easier for housekeeper and cook, since the work can all be done by daylight and the hours of work if not actually less are not so extended through the day. When supplies are ordered early and delivered promptly, much energy and worry is saved. At least half the time the soup may be derived from previous supplies, and be prepared in advance.

One kind of meat or fish, potatoes or rice and a single other vegetable or salad are enough for all ordinary occasions. Fruit or a dessert prepared earlier in the day completes a meal sufficient for all needs of the human body if the articles have been chosen wisely to supplement each other.

For a noon luncheon or night supper there are many variations of the soufflés, hashes and scallops already described. One of these with bread and butter, tea or cocoa, fruit and a simple sweet will provide all that is essential. **Supper**

To prepare meals for a family year in and out is not an easy task. The housekeeper must remember not only the cost and nutritive value of the foods but the whims and notions of her family. The ability of the human being to talk makes him much harder to feed than the animals who must accept the balanced ration bestowed upon them.

Planning Menus

A few points to be observed in planning menus are these: avoid routine, introduce novelties, cheap or expensive, in attractive form, but say little of nutritive value or cost. Do not allow the same meat or fish to appear too many meals in succession. Let something else intervene. When the meat course is substantial let the dessert be light and make the dessert especially nutritious when the meat course is insufficient. Let there be variety on the table through the week or month but have few dishes at each meal.

In Conclusion

The fundamental processes of cookery are not many and the essential points have been outlined in these pages. An intelligent woman can adapt the recipes in any reliable cook-book to her own conditions after she knows something of the composition of foods and the way each is affected by heat and moisture.

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Boston Cook Book ($2.00). Mary J. Lincoln.
Catering for Two ($1.25). Alice J. James.
Century Cook Book ($2.00). Mary Roland.
Home Science Cook Book ($1.00). Anna Barrows and Mary J. Lincoln.
Kitchen Companion ($2.50). Maria Parloa.
Practical Cooking and Serving ($2.00). Janet M. Hill.
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Rorer's (Mrs.) New Cook Book ($2.00). Mrs. S. T. Rorer.
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Luncheons ($1.40). Mary Roland.

Note.—These books may be borrowed by *Members*. Any one may purchase them through the School by sending price.

GOVERNMENT BULLETINS

Free, of the Department of Agriculture, Washington, D. C.
34. Meats: Composition and Cooking—Charles D. Woods.
85. Fish as Food—C. F. Langworthy, Ph.D.
93. Sugar as Food—Mary Hinman Abel.
121. Beans, Peas and other Legumes as Food—M. H. Abel.
128. Eggs and their uses as Foods—C. F. Langworthy, Ph.D.
182. Poultry as Food—Helen W. Atwater.
183. Meat on the Farm—Andrew Boss.
203. Canned Fruits, Preserves and Jellies—Parloa.
249. Cereal Breakfast Foods—Woods and Snyder.
256. Preparation of Vegetables for the Table—Parloa.
263. Use of Milk as Food—R. S. Milner.
293. Use of Fruits as Food—C. F. Langworthy.
295. Potato and other Root Crops as Food—Langworthy.
298. Food Value of Corn and Corn Products.
332. Nuts and their use as Food—M. E. Jaffa.
359. Canning Vegetables in the Home—J. F. Breazeale.
375. Care of Food in the Home—Mary Hinman Abel.
389. Bread and Bread Making—Helen W. Atwater.
391. Economical use of Meats in the Home—Hunt.

PRINCIPLES OF COOKERY

PART III.

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. *Do not copy answers from the lesson paper.* Use your own words, so that the instructor may know that you understand the subject. Read the lesson paper a number of times before attempting to answer the questions.

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1. Mention and describe three methods of making doughs light.
2. What are the advantages in the use of baking powder? When should baking soda and cream of tartar be used separately?
3. Describe some mixture where more than one means of making it light is used.
4. How does the bread obtainable outside your home compare with what you can produce there as to cost, including time and fuel, substance, and palatability?
5. Experiment, if you can, under your own conditions and report of the effect of too rapid and too slow baking on different types of dough.
6. Rearrange this recipe for a simple cake in proper proportions and order of mixing: ½ egg, 2 teaspoonfuls butter, 2 c. milk, 1 c. flavoring, 1 teasp. flour, 3 c. baking powder, 1 teasp. sugar

7. Give examples wherein the form and manner of serving may add to the attractiveness of food and not require too much time.
8. How does bread flour differ from pastry flour? How does this affect its use in doughs?
9. Give the general proportion of flour and liquid in (1) soft doughs, (2) a batter, (3) muffin mixtures, (4) pastry or cookies.
10. Why does shortening make doughs flaky?
11. Give the one method of making bread. What conditions will hasten the process; what will retard the process?
12. Successful pastry—how made?
13. What varieties of cake are there and what are the general proportion of the ingredients? Give some of the reasons why a cake "falls?" What makes cake dry and coarse in texture?
14. Discuss the use and abuse of "fancy cookery."
15. What is meant by contrast in foods? Give examples.
16. What can you say of flavoring?
17. How may "left-overs" of meat—of vegetables—of bread, be used?
18. On what principle should menus be planned?
19. Give the menus for the meals served in your household during one week and suggest how they might be improved without additional labor or expense.

SUPPLEMENT

PRINCIPLES OF COOKERY IN APPLICATION TO DAILY LIFE

By Anna Barrows

Director, Chautauqua School of Cookery; Lecturer, Teachers, College, Columbia University, and Simmons College.

The conditions of life in the households represented by the pupils of this school vary greatly with locality and climate, and, taken together, would give a fine composite picture of the average American home. While reading the hundreds of papers which have passed through my hands since the School opened, nothing has impressed me more than the variety of conditions to which any woman in this country must be ready to adjust herself at short notice. Much human energy might be set free for other purposes, and much money saved, if men and women gave closer study to some of these every-day questions.

Emerson has said truly: "We must learn the homely laws of fire and water; we must feed, wash, plant, build. These are the ends of necessity, and first in the order of nature. Poverty, frost, famine, disease, debt, are the beadles and guardsmen that hold us to common sense."

COMPARATIVE VALUE OF FUELS

Every householder and housekeeper should have more definite knowledge regarding the amount of heat available from a given bulk of each of the standard fuels. One cord of wood is approximately equal to one-half ton of coal; 1,000 cubic feet of coal-gas is equal to 50 or 60 pounds of coal, or about four and one-half gallons of oil or gasoline. The time required to keep stove and fire in good condition must be counted with the cost of the fuel.

In this connection, facts reported in some of the test papers received are interesting.

From a southern plantation, wood is reported as costing only the labor of preparation for the stove, and that only sixty cents a cord. In another locality, one sixteenth of a cord of wood is used daily at a cost of twelve cents, or about two dollars a cord. Elsewhere, a housekeeper finds wood at five dollars a cord the cheapest fuel within her reach, and estimates her daily supply to cost ten cents, or about one fiftieth of a cord. Another burns a cord of wood each week for cooking only.

An English pupil writes: "The range to which I am most accustomed is the almost universal farm-house open fireplace and Glendenning oven, used in Cumberland and Westmoreland. The oven is heated by the hot air from the fire by a passage at the back of the fireplace, with only one damper for oven. At the opposite side there is nearly always what is called here a 'set-pot' for heating water. The heat of my oven is greatest at the bottom, on account of the hot air being underneath. What is not cooked in the oven is done over the open fire."

COAL

The price of coal varies according to quality and distance from the mines, and may cost from three to twelve dollars a ton. A hodful or scuttle of coal may weigh from fifteen to thirty pounds, but after weighing the contents of an average hod, any housekeeper may estimate readily the amount used daily, or for different purposes.

One woman writes that she can do her day's work with a single hodful of coal, making a ton last nearly three months, while a maid in her kitchen usually disposes of a ton a month. Another housekeeper runs a fire day and night on half a ton a month, while in a colder region three hods daily is the usual winter allowance.

GAS

Gas is available in comparatively few sections of the country outside of the large cities, but wherever it is used, housekeepers soon learn to plan their cookery to save fuel. This usually results in economy of time, so that fewer hours are spent in the kitchen, though all the necessary work is as well done as before.

A thousand feet of gas a week is a generous allowance for kitchen use in an average family. According to one report, gas at $1.50 a thousand feet has proved cheaper than coal at $5.00 a ton.

One cannot use a gas range in the same fashion as the wood or coal stove, but must adapt herself to its plan and the nature of the fuel. A steam cooker makes it possible to cook enough food for two days over one burner at one time. Today's dinner, a cereal for tomorrow's breakfast, some cup custards for supper, a stuffed fowl to be browned over in the oven for tomorrow's dinner, all may be cooking at once.

Then, with the ovens as commonly arranged, we may broil or roast beneath the flame which is heating the other oven to bake potatoes, bread or cake.

One pupil reports that she boils potatoes in the lower part of the double boiler while cooking cereal for the next day, and above that sets a basin of milk to heat for a pudding or sauce or soup. By such forethought the expense of gas is no greater than any other fuel, and the labor of housework is much reduced.

ALCOHOL

The removal of the tax on fuel alcohol, January, 1907, may mean much to the housekeeper as well as to the manufacturer. Every one who has used a chafing dish or alcohol lamp has wished that alcohol was as cheap as kerosene. Under the new law it may reach that point.

Since it may be made of many coarse and inferior vegetable products now unused, there need be no lack of this fuel, which is practically without odor or smoke.

Thus the housekeeper must be ready to adapt herself to another change in fuels and apparatus for its use.

With the alcohol lamp and the hay-box much of the discomfort and dirt now associated with kitchen processes will be banished, never to return, and the kitchen itself well may be dignified with the name of "laboratory."

KEROSENE

The small oil and gasoline stoves are not used as much as they deserve. With intelligent care and high-grade oil, a well-made oil stove is safe. Fire in any form is not a plaything.

Every household without gas or electricity should be supplied with a good three-burner lamp stove and small oven to fit it. These will cost about $3.00. If this lamp is given the same care that is given lamps for evening use, results will be satisfactory. But one must not expect a small stove to work as rapidly or accomplish as much as a larger one. Have the lamp full of oil to do good work. Do not let it burn many hours in succession, but give it a chance to cool off. Keep the wicks even and clean, and have new ones when they become discolored, or too short to reach the bottom of the lamp.

Oil stoves are liable to smoke if they stand in a draft, and therefore should be protected. Choose utensils to fit the stove and oven, and never fill them so full that there is danger of boiling over into the lamp. Since the heat is greatest in the lower part of the oven, cook on the upper shelf as much as possible, or exchange when possible. Asbestos mats may be used on the lower shelves. With two three-burner lamp stoves, and an oven to fit one, it has been easy several times, in my own experience, to do all the cooking for a family of six or eight persons.

FIRELESS COOKERS

The Norwegian Cooking Box or Fireless Cook Stove is described and illustrated on pages 12-13. This device has been exploited so much of late that it deserves further description.

The new interest in this method of cooking is probably due to the experiments made in 1905, under the direction of the Commissary-General of the War Department, and these were the result of a report from United States Consular Clerk, George H. Murphy, of Frankfort, Germany. Below is a condensation of Mr. Murphy's report, as it appeared in Daily Consular Reports in April, 1905.

"In an address to an audience of working people, Mrs. Back, wife of the director of the industrial school at Frankfort, brought to the attention of her hearers, the hay box or fireless stove.

"Every housewife knows that a pot of coffee can be kept hot for some time, without fire, simply by wrapping it in a dry towel to hinder escape of heat. The Norwegian "automatic kitchen" attracted attention at the Paris exposition of 1867 but failed to come into general use. Now in Berlin, Munich, and other cities popular lecturers are showing the practical value of this method of cooking.

"Mrs Back stated that she had used the hay-box for thirteen years, thus greatly reducing the cares of housekeeping. At first she used the box merely to keep finished food warm. Discovering that the process of cooking continued, she experimented and found that she could finish, in the box, all boiled and roasted meats, sauces, fish, soup, vegetables, fruits, puddings, etc.

"The box cannot be used for articles whose chief attraction lies in the crispness resulting from rapid cooking on a hot fire, but the rest of the meal may be ready and hot in the box. Patience will secure needed experience, and remove all doubts. In general, two or three minutes actual boiling on the fire is sufficient for vegetables, while roasted meat requires twenty to thirty minutes. Most articles should remain tightly closed in the box for two or three hours, and may be left to keep hot for ten or twelve hours.

"Dried legumes, fruit, etc., should be well soaked in cold water, allowed to boil two to five minutes and left for two hours in the box. Soft vegetables should be merely brought to a boil and then placed for an hour or two in the box. Soups are improved by being allowed to develop for two or three hours in the box.

"Covers of pots should not be lifted when they are being transferred. The object is to retain the heat as long as possible when it has once been developed. Too much water is better than too little.

"A home-made hay-box will usually be found cheaper and more practical than those with immovable felt and upholstery. Almost any box will do, which has a tight cover. The wood should not be too thin, and there should be no knot-holes or cracks. Old trunks and valises may sometimes be used in this way.

"The box should be loosely filled with shavings, paper or hay, the last being probably most satisfactory. The hay should be renewed every two or three weeks. Nests are made for the pots and the hay packed tightly under and around them. Any kind of pots can be used, although, of course, earthen ones hold the heat best. The tighter the tops fit, the better, but if the food is to be used within six or eight hours, they need not be hermetically closed. When the pots have been placed in the box carefully, without lifting the lids, they should be covered with a pillow and the lid at once securely closed.

"When not in use, the box should always be left open and the hay loosened, the pillow being hung in the air to dry thoroughly.

"The chief advantages of the hay-box may be summarized as follows:

"The cost of fuel can be reduced four-fifths or even nine-tenths.

"The pots are not made difficult to wash; they are not blackened, and they will last for an almost indefinite period of time.

"The food is better cooked, more tasty, more nutritious and more digestible.

"Kitchen odors are obviated.

"Time and labor are saved.

"There is no need of stirring, no fear of scorching or burning.

"The cares of the housewife are lessened, and her health and happiness are protected.

"The kitchen need not be in disorder half of the day.

"Warm water can always be had when there is illness in the house and during the summer when fires are not kept up.

"Where workmen's families live crowded in one or two rooms, the additional suffering caused by kitchen heat is obviated by the hay-box, for the preliminary cooking can all be done in the cool of the morning.

"At picnics the appetites of young people are only half satisfied by sandwiches and other cold food. The hay-box can furnish a hot meal anywhere at any time.

"Similarly, men and women working in the fields, or having night employment, can take with them hot coffee, soup or an entire meal, thus avoiding the necessity of returning home at a fixed hour or having it brought to them by another member of the family.

"When different employments make it necessary for the various members of a family to take their meals at different hours, this can be arranged without a multiplication of work with the assistance of the hay-box."

This consular report covered the ground so fully that any intelligent woman can make it the basis of experiments adapted to her own surroundings.

A small trunk measuring 18x22x24 inches, an agate-ware kettle with close tin cover, made to order to fit in, or merely rest on the kettle, were the appliances which served me satisfactorily this summer.

It was not easy to secure hay, so we looked about for a similar non-conducting substance, and found some boxes of excelsior and sawdust — not quite enough of either, so they were combined and put in bags and sewed up closely enough to prevent clutter. The most of the bags were of denim, but some thin cotton bags, in which five and ten pounds of sugar had come, were filled, and did good service in filling chinks.

To test the heat-retaining capacity of this outfit, two gallons of water was raised to the boiling point in the kettle. Closely covered, it was placed on one of the thicker cushions in the trunk and the others fitted in closely around and over the kettle. A blanket and some newspapers were spread over all, and the trunk locked. Twenty-four hours later the water was hot enough for dish-washing or bathing.

The statements made in the above report were fully verified by my own experience. This method of cooking is especially adapted to any article requiring long, gentle heat, such as the making of soup-stocks and broths and rendering tough meats tender. With very tough fowls, when the water cools down below 150-160° F., the whole may again be raised to the boiling point and started again in the hay-box.

It must not be expected to do everything, but every housekeeper who must depend upon a gas or kerosene stove should arrange a fireless cooker for economy of fuel and to increase her own comfort.

Many an American housewife uses both coal and gas ranges in her winter home, and in the summer cottage must depend upon wood and kerosene stoves. Probably during the year she also uses a chafing-dish occasionally, and that may derive its heat from alcohol or electricity. Wherever a house is supplied with electric lights there should be at least one electrical cooking appliance. Some excellent ones are already on the market, and the next generation, doubtless, will use this force in housekeeping as freely as we use gas.

Each of these methods of securing heat for cooking may be the best under certain conditions and have disadvantages under others. The housekeeper needs to be keen in judgment and quick to see in order to adapt her formulas of cookery successfully in turn to wood, coal, gas, kerosene, gasoline, alcohol or electricity. She must know how to tell when a thing is "done," and not trust wholly to the number of minutes prescribed in a recipe.

Women who are called upon to make such rapid transitions become adaptable, inventive, and are less "set in their ways" in other directions. The study of processes of cookery may thus become a broadening influence and means of general education.

CO-OPERATIVE COOKING

But there are certain household traditions which hold many intelligent women in a firm grasp, and these traditions may be traced to the generations behind us, when no money value was placed upon woman's labor. It does not yet seem easy for women to count fairly the cost of foods cooked under their own roof. Until this can be done there is small chance for co-operative industries, which might relieve the pressure of home cares where house-workers are not readily secured.

Few families to-day find it wise to make butter for themselves, and many would do well to buy bread, also. When there is a demand for high-grade bread made outside the home, it will be supplied, as has been the case here with other commodities, and with bread in other countries. There are many small towns to-day to which bread is sent from first-class bakeries 100 to 200 miles away.

With stronger laws, better enforced for the cleanliness and purity of food products; with greateintelligence on the part of the consumer, and greater skill on the part of the producer, there is no reason why we should not in the future be able to secure wholesome prepared foods of all grades at fair prices outside the home, rather than attempt to prepare everything under the home roof.

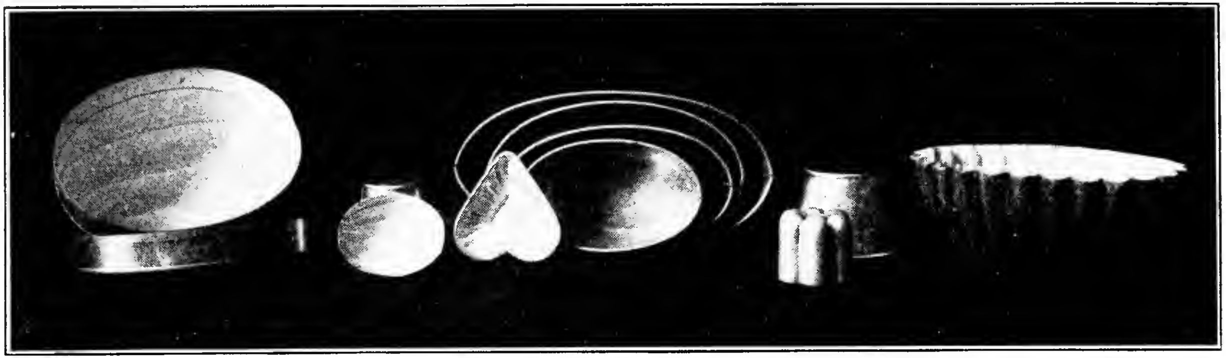
The isolated home must still be its own factory, and its director must be a Jack of all Trades. Such households should be supplied with all helps to make labor easy, but even then, much hard labor is necessary. Only where large quantities of any product are to be prepared does it pay to have all manner of machines and cunning devices to produce the most perfect results.

KITCHEN FURNISHINGS

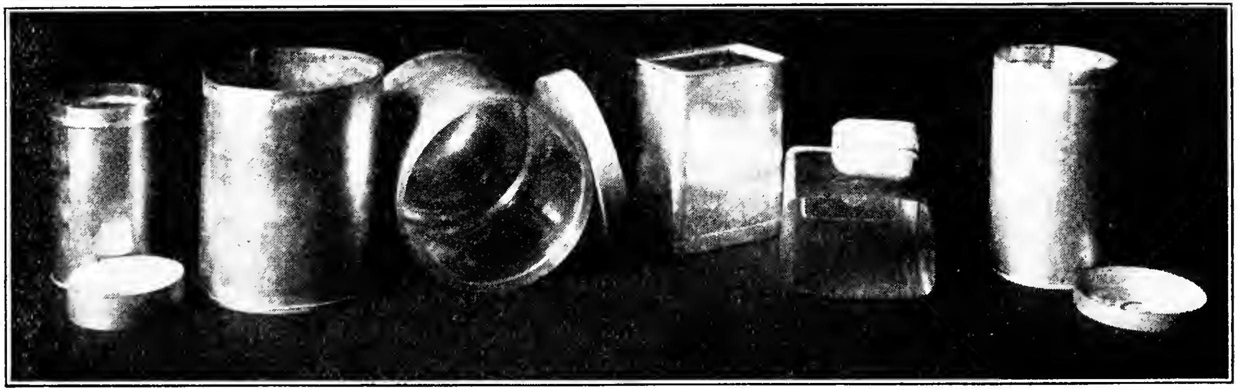
Where many people are to be fed, a few good tools like a bread-mixer (See p. 105), meat-chopper, etc., are often more helpful than another pair of hands, unless they are especially efficient ones.

One pupil has asked for a list of necessary kitchen furnishings. A good list is given in *Household Management*, page 105. Here is another designed for beginners in housekeeping, or for small families living in city flats, where there is no room to store superfluous utensils. The stove and refrigerator are usually supplied with such apartments.

For light housekeeping, where a chafing-dish or small oil or gas stove is the only means for cooking, still fewer utensils would suffice. With the addition



FANCY MOULDS



MOULDS FROM OLD TIN CANS
Good shapes for puddings

of a few fancy molds, all the foods illustrated in this book could be prepared by the utensils here mentioned. On page 101 some of the most useful are shown.

When selecting any utensil, be sure that it is of good quality, with no imperfections that will interfere with keeping it perfectly clean.

KITCHEN FURNISHINGS.

High stool	$1.50
Scales	1.00
Fibre pail	.50
Dish pan	.50
Soap shaker	.10
Dish mop	.10
Vegetable brush	.10
Tea kettle	1.00
Pastry board	.40
Rolling pin	.10
Chopping bowl and knife	.50
Bean pot	.30
Lemon squeezer (glass)	.10
Tea pot	.25
Coffee pot	.50
Muffin pan, agate ware	.50
Quart measure	.35
Pitcher	.50
Stew kettle and cover	1.00
Roasting pan	.50
Sauce pans (three)	.75
Bowls (two)	.50
Double boiler	.75
Two quart pans (two)	.50
Deep plates, to fit pan as covers (two)	.50
Cups for moulds (six)	.75
French knife	.50
Paring knives (two)	.30
Spatula	.30
Cork screw	.25
Can opener	.50
Measure cups, glass and tin	.20
Wire egg beater	.10
Dover egg beater	.10
Fine strainer	.05
Coarse strainer	.10
Colander	.20
Flour sieve	.20
Wire potato masher	.10
Grater	.10
Wooden spoons (two)	.20
Tablespoons (six)	.20
Teaspoons (six)	.10
Long fork	.10
Cutters (two)	.20
Omelet pan	.25
Loaf pans (three)	.60
Cake pans (three)	.30
Cake pans (three)	.30
Scotch bowl	.50
Glass jars (one dozen)	1.00
Total	$20.00

THE HOUSEKEEPER'S LIBRARY

Quite as important as helpful utensils to the housekeeper are the right kind of books.

.When we remember that cooking schools have been established for a generation in all our large cities, and that the lessons given in such schools have in several places been put in book form, and when we see the lists of cook-books sent out by publishers, we might suppose that every housekeeper in America would be the possessor of several reliable cook-books. But even the intelligent women taking this course are rarely well supplied.

One pupil honestly states the matter thus:

"My failures have been many, owing partly to my lack of a cook-book. I have overcooked custards, and undercooked corn starch. I have stirred and beaten all the gas out of pancakes, and wondered why they did not rise, etc., etc."

Many women everywhere are content to depend upon cook-books issued by patent medicine venders, and upon newspaper clippings liable to typographical errors. Such things may afford helpful suggestions, but much food-material has been wasted by blind following of careless printers, and writers who have little knowledge of the art and science of cookery.

Enterprising business men realize that they must read their trade journals to keep abreast of the tide of competition. Many a woman spends more than a dollar a year for tissue paper patterns for clothing, who would hesitate to buy a cook-book once in five years, or to subscribe for a reliable household magazine.

There has been little cash recompense for the housekeeper, however much she studied her trade, but now we are beginning to realize that personal health and family comfort are above price; that they depend chiefly on the air we breathe, the water we drink, and the food we eat.

On page 140 of this hand-book, there is given a list of reliable books relating to food and cookery, the whole costing about $20. The average American housekeeper, especially if she does her own housework, should *own* at least half of these books. While she may not find it feasible to spend more than a dollar a year in this way, still she may be sure that ten dollars spent in the purchase of helpful books would save more than that amount, in a single year, in her bills for food materials.

Any one near a public library has the opportunity to read such books, and thus discover which are the ones she wishes to own. If the library is not already supplied in this direction, send in requests that certain books be purchased. (Any of the books will be loaned to members by the School).

The study of this hand-book lays the foundations in the fewest words possible for the fundamental processes of cookery. As one pupil has expressed it: "I have found the lessons wonderfully helpful in classifying and fixing facts in my mind, and I feel that I am much better grounded in the principles of cookery than I ever should have been by merely studying cook-books."

After such a beginning, each one reading a cook-book will instinctively select and add to the foundation principles, already acquired, such explanatory details as are best adapted to her home conditions.

CARD CATALOG OF FOODS

The up-to-date housekeeper is ready to accept modern ideas and adapt methods from other departments of life to her business of housekeeping. She finds a card catalogue one of the simplest means for keeping addresses, and has another for an inventory of her household possessions, and a third for a list of foods especially suited to her family. In this list each card records not only the name of a food, but the approximate beginning and end of its season, its average price, the quantity required to serve a given number of persons, and several of the best methods of using it. Here, also, may be references to certain pages of the cook-books in her library. Or the cards may have copies of the recipes; such cards should have a hole in the top, so that they may be hung up in the kitchen within view of the worker.

When uncertain what to chose for the next day's dinner, or for some special occasion, she looks over these cards, and several possibilities will be suggested. From this plan one naturally comes to the study of dietaries and an application of the principles laid down in *Food and Dietetics*.

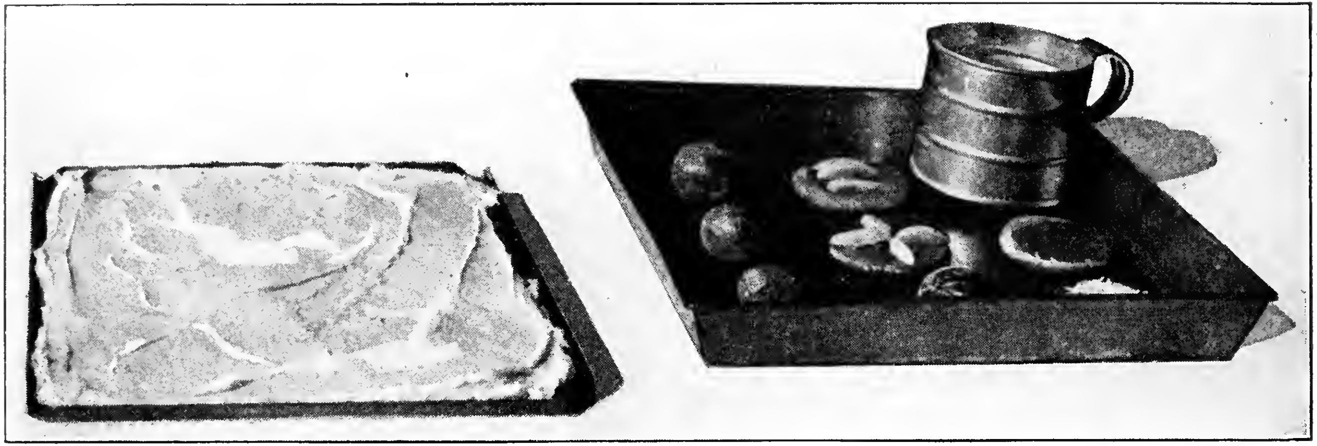
Among the helps in study along these lines are the series of dietary studies which have been issued from time to time by the office of Experiment Stations, United States Department of Agriculture, Washington, D. C. Two of the best to begin with are Bulletin 28 (Revised), "The Chemical Composition of American Food Materials" (5 cents), and Bulletin 129, "Dietary Studies in Boston, Springfield, Philadelphia; Chicago" (10 cents). The latter gives menus for several days at different prices, with itemized list of materials used and cost of each.

These may be obtained by sending coin to the Superintendent of Documents, Washington, D. C.

COOKERY A FINE ART

In cookery, quite as much depends upon the order and manner of combining the materials as upon the ingredients themselves. The manipulation of the cook-stove has something in common with that of a musical instrument. It is possible to play by ear with little knowledge of scales and chords, or to cook without knowing the laws of heat or the chemical composition of food materials.

Or, by continual practice, a single composition may be committed to memory and be reproduced in a mechanical fashion either upon the piano or on the kitchen range. Only after much study and repetition of processes does one become able to interpret intelligently the works of great masters, and the fundamental laws of harmony must be known, before one



BEFORE BAKING. FANCY CAKES AND COOKIES

AFTER BAKING. HOW TO MAKE SEVERAL FANCY CAKES FROM THE SAME RECIPE can produce new creations either in music or more material things.

As music appeals to the sense of hearing, so does cookery to that of taste. The truest art in cookery is not the ability to construct wondrous complications of food materials, or to carve roses from beets, or model faces in butter, but rather to develop the full flavor of a food by the simplest process, to make the "mouth water"—that is, to stimulate the flow of the digestive juices by savory odors and flavors.

Brillat Savarin well said that the invention of a new dish meant more happiness to the human race than the discovery of a constellation, but quite as important is the constant preparation of the simple, old foods in the very best way — the baked potato, the boiled egg, the broiled steak, etc., etc.

CAKE MAKING

The mixing of cake often has more to do with its texture than the proportion of materials used, though both have their influence.

It is an interesting experiment to make a good cooky dough and bake portions of it with different proportions of flour. Take, for example, the familiar 1-2-3-4 cake formulas and transpose the flour and eggs so that we use one cup of butter, two cups of sugar, three eggs and four cups of flour. The stiffness of this dough will vary with size of the eggs and the quality of the flour. Often some liquid and more flour are added, making a less rich mixture, and then some baking-powder or its equivalent will be needed, otherwise the creaming of the butter and the eggs will bring sufficient air into the dough.

Even before all the flour is worked in, some of the dough may be spread on a tin and cut in shapes after baking. When slightly stiffer, bits of the mixture may be dropped on the tin, fruit or nuts put over them, and they will spread out in dainty little cakes.

If still more flour is added, but before the dough is quite firm enough to use a rolling-pin, small balls of the dough may be shaped round with the hands and flattened on the pan with the under surface of a smooth tin cup.

A dough in this stage may be chilled, and then can be rolled easily, and the resulting cakes will be much richer than if more flour had been worked in.

Deft, experienced hands produce satisfactory results with doughs, because they can shape them without working in an excessive amount of flour.

MENU MAKING

Through the test questions, the attention of our pupils has been called to the planning of meals for a household, for this is an important part of the housekeeper's duties. Under Part I we asked for menus introducing as many dishes as feasible containing milk and cheese. Such menus would be useful where the meat markets were poor and milk abundant, since one may thus secure similar nutritive elements, and usually at less expense than for meats.

After Part II, the request was made for a menu for two days when eggs were cheap, and for two days more when they were expensive. This was done because few housekeepers pay sufficient attention to market prices. They get the idea that a certain food is costly, and therefore not to be used at all, when, perhaps, a careful comparison of the prices of all ingredients would show it to be cheap at some seasons. Angel and sponge-cakes, for example, when eggs are at their lowest price, are less expensive than average butter-cakes.

With eggs at 25 cents a dozen and butter at 25 cents a pound, a sponge-cake with five eggs costs no more than a cake with two eggs and half a cup of butter. If the whites of twice as many eggs are used, the actual cost is no greater, since the yolks are available for other purposes.

At the close of the lessons we asked for a week's menu from each householder represented, with suggestions for their improvement, without increase of labor or expense.

The responses show an increased attention to the details that count in feeding a family satisfactorily to all concerned.

Yet menu-making is still a great bugbear to many pupils, and a few more hints on the subject may be helpful.

Many are hampered seriously by the habits and wishes of different members of their households.

One young woman writes: "My father demands griddle cakes every morning the year round."

Naturally, with such tastes, it is difficult to introduce many new dishes, or to secure a very varied menu.

In the old days of the brick oven, most of the necessary cooking for a family was done on one day of the week, for the proper heating of that oven could not be accomplished hurriedly.

Now with the gas stove, conditions are very different, and two or three hours each day should be ample time for the actual cookery for an average family. But to accomplish everything in these limits wise planning is required. Whatever requires long cooking for breakfast must be started the previous day, and preparation for the dinner or luncheon is begun while breakfast is being made ready, and so on.

Many business women keep house in this way, and their families are as well fed as those where more time is frittered away on petty nothings. It is only by application of business methods in our kitchens, that the routine in many households can be simplified and untangled.

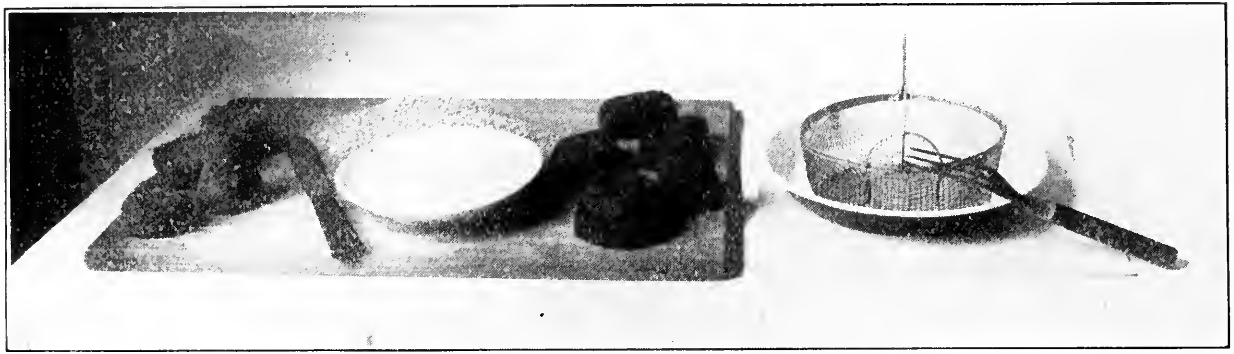
The preparation of food for an average household is not a difficult matter when the manager has learned her trade and each individual member is not unreasonable in his or her requirements.

The housekeeper must think out her plan of action for days in advance and thus save unnecessary duplication of processes.

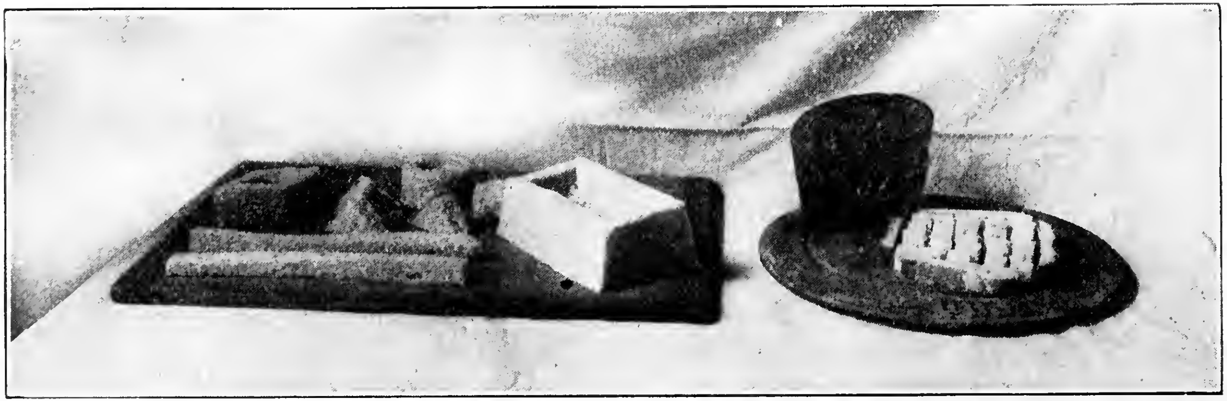
When one pair of hands must do all the cooking, it is a foolish waste of time and strength to cook fresh food for the purpose of making composite dishes. Let those come occasionally as an easy way of finishing up some bits too good to throw away, which have already appeared in other forms. For example, it

Making Timbale Cases.

takes no more effort or fuel to boil twelve potatoes than is required to cook six. These may appear one day as plain boiled, if we have a roast with a good gravy. The next day we are to serve the meat cold or perhaps fried fish with no sauce, so the second portion of potatoes is cut in cubes or slices and reheated in butter, flavored with onion, and sprinkled with chopped parsley just before serving, giving us Lyonnaise potatoes. Or we might prefer Delmonico potatoes and put them in layers in a pudding dish with



READY FOR MAKING CROQUETTES



SOME WAYS TO USE STALE BREAD

a sprinkle of cheese between, pour a thin white sauce over, cover with buttered crumbs, and heat through in the oven. Or the potatoes may be mashed and for a second appearance take the form of a huge cone, or apples, or pears for individual service.

Sometimes in our zeal to use up left-overs, we expend much time and strength and more additional material than the value of the original article warrants. But if one owns a timbale iron, those fragile shells resulting from frying a batter on it are attractive receptacles for a little creamed chicken or a sweetbread.

Croquettes have their place occasionally, and often save the purchase of more meat and thus justify the time they require. A garnish of crisp triangles of toast around a dish of creamed meat disposes of both the scraps of meat and bits of bread — or cases may be made of bread and browned in the oven and filled with meat.

The store closet should be kept well stocked, and this is less expensive and far easier than buying things as needed. One order a week ought to be enough for the staple groceries, and two orders a week in winter and three in summer for meats, fruits, and fresh vegetables. Do not order by telephone, but at least once each week visit the market and make the order according to what is available there.

The time often spent in a daily visit to markets or

BOSTON BAKED BEANS

a daily call from the store-man can be used to better advantage in an average home.

A fair supply of good-grade canned goods should be kept in the house for emergencies; but as a whole these are more expensive than fresh cooked meats and vegetables; but where fuel is expensive and labor high, they may be used more freely.

Milk should be used generously. Many families would do well to double their present milk supply. Where milk is abundant and canned vegetables at hand, it takes but a few moments to prepare a nourishing and attractive cream soup of corn, beans, peas, or tomatoes. If the top of the milk has been used for cereal and coffee, the remainder will be quite as satisfactory as whole milk for soups or puddings, when butter or other fat is added.

If our home is at a distance from markets and we have an abundance of one type of food material and little of others, then it may be necessary for us to devise many ways of serving this one, and then we must use different forms and flavors that we may not tire of the monotonous diet. But when the season of any fruit, vegetable, or meat is brief, then we need serve it only in its natural form or cooked in the simplest manner.

As the seasons change, cold merging into heat and heat into cold again, we let our fires go out, then we kindle them, and we decrease and then increase our clothing. But few households make a correspondingly marked change in their food, adapting it to the differing needs of the body as the external temperature changes.

All of us know places where pork and pies occupy as prominent a position on the tables in July as in January, though their heat-giving qualities make them out of place in summer, even if admissible in winter.

Some Ways of Serving Oranges.

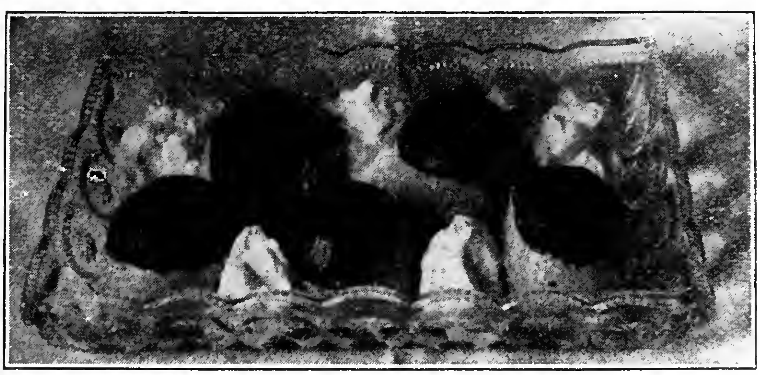
"Pork and beans," where the fat predominates, may be suitable for midwinter, while "baked beans," with a small amount of fat — be it pork, beef, butter or olive oil — are not out of place at any season.

Another phase of this matter is the improvement in flagging appetites, which is accomplished by a change in food. The city dwellers are often better off in the spring than the country family. From the South to the city markets come greens of several kinds, asparagus, lettuce, cucumbers, and radishes, while the country garden is still bare. A small bunch of asparagus as a garnish around some inex-

Lambs Heart with Asparagus.

pensive meat like lamb or calf hearts will give relish when a larger quantity would be an extravagance.

Those who prepare the food for the family deserve a change of labor from season to season, and many women in the country would do well to strike from pie making and spend the time so saved out of doors. It is no harder to care for a strawberry bed than to



Apricot or Peach Jelly.

wield the rolling pin or bend over a hot stove, and strawberries may well be substituted for pies.

True economy must be practiced in the planning of menus and one thing fitted into another so that nothing is lost.

USE OF FATS

Perhaps there is no one thing more often wasted in the average household than fat, yet this is essential to our health, and we pay high prices for it in cream, olive oil, and butter, when cheaper forms might be substituted in some cases.

The fat trimmed from meats is too often left at the market or thrown away after cooking, instead of clarifying it according to the directions on page 73. This, when properly prepared, would be far superior to the lard and cooking butter often bought for culinary purposes.

The flank fat from beef, or "cod fat," as some market-men call it, is much softer than suet, and, if carefully prepared, is to be preferred to cooking butter for making ordinary cookies, gingerbread, pastry, etc. This clarified fat usually costs less than ten cents a pound, even after the weight of the scraps is deducted.

When a housekeeper has not time to prepare such fat, she may buy *uncolored* oleomargarine at about half the price of table butter, or in the vicinity of fifteen cents a pound. (Colored butterine is taxed ten cents a pound.) Many preparations of cotton seed oil are on the market, which are satisfactory when fresh for frying and for use in doughs.

One must use discretion in combining fats for different uses. It is not desirable to use smoked fat like that from bacon, or highly seasoned fat, such as comes from sausages, for frying doughs, but these should be kept each by itself and used for warming potatoes and other vegetables.

The hard suet and soft chicken oil clarified together give an excellent compound, which may be substituted for butter in tomato sauce and some soups, as well as in many doughs.

In the same way all bits of meat and bone should be used for stock, alone, or combined with vegetables. Where meat is served once or twice daily in a house, there is rarely need of buying any especially for soups.

TABLE SERVICE

The desirability of careful table service for the simplest foods is shown by this incident told by one pupil.

"My aunt had great difficulty in getting us to eat cereal for breakfast, so she bought us each a very pretty blue bowl. We were allowed to use these only when we had cereal for breakfast. The result was that we eagerly asked for it every morning and now are very fond of the various kinds."

No one can deny that such attention to details is an important part of the housekeeper's duty.

Where there are no servants, a housekeeper must be careful that her efforts for dainty service do not involve her in labor beyond her strength. Each member of the family should have a part in the table service that everything may move smoothly.

MENUS FOR SPECIAL OCCASIONS

Every housekeeper occasionally has to plan a special menu for home or club or church society, and consideration of this matter may be helpful here.

It is of first importance that we do not undertake more than we can carry out well. This applies to the choice of the food material, to the number of courses, and the way in which they are to be served.

Instead of sending away for rare luxuries with which our guests might be familiar every day, let us make the most of the specialties of our own locality.

The table decorations may take the form or color of the season, but beware of special shapes or garnishes which might cause any deterioration of the food to be served.

Other essential points are to have everything served at the proper temperature, to alternate brown and white or crisp and soft effects, and to avoid having the same article appear in two different courses.

This couplet from an old English poet sums up the whole matter:

"Three dishes well dressed, and a welcome withal,
Both pleaseth thy guest, and becometh thy hall."

SUPPLEMENTAL PROGRAM ARRANGED FOR CLASS STUDY ON

PRINCIPLES OF COOKERY

Ample material for a course of six or more lessons may be secured from the lesson books on *Principles of Cookery* and from the Government Bulletins. The Farmers' Bulletins may be obtained without charge by writing to the United States Department of Agriculture, Washington, D. C. As many copies of each will be sent as desired. The bulletins for which a price is given may be obtained by sending *coin* to the Superintendent of Documents, Washington, D. C. The Government will not accept postage stamps. A few reference books are mentioned which will be loaned by the School for the cost of postage given, if not available in the local public library. Any encyclopedia will furnish much on every subject, and a book of standard quotations will also add to the interest of the meeting.

All the common daily foods may be studied from the historical or literary standpoint, for each has a history and literature of its own. Often it is wise to set the practical housekeeper to look up the historical side of a food, while a philosophical member is required to report upon its practical use. Thus each gets a fresh point of view and a new interest in an old subject.

It might prove interesting to arrange for a series of lunches to illustrate the foods being studied. Here it is best to keep out of the conventional lines and make the menus educational. When the class is large, a few may be chosen to prepare the lunch for all and directed to keep the expense within certain limits, 10 to 20 cents apiece, and to give a report. Chafing dishes should be provided for each group of four to eight and some experimental cookery tried.

MEETING I

(Study pages 1–49)

Fuels and Appliances for their Use

Work of Count Rumford — Rumford Kitchen Leaflets, No. 1. ($1.00, postage 8c.)

Work of Benjamin Franklin. See encyclopedias.

Aladdin Oven. See Science of Nutrition, by Edward Atkins. ($1.00, postage 14c.)

Fireless Cook Stove. Pamphlet, postage 4c. See also Supplement to *Principles of Cookery.*

The Gas Stove. If gas is in common use, have members calculate the amount of gas required to bake a loaf of bread, a cake, to boil two quarts of water, etc., by observing the length of time taken to burn two cubic feet — i. e., one complete revolution of the hand of the small dial D. See page 10. See also Question 5.

Electric Cooking — Technical World Magazine, July 1906. (Postage 6c.)

Water

Experiments: See pages 11, 22. Test the water boiling slowly and boiling hard with a thermometer. Note the simmering temperature and observe how much less heat is required to keep the water at this temperature than to keep it boiling vigorously. (If a gas stove is not available, use a small kerosene stove or a chafing dish burner.) A suitable thermometer may be obtained through the school for 50 cents. Loaned for 6c postage.

The experiment on page 22 can be made with one dish using the same quantity (say a cup) in each case.

Topic: Kitchen Experiment

References: Chemistry of Cooking, by Williams. Chapter II. Boiling of Water. ($1.50, postage 12c.)
Drinking Water and Ice Supplies, by Prudden. (75c., postage 6c.)

Preserving

Canning of Fruit, Preserves and Jellies, Maria Parloa. Farmers' Bulletin No. 203, *free.*

Improved Method of Canning, in Farmers' Bulletin No. 262.

Use and Abuse of Food Preservatives. Extract No. 221. Free, Department of Agriculture, Washington, D. C.

MEETING II

(Study pages 39–54)

Milk

Make sour milk cheese and junket. (See page 44.)

Show how acid may be used with milk without curdling. (See page 45.)

References: Farmers' Bulletin No. 42, Facts about Milk; No. 74, Milk as Food; No. 29, Souring of Milk and other Changes in Milk Products; No. 63, Care of Milk on the Farm; No. 210, The Covered Milk pail; No. 227, Clean Milk.
Milk and its Products, by Wing. ($1.00, postage 10c.)

Butter

See experiments page 50.

White Sauce: In a chafing dish, or over a small kerosene or gas burner, make white sauce by three methods described on page 51.

To what extent may other less expensive fats be substituted for butter.

Make white sauce with oleomargarine.

Have some member make two or three small cakes from the same recipe. In one use butter, in another oleomargarine, in another a mixture of equal parts of lard and beef suet. Bake all at the same time and have all conditions as nearly the same as possible. Show results.

Topic: French Sauces and their Inventors. See Hand Book of Domestic Science, by Wilson, page 69. ($1.00, postage 10c.) And other books.

References: Extract No. 44. Butter Substitutes.

Sanitary and Economic Cooking, by Mary Hinman Abel. Chapter on Fats and Oils. (40c., postage 6c.)

Cheese

Make and serve Welsh rarebit made from different recipes, using the same kind of cheese, or make two lots by the same recipe and method, using two or more grades of cheese.

See Question 17.

Exhibit: Show samples of all possible kinds of cheese; prices and composition.

Topic: Ways of using Cheese in Cookery. See Sanitary and Economic Cooking and Cook Books.

References: Farmers' Bulletin No. 82, Curd Test in Cheese Making; No. 144, The Curing of Cheese; No. 162, Cheese Prints; No. 202, Manufacture of Cottage Cheese; No. 244, The Food Value of Cottage Cheese; No. 166, Cheese Making on on the Farm.

Chemistry of Cooking, by Williams; Chapter IX. Cheese. ($1.50, postage 2c.)

(Select answers to Test Questions on Part I and send them to the School for correction and report on experiments.)

MEETING III

(Study pages 55–82)

Eggs

See experiments on cooking of eggs in water, page 57.

Try similar experiments in "frying" eggs with fat at high and low temperature.

See Question 6.

Show egg mixtures as custards, sponge cakes, etc., cooked at too high a temperature and the same ingredients cooked at correct temperature.

References: Farmers' Bulletin No. 128, Eggs and their Use as Food; No. 103, Preserving Eggs; No. 122, Flavor of Eggs; No. 262, Color of Eggs.

Meat, Fish, Fowl

Sanitary and Economic Cooking, "Methods of Cooking Meat," by Mary Hinman Abel. (40c., postage 6c.)

See Cook Books.

Farmers' Bulletin No. 34, Meats: Composition and Cooking; No. 85, Fish as Food; No. 182, Poultry as Food; No. 193, Cooking Meat; No. 162, Cooking Meat.

The Roasting of Beef, by Isabel Bevier. Circular No. 71, University of Illinois (postage 2c.).

Topic: Methods of Cooking Cheap Cuts of Meat in Palatable Form.

MEETING IV

(Study pages 83 – 97)

Vegetables

See experiments, pages 83 – 84.

Get up an exhibit of uncommon vegetables.

Illustrate the effect of overcooking vegetables by boiling a peeled potato, — one until it is just soft, another until it becomes soggy.

Topic: History of the White Potato.

References: Farmers' Bulletin No 256, Preparation of Vegetables for the Table, by Maria Parloa. Farmers' Bulletin No. 121, Beans, Peas and other Legumes as Food, by Mary Hinman Abel; No. 127, Sweet Potatoes; No. 244, Cooking Qualities of Potatoes; No. 73, Losses in the Cooking of Vegetables; Extract from Year-Book, 1900, Value of Potatoes as Food.

Grains

History: See "Corn Plant" by Sargent. (75c., postage 6c.)

Experiment: Cook cereal breakfast food for twenty minutes as directed. Start another portion the night before and cook for two hours, heating before serving. Compare results.

References: Farmers' Bulletin No. 249, Cereal Breakfast Foods; Extract 324, Wheat Flour and Bread; Extract 326, Macaroni Wheat.
The Cooking of Starch in Cereals, Extract No. 7, Illinois Experiment Station. (Postage 2c)

(Select and send answers to Test Questions on Part II.)

MEETING V

(Study pages 99 – 122)

Bread

Demonstration: Illustrate proportion of flour and liquid for (1) Batters, (2) Muffin Mixtures, (3) Soft Dough, (4) Pastry Dough. See pages 99 – 100.

See experiments with Leavening Agents, page 108.

If members are in the habit of making their own bread, hold a bread contest, appointing judges to grade the bread according to the chart designed by Professor Isabel Bevier for the Illinois Domestic Science Association, viz.

Flavor	35
Lightness	15
Grain and Texture	20
Crust— Color, Depth, Texture	10
Crumb— Color, Moisture	10
Shape and Size	10
	100

Size of pan recommended, $7\frac{1}{2}$ x $3\frac{1}{2}$ x $2\frac{3}{4}$ inches.

Pastry and Cake: Illustrate the difference between bread and pastry flour by making two cakes exactly alike and baking at the same time.

Illustrate the effect of a quick and a slow oven on the same dough.

Topic: Use of thermometers.

Bread: Quotations from prose and poetry by members.

References: Farmers' Bulletin No. 112, Bread and the Principles of Bread Making; No. 114, Skim Milk in Bread Making.

Story of a Grain of Wheat, by W. C. Edge. ($1.00, postage 10c.)

MEETING VI

(Study pages 122–138)

Food and its Appeal to the Senses

The importance of flavor, etc., as an aid to digestion: See The Work of the Digestive Glands, by Pawlow, the "Psychic or Appetite Juices." ($2. 00, postage 16c.) Also Food and Dietetics, by Hutchison. Pages 396–397. ($3.00, postage 26c.)

Cut illustration of cooked food from magazine to be discussed and criticised by members.

Topics: The Use and Abuse of Garnish in Food.
Harmony in Colors, Flavors and Odors in our Foods.
Salads.
Use of Left-overs.

Menus

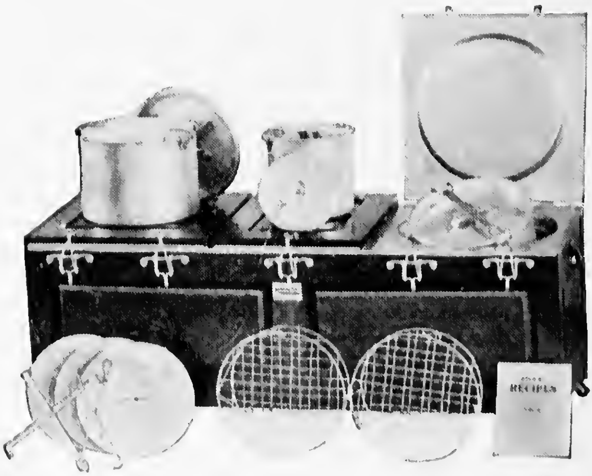
See Supplement.

Menus for a week: Have each member give her method of planning meals.

Menus for Social Occasions.

Topics: Economy of Time and Strength in Cooking.
Is Hospitality a Lost Art.
Serving by different Methods. Illustrated

CYLINDER TYPE FIRELESS COOKER



BENCH TYPE FIRELESS COOKER

The "Caloric," Aluminoid Lined with Aluminum Utensils. The aluminum utensils with clamped covers can be purchased separately for home-made cookers.

FREEHAND COOKING

THE purpose of this Bulletin is to tabulate the material in *Principles of Cookery* and to give the comparatively few fundamental recipes in cooking which are capable of infinite variation.

Exact proportions, conditions, and materials are essential to obtain identical results in cooking, but materials vary somewhat and conditions differ, so that it is often necessary to modify a recipe. By "free hand cooking" is not meant hit or miss cooking, or cooking by guess, but the compounding of food materials on scientific principles—not following blindly by "rule of thumb" recipes which may have been made for different conditions.

WEIGHTS AND MEASURES.

3 teaspoons=1 tablespoon	2 pints=1 quart
16 tablespoons=1 cup	4 quarts=1 gallon
2 cups=1 pint	1 cup=8 ounces (volume)

A gallon of water weighs 8 1/3 pounds—a cup of water, 8 1/3 ounces (avoirdupois). A gallon contains 231 cubic inches.

All materials are measured level, i. e., by filling cup or spoon more than full and leveling with a case knife. This applies to liquids which "round up" in spoons. Flour, meal, and fine sugar are measured after sifting. Measuring cups are not always accurate and ordinary tea and tablespoons vary considerably.

Test spoons with each other and with the cup before using.

APPROXIMATE MEASURE OF ONE POUND.

2 cups milk	2 5/6 cups granulated cornmeal
2 cups butter	2 2/3 cups oatmeal
2 cups chopped meat	6 cups rolled oats
2 cups granulated sugar	4 1/3 cups rye meal
2 2/3 cups brown sugar	1⅞ cups rice
2 2/3 cups powdered sugar	2 1/3 cups dry beans
3½ cups confectioners' sugar	4 1/3 cups coffee
4 cups patent flour	8 large eggs
4 cups entire wheat flour	9 medium eggs
4½ cups Graham flour	10 small eggs

Note.—Read "tablespoons" in place of cups in the above and the weight is about 1 ounce.

No table of weights to measure can be more than approximate, as different samples vary in weight for bulk. In truly scientific cookery quantities should be measured by weight. The table is useful for comparison, i. e., powdered sugar is more bulky than granulated and less so than confectioners', hence the greater sweetening power of granulated; ordinary white flour (sifted) is less bulky than graham flour, and so on.

Experiments have shown that there may be a difference of 25 per cent in the weight of a "cup of flour" measured by different persons in different ways. One method is to sift the flour onto a square of glazed paper (or oil cloth) and pour it into the cup placed on another piece of paper—tap the side of the cup once with a knife and level.

METHODS OF APPLYING HEAT

BROILING—Cooking before or over glowing coals or under gas. Radiant heat. High temperature at first to sear outside, thus developing flavor and retaining juices; then lower temperature for the heat to penetrate and to avoid burning.

PAN BROILING—Cooking on very hot griddle with only sufficient fat to prevent sticking.

ROASTING—Same as broiling, superseded by baking in oven.

BAKING—Cooking in oven by heated air and radiation.
Slow oven, 270°—350° F.
Moderate oven, 350°—400° F.
Quick oven, 400°—480° F.
(These temperatures were taken by a thermometer through the top of a gas stove oven).

BOILING—Cooking in boiling water, 212° F.

STEWING—Cooking in water at temperature 160° to 180° F.

STEAMING—Cooking in contact with steam, 212° F.

DRY STEAMING, as in a double boiler, 192° F.

FRYING—Cooking by immersion in deep fat, approximately 360° F. for uncooked foods, 380° F. for cooked foods. The fat used: all lard, 2/3 lard and 1/3 bef suet, "cod fat" from the flank of beef, oil, "snowdrift," "cottolene" and mixtures. Temperatures vary to produce similar effects with different fats.

SAUTE-ING—Cooking in small quantity of fat—often called frying.

BRAISING—Combination of stewing and baking. Meat is often first seared to develop flavor and prevent escape of juices.

FRICASSEEING—Combination of sautéing and stewing.

COMPOSITION OF RAW FOODS

Parts in 100 (approximate).

Wheat Flour—12 water, 12 gluten, 75 starch, 1 fat.
Cornmeal—12 water, 9 protein, 75 starch, 2 fat.
Beans and Peas, dry—13 water, 24 legumen, 60 starch, 2 fat.
Potato, white—78 water, 2 protein, 18 starch, trace of fat.
Parsnips, Carrots, Turnips—85 water, 1 proteid substance, 9—12 starch and sugar, ½ fat.
Banana—75 water, 1 protein, 22 sugar and starch, ½ fat.
Loin of Beef (avg.)—60 water, 18 protein, 20 fat.
Eggs—74 water, 13 albumen, 10 fat.
Egg, white—86 water, 12 albumen, no fat.
Egg, yolk—50 water, 16 albumen, 33 fat.
Milk—87 water, 3 casein, 5 sugar, 4 fat.
Cheese—33 water, 26 casein, 33 fat.
Nuts—3 water, 20 protein, 15 starch, 55 fat.
Butter—12 water, 1 protein, 85 fat.
Lard, Olive Oil—100 fat.

All the above foods except refined fats, sugar and starch, contain from ½ per cent to 1 per cent of *mineral matter* (salts), apparent when the foods are burned as *ash*. Butter and cheese have 2 per cent or 3 per cent of common salt added.

Protein foods are eggs, meats, fish, cheese.

Starchy foods are the grains—wheat, rice, rye, oats, corn, etc., beans, peas, potatoes, chestnut.

Fats are prominent in fat meats, nuts, cream, butter, lard, vegetable oils.

Cellulose or woody fiber is found in vegetables, unscreened flours and meals, and in fruits, especially when unripe.

EFFECT OF HEAT ON FOOD MATERIALS

STARCH absorbs water, swells and becomes partially soluble in water. This begins at about 150 degrees F. Dry starch begins to change to dextrine at about 320 degrees F.

SUGAR is not changed at low temperatures unless acid is present. It melts at about 365 degrees and begins to caramelize at about 420 degrees F. Sugar, boiled with acid, changes slowly to glucose or non-crystallizing sugar.

CELLULOSE itself is not affected by cooking, but the connecting substances are softened and it may be separated.

Protein foods are hardened somewhat by heat. Albumen coagulates completely at 160 degrees F. and will no longer dissolve in water. Other proteins, as *gluten* of flour, *casein* of milk, *ligumen* of peas and beans, *myosin* of meat, are hardened somewhat.

Gelatin is formed from *gristle* and *connecting tissue* of meat, and from bones, by long continued heating in the presence of water.

Fat is not changed except at a high temperature, when it is broken apart—"split"—into fatty acid and glycerine. Some of the glycerine is changed into "acrolein" at very high temperatures, 500° and over, which is very irritating to the mucous membrane, as is recognized by the smarting sensation given to the eyes and nose when fats are overheated. Butter begins to "split" at about 256° F., lard at 360° F., beef suet at 440° F., cottolene and snow drift at 450° F., especially prepared cottonseed oil and olive oil at 600° F.

Baking Powder, a mixture of cooking soda and an acid substance, as cream of tartar, or phosphates, or alum, undergoes chemical change, whereby carbon dioxide is set free and salts—as Rochelle salts, or phosphate, or alumina compounds—are formed. The heat of the oven expands the air or gas in the food, evaporates part of the water and drives out volatile substances like alcohol.

All these changes are, for the most part, physical rather than chemical in their nature. For example, in a cake after baking, the sugar is still sugar, the starch is still starch, the fat is still fat, and the albumen is still albumen. All the materials have been blended, flavors having been developed through minor but complex chemical changes and a small proportion of the starch and sugar in the crust have been changed to dextrin and caramel.

TEMPERATURE AND TIME OF COOKING

All food materials are poor conductors of heat—it takes time for the heat to penetrate.

The correct time and temperature depends on (1) what is to be accomplished, (2) size and thicknesses, i. e., the extent of surface exposed to the heat, compared to the bulk.

Foods with a large proportion of eggs require low temperature to prevent toughening.

Starch requires nearly the temperature of boiling water for cooking.

No food containing much water can be raised to a temperature above the boiling point—212 degrees F. Water gives off vapor at all temperatures, but at 212 degrees F. steam forms rapidly and in so doing absorbs a large quantity of heat. No brown crust can be formed until the water from the surface is nearly all evaporated. A full oven in which much water vapor is being given off requires the application of more heat than when only one or two dishes are in it.

In baking doughs, the larger the mass the lower must be the temperature in order that the heat may have time to penetrate to the interior and expand the gas and harden the albumen and gluten. If the temperature is too high at first, a crust forms, preventing the proper expansion of the loaf and hindering the penetration of the heat.

Thin loaves, pieces of meat, etc., need much less time for cooking, because the heat penetrates quickly. Higher temperatures may be used, as the food is cooked before the surface begins to be burned.

Mixtures containing much sugar or molasses burn easily.

Vegetables containing much fiber need long boiling to soften them and separate the cellulose. Young, green vegetables contain less fiber and require less time in cooking.

Bearing all the above in mind, the following tables may serve as a general guide for beginners. When it is possible to do so, TEST.

TIME TABLE.

BOILING

Meats (4 to 5 lbs.)—2 to 5 hours. (Tough meats should be kept below boiling, 180° F.)

Fish (2 to 5 lbs.)—30 to 45 minutes.

Ham (12 to 14 lbs.)—4 to 5 hours.

Corned Meat (6 to 8 lbs.)—4 to 6 hours.

Potatoes, white—20 to 30 minutes.

Potatoes, sweet—15 to 25 minutes.

Peas, green—20 to 60 minutes.

Beans, string—½ to 1 hour.

Beets, young—15 minutes.

Beets, old—3 or 4 hours.

Onions—40 to 60 minutes.

Cauliflower—20 to 25 minutes.

Cabbage, cut up—20 to 25 minutes.

Turnips, parsnips—30 to 45 minutes.

Carrots—1 hour; less if young.

Green corn—8 to 15 minutes.

Spinach—15 to 20 minutes.

Squash—20 to 30 minutes.

Asparagus—20 to 30 minutes.

Diced Vegetables—10 to 20 minutes.

BAKING

Beef rib (medium, 4 lbs.)—1 hour, 15 min.

Beef rib (medium, 8 lbs.)—2 hours, 15 min.

Leg of lamb—1 hour, 30 minutes.

Pork (rib)—3 to 4 hours.

Veal (leg)—3 to 4 hours.

Chicken (3 to 4 lbs.)—1 to 1½ hours.

Turkey (8 to 10 lbs.)—2 to 3 hours.

Fish (3 to 4 lbs.)—45 to 60 minutes.

Braised beef—4 to 5 hours.

Bread, white—45 to 60 min. depending on shape of loaf.

Bread, Graham—35 to 45 minutes.

Quick Doughs—8 to 15 minutes.

Cookies—8 to 10 minutes.

Cake, thin—15 to 30 minutes.

Cake, loaf—40 to 60 minutes.

Pudding, Indian, etc.—3 hours or more.

Bread Pudding—20 to 45 min., depending on shape and number of eggs.

Pies—30 to 45 minutes.

Scalloped Dishes—15 to 20 min.

Baked Beans—12 hours or longer.

OVEN TEMPERATURES.

	ENTER AT	KEEP AT
Roast Meats	480° F.	350° F.
Fish	425° F.	350° F.
Bread	440° F.	400° F.
Popovers	480° F.	450° F.
Cookies, Puff Paste	480° F.	450° F.
Quick Doughs	480° F.	480° F.
Ginger Bread and Molasses Mixture	380° F.	380° F.
Plain Cake	380° F.	380° F.
Sponge Cake	350° F.	340° F.
Baked Custard	350° F.	Higher in water

These temperatures are for gas ovens, with thermometer through the top. An oven door "thermostat" should register from 50° to 70° less. Few of these are accurate in their readings, but after being tested a few times they are useful in obtaining desired temperatures thereafter.

In addition to the methods of processes of applying heat, there are a few fundamental processes in cooking, i. e., thickening, leavening, shortening and flavoring.

THICKENING AGENTS

The common thickening agents are flour, corn starch, rice flour, potato flour, arrow root, eggs; also gelatin, sea moss, junket for milk, and pectin of unripe fruits stiffen liquids on cooling.

Proportions

One level tablespoon of flour will thicken one cup of liquid for soups.

Two level tablespoons of flour will thicken one cup of drippings or other liquid for gravies and sauces.

Five level tablespoons of *browned* flour will thicken one cup of liquid for gravy.

The thickening power of corn starch is about twice that of flour.

Four level tablespoons of corn starch will stiffen about one pint of liquid, as in corn starch pudding.

Two good sized eggs to one pint of milk make a custard—one egg to a cup for soft custard or baked cup custard; three eggs to a pint of milk for a large mold custard.

One level tablespoon of granulated gelatin will stiffen about one pint of liquid, if cooled on ice.

LEAVENING AGENTS

Doughs are made light or porous in the following ways:

(a) By the production (and expansion by heat) of carbon dioxide gas from the combination of baking soda with some acid substance.

(b) From carbon dioxide gas produced by the growth of yeast—a microscopic plant.

(c) From the expansion of entangled air, incorporated in the dough by means of (1) beating batters; (2) folding thick doughs; (3) beating air into eggs, especially the whites—then folding them into the mixture.

(d) From the expansion of water to steam.

Proportions

Use two level teaspoons baking powder to one cup of flour.

Use one teaspoon less of baking powder for each egg added after two have been used.

Use one-half teaspoon soda with one and a quarter teaspoon cream of tartar.

Use one-half teaspoon soda with one cup sour milk.

Use one-half teaspoon soda with one-half cup molasses.

Two teaspoons baking powder are equivalent to one-half teaspoon soda in the above combinations.

The yeast plant grows best at 75 to 90 degrees F. It changes *sugar* into alcohol and carbon dioxide gas. Flour contains a small proportion of sugar and during bread making some of the starch is changed into sugar, but the yeast begins to act more quickly if a little sugar or glucose is added at first. Salt and fats in quantity hinder the growth of the yeast. Low temperatures stop the growth almost completely; high temperatures kill the plant.

When eggs are used as leavening agents, the whites are beaten separately, as they will hold much more air than the yolks, and folded into the mixture the last thing, breaking as few air cells as possible.

When air is depended on for leavening agent, all materials are kept as cold as possible. Cold air expands more on heating than warm air. In pastry making, heat also melts the fat, so that the dough cannot be handled.

SHORTENING

Fats are added to doughs to make the product brittle—friable—"short," and to enrich the mixture. The fat counteracts the adhesive properties of the gluten and starch in flour.

Pastry flours contain less gluten than bread flours and so require less shortening.

Butter and oleomargarine contain about one-eighth water and salt, and thus have less shortening powers than lard, drippings, snowdrift, cottolene, etc., which contain no water.

Proportions

Two cups of flour (eight ounces) made into puff paste requires eight ounces (one cup) of shortening.

Two cups of flour in ordinary pie crust requires four ounces (one-half cup) of shortening.

Two cups of flour in cookies requires four ounces (one-half cup) of shortening, or less.

Two cups of flour in cake requires about three ounces of shortening.

Two cups of flour in short cake requires two ounces (one-fourth cup) of shortening, or more.

Two cups of flour in tea biscuits requires one-half to one ounce (one to two tablespoons) or more of shortening.

In yeast doughs less shortening is used—from one-half to an ounce to two cups of flour. The tenacity of the gluten is required to hold the carbon dioxide gas slowly formed by the yeast, hence too much shortening prevents proper rising.

Shortening for batters may be *melted* and mixed in, but in doughs which are to be rolled—pastry, cookies, short cake, biscuit, etc.—the fat should be *cold* and hard and cut into the flour with a knife, or rubbed in with the tips of the fingers.

FLAVORING

The flavoring materials most commonly used are salt, sugar, spices and extracts. The fine art of cookery consists of developing the full natural flavor of the foods themselves and in combining them in pleasing ways.

The amount of salt to be used depends, in general, on the *total volume* of the food. When food tastes salty, too much has been used. A safe proportion is one teaspoon salt to one quart of liquid in soups, sauces, or to one quart of flour in doughs, and for cereals one teaspoon to each pint of water used. When the flavors are delicate, somewhat less salt is used, and with strong flavors, somewhat more. Cakes in which much salt butter is used do not need more salt.

The quantity of sugar to be used depends on the taste desired. Foods served frozen need more sweetening than when at ordinary temperatures. On the other hand, foods that are served warm taste somewhat sweeter than when at ordinary temperature.

RECIPES

The following recipes were furnished by Miss Anna Barrows, teacher of cookery, Columbia University, author of *Principles of Cookery*, or adapted by the editor from the various standard recipes used in cooking schools:

WATER: EXTRACTING FLAVOR.

Tea.

Heat an earthenware teapot with hot water. Empty it and put in one teaspoon of tea for each measuring cup of fresh *boiling* water. Let it stand in a warm place two or three minutes. Strain and serve at once. If the tea boils or stands too long with the leaves it is unfit to drink.

Coffee.

Use one-fourth cup of coffee for one pint of water. Place fine ground coffee in strainer in the coffee pot; add actually boiling water *slowly*, a spoonful or two at a time. Cover between additions Pour through a second time if desired stronger.

OR: Mix one-fourth cup coffee and one teaspoon beaten egg with a little cold water, add the remainder of one pint of water boiling hot. Let it boil up, pour from the spout and turn back into the pot and leave for ten minutes where it will keep hot but not boil.

Stock.

Stock is the basis for all soups, except milk or cream soups, to which it is sometimes added. From a pint to a quart of cold salted water is used to each pound of meat and bone, both of which should be in small pieces. Let stand one hour, heat slowly and simmer gently for four hours or more, strain and cool quickly. Remove the hardened fat before using. About a cup of mixed vegetables—carrot, onion, parsley, celery, etc.—may be added during the last hour. Mixed herbs and spices, as bay-leaf, blade of mace, two or three cloves and pepper corns, may be tied in cheese cloth and removed from the liquor when sufficient flavor has been extracted.

Bouillon—usually made from beef with little bone and no vegetables. Brown Stock—some of the meat and a part of the vegetables browned in hot fat or marrow. White Stock—made from chicken, veal, or fish; no flavoring which gives color added. Macaroni, Vermicelli, Noodle, Rice, Barley Soup and the like—cook about one-fourth cup of dry material until tender and add a quart of hot stock, or use cooked left-overs. Julienne Soup—one-half cup mixed cooked vegetables cut in cubes, strips or fancy shapes, to one quart of stock.

RESTORING WATER.

Dried Fruits and Vegetables.

Pick over, cover with cold water, leave for half an hour, then wash thoroughly, inspecting each portion and drain. Again cover with cold water and soak 12 to 24 hours, and then cook slowly until tender. Add sugar if desired for sauce when nearly done, or use like fresh fruit for pies, shortcake, etc.

Prunes, apricots, peaches, apples, pears and vegetables are treated in this way.

THICKENING.

Sauces.

Methods of mixing: (1) Melt butter (or other fat) in saucepan, stir in dry flour, cook and stir until frothy all over, then add liquid slowly, hot or cold, while stirring; cook again until thick, stirring until smooth.

(2) Rub butter and flour together and stir into the warm liquid in a double boiler, then cook and stir until thick and smooth.

(3) When cream or less butter is used, rub the flour smoothly with a little cold liquid and stir into the remainder, which should be hot, and cook in double boiler until smooth. Then add butter and seasoning.

Thin Sauce: One level tablespoon fat, one tablespoon flour and one cup liquid, one-fourth teaspoon salt, few grains pepper (white).

Suitable for creamed potatoes, macaroni, toast, etc.

Medium Sauce: Two tablespoons fat, two tablespoons flour and one cup of liquid. Seasoning.

For general use with fish and vegetables.

Thick Sauce: Two to four tablespoons of fat and three or four of flour for each cup of liquid, either milk or milk and stock.

This is the basis of souffles and croquettes.

White Sauce may be varied by different flavors and garnishes, such as capers, celery, mushrooms, oysters, lobsters, etc., etc.

Tomato for the liquid in sauce may be seasoned with onion, herbs and spices, by cooking them with it for a short time before straining.

Spanish Sauce is tomato sauce with the addition of onion and peppers.

Dutch or Hollandaise Sauce: To one cup white or milk sauce add one or two beaten egg yolks and cook in double boiler like custard. Flavor with one tablespoon lemon juice.

Brown Sauce for Roast or Pan Broiled Meats: After placing the meat on the platter drain out any fat in the pan and put some water to soak off the browned juice and flour.

For each cup of gravy put two tablespoons of the fat in a saucepan and brown two tablespoons of flour in it; then add one cup of the water from the pan. Cook like white sauce. Season as desired with salt and pepper.

Or, Melt and brown two tablespoons of butter in a saucepan; add two or three tablespoons of flour and continue the browning. When coffee color, add one cup water or stock or milk.

Welsh Rarebit.

Heat one-half cup of cream in the blazier of a chafing dish or in a skillet, add one tablespoon of butter creamed with one teaspoon of corn-starch, one-fourth teaspoon of salt, and a few grains of cayenne. When thick, set over the hot water or heat very slowly and add one-half pound of soft mild cheese cut up fine and one-half teaspoon of mushroom ketchup or Worcestershire sauce or one-fourth teaspoon of mustard. Stir until the cheese is melted and pour over crackers or thin toast.

Cream Soups.

Cook the vegetable till soft and rub through a strainer, using all or a part of the water in which the vegetable is cooked, except with potatoes. Combine with an equal quantity of white sauce or white stock or mixture of the two. Season. If too thick, add hot milk. Beaten egg may be added just before serving if too thin.

Asparagus, Carrots, Cauliflower, Celery, Corn, Cucumbers, Lettuce, Mushrooms, Onions, Spinach, Summer Squash, Turnips, Water Cress.

CREAM OF PEAS, BEANS, LENTIL, POTATO and other thick soups have half quantity or less of white sauce added to keep the materials from settling.

CREAM OF CHICKEN, FISH, etc., made of stock from bone, skin and other inedible portions combined with about equal quantities of hot white sauce seasoned in various ways.

Corn Starch Blanc Mange.

Blend two tablespoons cornstarch with an equal bulk of milk, heat remainder of one cup milk in double boiler. Stir the hot milk into the moistened starch, return to double boiler, stir on stove till thick, put over water, cover and cook twenty to thirty minutes or longer. Add two tablespoons sugar, a bit of salt, flavor and put in moulds.

VARIATIONS: For liquid use part thin cream and part strong coffee, or all fruit juice.

Put layers of raw or cooked fruit alternately with the blanc mange in the moulds.

Blend two tablespoons of cocoa with the sugar before it is added to the cornstarch mixture.

Irish Moss Blanc Mange.

To soften the moss, soak one-half cup in cold water, wash pick over and cook in one pint of water in a double boiler for about half an hour. Strain and make up to a quart with scalded rich milk or thin cream; add a teaspoon of extract flavoring and one-fourth teaspoon of salt. *Or* cook the softened moss directly in one quart of milk, season and strain. Put in molds.

Use of Gelatine.

One level tablespoon granulated gelatine will stiffen about one pint liquid. Different makes of sheet, shredded, granulated and powdered gelatine may be used interchangeably by weight. A larger proportion of gelatine is required for large moulds than for small. A little salt improves most gelatine combinations.

Soak gelatine in cold water until soft, dissolve by adding boiling liquid, sweeten and flavor with coffee, lemon, or other fruit juices and pulp. Keep the proportions of gelatine and total liquid right. A little more gelatine is required in hot weather, unless ice is used.

Such jellies may be served with whipped cream or boiled custard. Every package of gelatine is accompanied with directions for its use.

Fruit Pudding.

Make a jelly flavored with fruit juice, slightly increasing the proportion of gelatine. As it begins to stiffen, combine nearly an equal amount of fruit with it. With each half cup of jelly may be used one date, one-half fig, two or three almonds, one-fourth orange, one-fourth banana, etc.

Snow Pudding or Fruit Sponge.

Beat one egg stiff and add one cup half stiffened jelly gradually. Or, beat the jelly till frothing and blend the stiff egg with that. Mould and chill. Serve with soft custard sauce made of the egg yolks.

Bavarian Cream.

Stiffen a soft custard, or fruit juice, or combination of the two, with gelatine. As it begins to stiffen, fold in stiff whipped cream.

Baked Custards.

Scald one pint milk. Beat two eggs till smooth, add one-fourth cup sugar, a bit of salt, and blend with the hot milk. Strain into buttered molds, set in a pan of hot water and bake until firm. Put a thin knife blade in center of custard and if done no milk will adhere to the blade as it is removed.

The same proportions may be used for custard pies, or may be combined with cooked rice for a pudding.

Soft Custard.

Use the same proportions as for baked custards, or three egg yolks in place of two whole eggs. Pour hot milk over the beaten eggs, stirring constantly. Sugar may be added before or after cooking the custard.

Return milk and egg to the double boiler and cook, stirring all the time until the custard thickens and coats the spoon, three minutes or longer. If cooked too long the custard will curdle. Cool quickly. Flavor before serving.

Egg Timbals.

Use only one-fourth to one-half cup liquid, milk or stock, for each egg. Flavor with salt, pepper, etc. Cook like custards, turn from mold and serve hot with tomato sauce.

Thickened Custards.

Filling for Cream Puffs, Layer Cake, Sauces, Ices, etc.

Make a smooth paste with one-fourth cup flour and a little milk and scald the remainder of one pint of milk. When it is hot, blend carefully with the flour and cook in a double boiler twenty minutes or more. Then combine with the beaten yolks of two or three eggs and stir steadily while cooking three to five minutes longer. Take from the fire and sweeten and flavor according to its use. For filling for a layer cake one-fourth cup sugar may serve, while for cream puffs one-half cup or more will be needed.

The same foundation may be combined with an equal quantity of cream or of fruit juice, or of each, made very sweet and frozen as ice cream.

Frozen Desserts—General Directions.

All mixtures must be sweeter and more highly flavored than if served without freezing. Cool thoroughly before packing in ice and salt. Use three measures fine cracked ice to one measure of salt.

Lemon Ice.

Mix in proportion of the juice of one lemon, one-fourth cup of sugar and one cup of water. *Or,* make a quantity of syrup, 4 measures of sugar to 2 of water, and use 4 measures of syrup to 1 of fruit juice. Strain into a tin can or straight glass jar with a close cover. Pack this in a pail or pan with ice (or snow) and salt. Turn the can around and occasionally scrape down the ice which forms inside. Use other fruit juices in the same way—orange, pineapple, raspberry—to which lemon juice is usually added, grape juice or acid jelly.

Pineapple Sherbet.

One can of grated pineapple, one cup of sugar, juice of two lemons, one tablespoon of powdered gelatine, one quart of water or milk.

Ice Cream.

Scald thin cream in double boiler, dissolve sugar in the proportion of one cup to a quart, add flavoring when cool—extract, one tablespoon to a quart. This is "Philadelphia" ice cream. Thickened custard made very sweet and highly flavored is often called "New York" ice cream.

Mousse or Parfait.

Mix together one cup thick cream, two tablespoons powdered sugar and flavoring. Whip cream with egg beater, skimming off froth as it rises and draining on a sieve. Return liquid to bowl and whip until no more froth will rise. Turn drained froth into a mould; cover, and bind the lid with a strip of muslin dipped into melted fat. Bury in ice and salt for three to four hours before serving.

Junket.

The active principle in junket is rennin or "rennet," which is extracted from the lining of calf's stomach. This will coagulate or thicken warm milk but nothing else. Its properties are destroyed at the boiling temperature and it has no action in the cold. Heat two cups of milk to body temperature, 99 degrees, powder junket tablet and dissolve in a little water, add one-third cup of sugar dissolved in one-third cup of warm water and flavoring extract. Pour into serving dishes and keep warm until set. Cool.

Caramel syrup or maple syrup may be used in place of sugar. Chocolate may be added or beaten egg yolks with beaten whites on top.

Jellies.

Pectin is the gelatinizing agent in jellies and jams. It is a substance similar to starch and is found in most fruits and some vegetables. It is most abundant when fruit is just ripe or nearly so. The making of good jelly depends on having the correct proportion of fruit juice, sugar, and *acid* and on boiling. The density of the mixture should be between 24 degrees and 30 degrees as measured by the syrup gage at the boiling temperature, and the boiling point 217 degrees F. or 103 degrees C. Long boiling alters the gelatinizing properties of pectin. Too great a proportion of sugar and violent boiling cause the sugar to crystallize in the jelly.

Pick over and clean, or pare, core and cut up large fruits, heat with or without water and cook until very soft. Juicy fruits like currants and grapes need no added water, while fruits like apples should be barely covered with water. Strain the juice from the pulp through cheese-cloth or flannel. To the strained juice granulated sugar is added usually in the proportion of pint to pint, but good jelly may be made with half the volume of sugar to juice. The proportion depends on the acid and sugar in the fruit. Heat slowly to dissolve sugar, and boil gently until proper density is obtained, skimming froth that rises. If no syrup gauge is used, test by dropping a little on a cold plate to see if the jellying point is reached. Pour into sterilized glasses and when set cover with melted paraffine.

The pulp may be squeezed in the straining bag to get a marmalade or even a second quality jelly: or, better, heat pulp again with a small amount of water and strain without pressure. This process may be repeated. Boil down somewhat and add sugar and finish as before. Jelly may be made from parings and cores.

As the presence of acid is essential to make the materials jelly, lemon or currant juice is usually added to sweet flavored fruits. (Summary of the result of experiments made by Dr. Goldthwaite at University of Illinois and Miss Snow at University of Chicago).

Soft Cooked Eggs.

Place eggs in one cup of boiling water to each egg in a saucepan, cover and remove from the fire.

From five to ten minutes will be required according to the firmness desired.

Or, put one egg in one cup of cold water and bring slowly to the boiling point. Then remove the egg.

Hard Cooked Eggs.

Keep eggs in water just below the boiling point for thirty minutes. The yolks should be dry enough to mash easily. Such eggs are suitable for salads—may be warmed in any well flavored sauce, may be stuffed by blending the yolks with chopped meat or nuts or seasoning of any kind.

THICKENING AND LEAVENING.

Omelets.

There are but two types of omelet to which special names are given from the garnish added.

French Omelet.

Beat an egg slightly. Add one tablespoon water or milk, season with salt and a dash of pepper. Turn into a hot buttered frying pan, which must be perfectly clean and smooth. Lift cooked portions with a fork. Shake the pan to prevent adhesion. When all is firm, fold and serve at once.

Puffy Omelet.

Separate white and yolk of one egg. Beat white stiff, add yolk and blend together. Add salt, pepper and one tablespoon of water or milk. Turn into buttered pan and place where it will cook slowly and evenly. When firm, fold and serve.

Two tablespoons of white sauce or bread softened in milk may be used instead of one of milk or water. Chopped parsley, or other vegetable, any nice bits of meat or fish, cheese, jelly, etc., may be folded into the omelet just before serving.

Meringues or Kisses.

Beat egg whites with a speck of cream of tartar. When stiff fold in one-fourth cup powdered sugar for each white. Flavor slightly, drop on ungreased paper, and bake slowly until dry, thirty minutes or more.

For soft meringues on puddings, use half as much sugar.

Fruit Souffles.

For each stiffly beaten egg white fold in one-fourth cup thick, sweetened fruit pulp, or marmalade, or jam. Partly fill buttered molds, and bake like custards, until firm.

Serve with soft custard as a sauce.

Sponge Cakes.

Equal measures of eggs, sugar and flour, or the weight of the eggs in sugar, and half of the weight of the eggs in flour. This also applies to the use of egg whites only as in angel cakes.

In other words, two large or three small eggs rightly blended with one-half cup each of sugar and flour and carefully flavored and baked slowly will produce such a cake as that shown on page 65.

The yolks of the eggs should be beaten until thicker and lighter colored than when beginning the process. To them add the sugar, one or two teaspoons of lemon juice and a bit of grated rind. Over the whites of the eggs sprinkle a bit of salt and beat until stiff. Fold them into the yolks and gradually sift the half cup of flour over, blending carefully without stirring. Put into the pans and bake in a gentle heat for twenty minutes, if in small cakes; twice as long if in one mass.

Cream Puffs.

In a saucepan heat one-half cup water with two ounces of butter or less. When boiling hot mix in one-half cup of flour and continue to stir while it cooks into a smooth mass. Cool till it will not cook eggs and mix in one egg and a second and beat the whole vigorously with the spoon. Shape on greased pan some distance from each other in six to twelve mounds and bake about thirty minutes according to the size. They should be light and dry when taken from the pan, otherwise they will shrink and be heavy.

QUICK DOUGHS—GENERAL PROPORTIONS.

	Flour	Baking Powder	Liquid	Shortening	Sugar	Eggs
Pop Overs......	1 cup	....	1 cup	....	....	1
Timbale Cases...	1 cup	....	½ cup	1 tbs.	1 tsp.	1 or 2
Griddle Cakes...	1 pint	3 tsp.	2 cups	2 tbs.	1 tbs.	1 or 2
Muffins.........	1 pint	4 tsp.	1 cup	1 tbs.	....	......
Muffins (richer).	1 pint	2 or 3 tsp.	¾ cup	1 or 2 oz.	¼ cup	1 or 2
Cake...........	1½ cups	2 tsp.	½ cup	2 oz.+	¾ cup	1 or 2
Doughnuts......	1 pint	2 tsp.—	½ cup	....	½ cup	1
Cookies.........	1 pint +	2 tsp.	¼ cup	2 oz.	½ cup	½ to 1
Tea Biscuit.....	1 pint	3 tsp.	⅔ cup	½ oz.+	....	......
Shortcake.......	1 pint	3 tsp.	⅔ cup	2 oz.	....	......
Pastry..........	1 pint	....	½ cup	4 oz.	....	......

Biscuit.

Two cups sifted flour, three teaspoons of baking powder, one-half teaspoon of salt; sift together, rub in one tablespoon of shortening—butter, oleo, lard, cottolene or drippings. Mix to a soft dough with about two-thirds cup of milk or water. Turn onto a floured board, roll and pat gently to three-quarters inch thick, cut and bake. Pastry flour make more delicate biscuits than bread flour.

Dumplings for Stews: Omit shortening, add milk until dough may be dropped from the spoon into boiling stew. Cover tightly and cook rapidly 10 minutes.

Shortcake: Rub in one-fourth cup of butter in biscuit mixture. Cut like biscuit for individual shortcakes or use a square pan and divide with knife dipped in melted butter so that portions may separate readily after baking.

Use shortcake mixture for covering to meat pies, apple dumplings, etc.

Muffins.

Two cups of sifted flour, two teaspoons of baking powder, one-half teaspoon of salt, one tablespoon of sugar; sift and add one tablespoon of shortening melted, one beaten egg and one cup of milk. Beat together thoroughly and bake in a quick oven.

Blueberry Muffins: Use a little less milk in muffin mixture and add one cup of blueberries and a little more sugar. Chopped apples or other fruit may be used in same way.

Tea Muffins: In the above muffin mixture use one-fourth cup of sugar and of butter and add two more eggs.

Drop Cakes.

One and one-half cups of graham flour, one-half teaspoon each of salt and soda, and one-fourth cup of brown sugar; sift together and mix with three-fourths cup of thick sour milk into stiff batter which drop from a spoon onto a greased pan or in heated gem pans and bake quickly 12 to 15 minutes. Sweet milk and two teaspoons of baking powder may be substituted as well as rye and other flours.

Cereal Gems.

Use even quantities of flour and softened cooked breakfast food, one teaspoon of baking powder to a cup of material, add sufficient milk to make a batter which will drop from the spoon. Mix thoroughly and bake in hot buttered gem pans.

Boston Brown Bread.

Sift together one cup of cornmeal, one cup of rye meal, or entire wheat flour, one teaspoon of soda, one-half teaspoon salt. Mix with one-half cup molasses and one cup sour milk. If not soft enough to smooth out in the bowl, add a little water. Put in greased tins with tight cover and steam three hours or more.

Corn Cake.

Sift together three-quarter cups each of cornmeal and flour, one-half teaspoon each of salt and soda, one tablespoon of sugar. Mix with one beaten egg and one cup of thick sour milk or cream. Bake in muffin pans or single pan, twenty to thirty minutes, according to thickness.

The cornmeal may be scalded with an equal volume of boiling water, left to cool, or over night, and more shortening, two eggs and a little sugar may be added.

Griddle Cakes.

Into one pint of sifted flour mix one-half teaspoon of salt, three teaspoons of baking powder and one teaspoon of sugar. Beat two eggs until very light, turn into one cup of milk without stirring, add the mixture to the flour with two tablespoonsful of melted butter; beat well, and add more milk to make a batter about like thick cream. Beat vigorously, especially before each frying.

Fry on hot griddle, grease with rind of pork or ham. Drop batter from end of the spoon, making circular cakes. Turn when full of bubbles.

Waffles.

Are cooked on a waffle iron, using the griddle cake mixture.

Plain Cake ("Lightning" Cake).

Place the flour sifter in the mixing bowl and put in it one and one-half cups of flour, three-fourths cup of fine granulated sugar, two level teaspoons of baking powder, one-half teaspoon of salt. Sift into the bowl.

In the measuring cup, melt one-fourth cup of butter (or oleo), break in two eggs, fill up the cup with milk. Add one-half teaspoon flavoring extract or saltspoon of spice. Mix with the dry ingredients and beat well two or three minutes. Bake in sheet or greased muffin tins in quick oven.

VARIATIONS: Add two tablespoons of cocoa, or an ounce of melted chocolate. Use one cup caramel or maple syrup in place of sugar. Leave out part of the sugar for Cottage Pudding.

Cookies.

Rub one-half cup of butter until creamy, gradually add one cup of sugar, then put in one egg and beat together thoroughly. Next add, alternately, one-half cup of milk or water and one pint of flour, in which two teaspoons of baking powder have been sifted. Use enough more flour to make a soft dough, from one to two cupfuls, according to the nature of the flour, roll out thin, cut with a cookie cutter or in fancy shapes, and bake in a quick oven.

VARIATIONS: Before all the flour is added, divide into four portions; to one add one teaspoon of lemon extract, to another one-half cup of desiccated cocoanut; one-half ounce of chocolate melted, or a teaspoon of cocoa, sifted in with a little flour; to the fourth, one teaspoon of mixed spice and one-half cup of chopped raisins, etc. Or flavor the portions with ginger, almond with chopped almonds on top, or with dates, figs, nuts. Or use less flour and drop from a spoon for a soft thick cake.

Gingerbread.

Sift together two cups of flour, one-half teaspoon each of salt and soda and one teaspoon of ginger. Mix with one cup of molasses and two tablespoons of fat softened in one-half cup of hot water. Bake twenty minutes or more in a moderate oven.

Doughnuts.

Sift together four cups of flour, one teaspoon of salt, three teaspoons of baking powder, one-half teaspoon of mixed spice and one cup of sugar. Mix with one egg and one cup of milk.

Sour milk and soda may be used in place of baking powder. For richer doughnuts, two eggs and one tablespoon of butter may be used.

Plain Pastry.

Sift two cups of flour with one-half teaspoon of salt and cut in with a knife, one-fourth cup or two ounces of shortening. Mix with about one-half cup of ice water into a stiff dough. Roll out and spread with one ounce of butter, fold and add a second ounce of butter in the same way, making one-half cup of shortening in all. For upper crusts more shortening may be rolled in if desired. Keep everything as cool as possible. The lightness of the pastry depends on the amount and coolness of the air enclosed and the flakiness on the number of layers of fat and dough produced by folding and rolling.

YEAST DOUGHS—GENERAL PROPORTIONS.

	Sugar	Shortening	Liquid	Yeast Cake	Flour	Eggs
Bread.....	1 tsp.	½ oz. +	1 cup	¼ to 1	3 cups	....
Muffins....	1 tbs.	½ oz.	1 cup	¼ to 1	2 cups	1 +
Rolls......	1 tbs.	1 oz.	1 cup	¼ to 1	3 cups	...
Fancy Rolls.	2 tbs.	2 oz.	1 cup	¼ to 1	3 cups+	1 +
Buns......	½ cup	2 oz.	1 cup	¼ to 1	3 cups+	....
Coffee Cake	¼ cup	2 oz.	½ cup	¼ to 1	2 cups	2 +

Bread—Short Process.

For each loaf, use one cup of milk scalded or half milk and half hot water, or all warm water, one-half teaspoon of salt and of sugar, one-half or more compressed yeast cake, softened with luke warm water, and about three cups of bread flour. Mix well and kneed until the dough is smooth and springy. The dough should now be warm. Let rise till double, shape, put in pan and let rise again and bake. Or this amount of dough may be shaped into a dozen or two dozen small rolls before final rising.

Entire Wheat Bread.

Scald one cup of milk; in it melt one teaspoon of butter and half a teaspoon each of sugar and salt. When lukewarm, add half a cake of compressed yeast, softened in one-fourth cup of warm water. Stir in between two and three cups of flour to make a dough stiff enough to hold its shape. Mix thoroughly with a knife, but do not knead it until after it has risen to double its bulk, then shape into small loaves, let rise until double in size, bake in hot oven about half an hour.

One-fourth cup of molasses may be used in place of the sugar if preferred.

Rolls—Long Process.

For rolls or two loaves of bread, put into the mixing bowl one tablespoon of butter or lard, one tablespoon of sugar, one teaspoon of salt and one pint of scalded milk. When lukewarm, add one quarter yeast cake softened in water and three cups of flour. Cover and let rise. In the morning, add to this sponge about three cups of flour to make thick enough to knead. Let rise till double, shape, put in pans, rise again and bake.

MUFFINS: Add two or three eggs to the sponge, but no more flour. Bake in muffin pans.

Coffee Cake.

Work into one pint of light dough, two-thirds cup of white sugar, one egg, and two ounces of melted butter. Mix thoroughly to a creamy, smooth batter by beating.

Pour into shallow pan and let rise again. Sift sugar and cinnamon over the top and bake in a quick oven. Serve warm.

Use of Stale Bread.

Bread Cases.

Cut slices of bread two inches thick and three inches long. Remove part of crumbs from the center, leaving a hollow space. Spread with butter and brown in the oven.

Croutons.

Cut stale bread into slices about one-third inch thick and then in cubes. Bake in moderate oven until golden brown.

Dry Crumbs.

Crusts remaining from croutons, etc., should be dried in the oven, rolled and sifted, the fine ones used for croquettes, etc., the coarser for stuffing or escalloped dishes.

Cracker crumbs may be used in the same way.

Buttered Crumbs.

Melt butter and stir in crumbs till the butter is evenly distributed.

One ounce of butter for one cup of crumbs is a fair proportion. Buttered crumbs seasoned and moistened are used for stuffing peppers, tomatoes, fish, poultry, etc.

Filling for Fish or Fowl.

One cup of crumbs will serve for a small fish or chicken, while a large fowl or turkey will require two or three. With each cup of crumbs blend one ounce or more of butter or chopped fat salt pork, one teaspoon parsley or mixed herbs, one-half teaspoon salt and a little pepper. Moisten with milk, water or stock. For fish season also with lemon and onion juice.

Mashed potato or chestnuts may be used instead of crumbs.

Fat—To Try Out and Clarify.

Cut the fat—beef suet or flank fat—in small pieces, removing skin and bits of lean meat. Cover with cold salted water and leave in a cold place for several hours. Drain off the water, and if possible soak again, and drain. Cook slowly in moderate oven or in upper part of the double boiler till the fat has melted and the scraps are crisp, but not brown. Strain and cool. Slices of raw potato or pieces of charcoal cooked in the fat before straining will absorb any impurities.

Beef, pork and chicken fat may be combined. Surplus fat from roast beef, corned beef, etc., may be added.

Such fat may be used for shortening muffins, gingerbread, etc., for greasing pans, for some sauces and soups, or for deep frying. Mutton fat may be prepared to add to fry fat.

Fat from bacon, ham or sausages should be reserved for hashes or warming over potatoes.

MEATS.

Broiled Meats, Chops, Steaks.

The meat should be cut in convenient pieces, and some of the bone, gristle and fat removed. Sections one inch thick will be more juicy than thinner ones. Wipe the meat with a damp cloth, grease the broiler or pan with a piece of the fat, or brush melted fat over the meat. Place the meat where intense heat will reach it at first, under the gas flame, or in a hot pan on top of the stove, or over hot coals. Turn often at first, every half minute if directly over the coals, until well seared and browned on both sides, then move it farther away from the fire so the heat may penetrate to the center without burning the outside.

As the meat is seared on the surface the juices are driven towards the center, and expanding with the heat tend to make the surface of the meat puff outward. This is very apparent between the wires of a double broiler and probably is the best indication that the meat is cooked.

Steaks one inch thick should cook in five or six minutes to be rare, eight or ten minutes to be well done, the time varying according to the method of cooking and intensity of heat. Mutton chops may be served rare, lamb usually well done, veal and pork always must be thoroughly cooked.

Broiled meats should be served at once on a hot dish and with slight seasoning beside their own juices. If kept hot the cooking is continued too far.

Fish and chicken may be partially broiled and then finished in the oven. Apply the direct heat mainly to the cut inside surface, as the skin burns easily.

Roast Meats.

Trim, wipe, score the fat portion and rub salt into that, place on rack in pan, sprinkle flour all over it, put skin side down. Have oven very hot at first to sear outside quickly to prevent escape of juice, then reduce heat. Baste occasionally as needed with the fat which cooks out into the pan, and turn the roast over to cook it evenly.

If there is danger of burning put some water in the pan after the meat is seared, but this is not necessary if heat of oven is lowered.

A sirloin or rib roast weighing five pounds will require about one hour, or longer, if it is to be well done. A surer rule for time of cooking is to allow fifteen minutes for each inch in thickness, or twenty minutes if wanted well done.

Braised Beef.

Use a thick section of the lower part of the round, two to four pounds. Trim, wipe and sprinkle with flour, season with salt and pepper. Brown under the gas or in hot fat. Put in casserole, partly cover with water or brown or tomato sauce. Cover closely and cook in very slow oven three to five hours.

Meat Stew.

Neck or breast of lamb of veal or inexpensive cuts of beef may be used in this way. Cover bones with cold water and heat slowly. Cut meat in convenient pieces, roll in flour seasoned with salt and pepper. Fry bits of fat, then brown sections of prepared meat and onion if desired. Put meat in kettle with bones when water is hot.

When nearly tender add carrot, turnip, peppers, or celery cut in small shapes about one cup each to one pound of meat.

Potatoes pared and cut in quarters may be added 20 to 30 minutes before serving, and dumplings 10 minutes before serving.

Escalloped Fish or Meat.

Equal measures of cooked minced meat, bread crumbs and white or tomato sauce; or, for one measure of meat, half as much sauce and one-fourth as much buttered crumbs. (Boiled rice or macaroni may be used instead of crumbs.)

Remove all uneatable portions from meat and mince or chop. Put in layers in a buttered dish, having crumbs for the last. Bake until heated through and brown on top.

Fish or Meat Loaf, or Timbales.

Remove skin, gristle and bone from meat or fish and mince fine. Combine with an equal quantity of bread crumbs or stuffing from a baked fish or roast fowl, season as desired, moisten with milk or stock. Add one beaten egg or more to each pint of the mixture. Pack in buttered moulds, steam or bake until firm in center. Turn out and serve with sauce.

Meat Loaf in Rice.

Line a mould with well-cooked rice. Fill with the meat prepared as above. Cover with rice. Steam an hour. Serve with tomato sauce.

Fish Balls.

In a stew pan put one pint potatoes, pared and quartered, and one cup salt cod fish which has been picked apart in cold water. Cover with boiling water and cook until the potatoes are soft. Drain in a colander till no water can be shaken out. Return to pan, mash thoroughly, add salt if needed, a shake of pepper, one teaspoon butter, one raw egg, and beat all together. Shape on a spoon or in small balls and fry in deep fat, hot enough to brown them in one minute. Drain on soft paper.

CEREALS AND VEGETABLES.

Breakfast Foods.

Usual proportions—one-half cup flakes or one-fourth cup granules to one cup water, one-fourth teaspoon salt to one cup water.

The denser the cereal, the more water and the longer the time required.

Bring water to boiling point in upper part of double boiler, placed directly on the stove.

Pour cereal slowly into boiling water, stirring constantly. Let boiling continue about five minutes till mixture begins to thicken. Place over boiling water in lower part of the boiler. Cover and cook gently with little stirring one hour or more, or till tender and soft. Or put in Fireless Cooker for three hours.

Serve hot, with or without sugar, with milk, cream or butter. Put in moulds with fruit and serve cold as dessert. Pack solidly in loaf shape, slice when cold, brown in hot fat, serve hot.

Corn Meal Mush.

Mix one cup cornmeal, one-fourth cup of flour, one teaspoon salt, one cup cold milk or water. When smooth blend with one pint boiling water, stir for about five minutes. When thick place over water or in steamers and cook one hour or more. Serve hot or pack in pan to fry, or dip in fat and toast under the gas.

Rice.

Pick over and wash thoroughly or parboil five minutes and drain. Then put in a buttered dish with twice its bulk of boiling water and set in a steam cooker. In three-quarters of an hour it should be tender and every kernel distinct, and it may be cooked longer without becoming mushy.

Rice Croquettes.

With one pint of cooked rice (if cold, reheated) blend one tablespoon butter and one or two beaten egg yolks. Season with salt, pepper and parsley, or with sugar and spice. Divide in ten or twelve portions, press in firm shape, roll in egg and crumbs, and fry in deep fat.

Boston Baked Beans.

Soak one pint beans over night. Parboil in the morning until the skins crack readily with a slight pressure. A very little soda may be put into the water to help this process. Score the rind of one-fourth pound fat salt pork and rinse it. Drain the beans and put part in the bean pot, then the pork and cover with the beans, leaving only a little of the pork rind exposed. Mix one teaspoon of salt, one-fourth teaspoon of mustard and a tablespoon or more of molasses as desired, add water and pour over the beans. Cover and bake twelve hours or more, keeping the beans filled up with water until the last hour, when the cover should be removed and the pork rind and the top layer of beans should brown.

Potatoes.

Baked.

Choose those of equal size and scrub with brush. Cook in hot oven 30 to 40 minutes, or until soft. Then crack the skin to let out steam. The potato should be plump (not shriveled), and the inside white and mealy.

Boiled.

Wash, pare if imperfect or old. If not of uniform size, divide the larger ones. Put in boiling salted water and cook for 20 to 30 minutes, till tender. Drain off the water and shake the uncovered kettle to let the steam escape.

Riced.

Put boiled potatoes through strainer or ricer into a hot dish from which they are to be served.

Mashed.

In a hot pan mash boiled potatoes. For each half pint, add two tablespoons milk, one teaspoon butter, season with salt and pepper.

Croquettes.

Prepare mashed potato with less milk and one egg yolk for each half pint and season with celery salt, paprika and parsley. Roll in crumbs, egg and crumbs, and fry in deep fat.

Stuffed Potatoes.

Cut a slice from end of baked potatoes, scrape out inside, mash and season. Add chopped meat, cheese or parsley for variety. Refill skins and reheat in oven.

Canoes, or Potatoes on the Half Shell.

Cut the potatoes in two lengthwise, refill each part and brown.

Creamed.

Cut boiled potatoes in cubes or slices and reheat in thin white sauce, one-half cup to each cup of potato.

Hash.

Use two parts potato to one part meat, or equal amounts of each. Chop meat, chop or mash potato. Season with salt, pepper, onion, etc., moisten with gravy or water. For one cup hash, put one tablespoon fat in a frying pan. When hot, put in the hash and cook slowly, without stirring, until a brown crust forms on the bottom. Fold like an omelet.

French Hash.

Put meat and gravy in a deep dish, cover with mashed potato and bake till golden brown.

SUGAR.

Caramel.

Put sugar in a smooth iron pan over a hot fire and stir constantly with an old wooden spoon until melted to a light brown syrup. Scrape off any sugar that forms in lumps. When all is melted add an equal amount of boiling water and simmer a few moments until blended into a thick syrup.

A quantity of this may be made at once and kept on hand to flavor and sweeten custards and ice cream, or to serve as a sauce with other puddings.

If it should happen to brown beyond the shade of good maple syrup, let it go a little further until the sweet flavor would be lost. Then dissolve as above and bottle to use for coloring soups and meat gravies.

Syrup.

Combine equal quantities of water and sugar in a saucepan and stir until dissolved. Boil five to ten minutes until only slightly reduced in quantity. Can while hot in small jars and keep on hand to sweeten fruit drinks or ices as the dissolving of the sugar in cold liquids is a slow and unsatisfactory process.

Fondant.

In an agate saucepan put one cup granulated sugar, about one-sixteenth of a teaspoon of cream of tartar—a bit the size of a small pea—and one-half cup of hot water. Stir till sugar is dissolved, then cover and cook without stirring. Skim and wipe the sides of the pan if necessary. Boil about ten minutes or till 238 to 240 degrees F., when it will form a soft ball in cold water. Turn into a greased bowl or platter and cool slightly. It will grain if stirred while too warm. Beat and knead till a smooth, creamy mass. If it hardens too rapidly dip the hands in water and continue the kneading.

Pack away in covered dish for a day or longer, then shape as desired. Colors and flavors must be very concentrated. By combination with chocolate, dates, figs, nuts, etc., a great variety of candies may be secured. This fondant is a very satisfactory frosting for cake and may be kept on hand. Warm it over water until it can be spread on the cake.

Boiled Frostings.

Cook one cup of sugar with one-half cup of water or less, and a bit of cream of tartar until it will thread, not quite reaching the soft ball stage. Then pour slowly on the stiffly beaten white of one egg and continue beating until cool enough to spread. Much depends on the moisture in the atmosphere as well as the dryness of the cake.

For a still softer frosting a larger proportion of egg white is used. This may be varied with different flavors and colors.

French Dressing for Salads.

One-fourth teaspoon salt, speck pepper, one tablespoon vinegar, two or three tablespoons oil.

Blend thoroughly and pour over the salad.

Mayonnaise Dressing.

One egg yolk, one-half to one cup oil, one tablespoon vinegar, one tablespoon lemon juice, one-half teaspoon salt, one-half teaspoon mustard, few grains cayenne.

Mix vinegar, lemon juice and seasoning.

Beat egg yolk, add oil drop by drop at first, beating continually. When thick add a little of the seasoning mixture, then more oil and alternate until all is used.

Utensils and materials should be kept as cool as possible.

Chocolate.

Melt one ounce chocolate in saucepan over hot water, add a few grains salt, one tablespoon sugar, one-half pint boiling water; stir till smooth; boil one minute. Blend with one pint hot milk and cook in double boiler.

Beat with Dover egg beater to prevent skin forming on top. Just before serving, an egg yolk may be added to the chocolate. Serve with whipped cream.

Chocolate and cocoa both contain starch which requires cooking.

HOUSEHOLD MANAGEMENT

Divisions in Economics

IN THE study of Economics there are two great divisions—production and consumption. Until within a few years, by far the lion's share of time and study has been given to the first of these divisions. It has been deemed sufficient for the securing of happiness and prosperity to a people to point out how the greatest degree of efficiency in *producing* wealth might be obtained. The manner in which that wealth was expended was considered less important. Recently a decided change has taken place. A conviction has been growing, especially among students or economics, of the equal importance of the other division, which covers *the use made of the money* after it has been acquired. This emphasizes the important place of the *home* in Economics as will be realized by those who consider how largely the home is the center of the consumption of wealth.

Place of Home in Consumption of Wealth

In former times the home was practically the entire economic world. Most of what was produced to meet the needs of the people originated there, while all of it found ready consumption within the family circle or by limited exchange. To-day the shop and factory have taken most of the productions and developed them one by one, into large industries outside the home, such as the manufacture of dress goods and cloth of all kinds, carpets, bedding, candles and soap; trades, such as tailoring, shoe-making and millinery, all having their origin in the home. The preparation of food is almost the only work left to the home which may be called creative, unless we include the supreme work of developing men and women.

Yet with production passed practically out of the control of the home, we find the other branch of Economics, consumption, still chiefly confined there. Most of the wealth acquired outside is expended on either the home or the interests closely connected with it. Women thus become the main directors of these expenditures. It is generally conceded that most of them stand in great need of a better understanding of the importance of the work that is theirs, and of the principles which underlie all correct economy.

Economy

Two aims are of equal importance in the practice of economy; (1) to increase the income, and (2) to diminish the expenditures. The last contains possibilities of comfort of quite as high order as the first. There are, according to Devine, "three methods by which general prosperity may be increased; a better choice, a better production, a better consumption. In comparing the relative importance of the three methods it will be found that there are greater immediate possibilities in the third (a better consumption) than in either of the others, and that of the two that remain, the first (a better choice) is more important than the second."*

Economic Position of Woman

In the light of all these facts it is a surprising thing that anyone can look lightly upon the share that is given to woman in the economic struggle. There are those who urge that the reason why women are finding the care of their homes less attractive than formerly is the fact that all which adds zest and is worth while is taken from them. Rather is it true that some things which demanded time and strength have yielded to more vital things, and there is now opportunity to perfect that which is left, with a better appreciation of its importance.

Office of the Wealth Expender

Devine further affirms that "it is the present duty of the economist to magnify the office of the wealth expender, to accompany her to the very threshold of the home, that he may point out, with untiring vigilance, its woeful defects, its emptiness, caused not so much by lack of income, as by lack of knowledge of how to spend wisely. There is no higher economic function than that of determining how wealth shall be used. Even if man remains the chief producer, and woman remains the chief factor in determining how wealth shall be used, the economic position of woman will not be considered by those who judge with discrimination, inferior to that of man. Both may in their respective positions contribute directly and powerfully to the advancement of general prosperity."

* Devine: *Economic Function of Woman.*

Use of Money

As women awaken to a realization of this truth, and bend their energy to acquire the knowledge and skill necessary to do their part more successfully, we shall begin to attain the degree of comfort and prosperity possible for us to enjoy. There is far more money earned in the majority of families than is wisely spent. The error is frequently careless expenditure, not sloth in acquiring, a *misuse* rather than *lack* of income. The old adage, "A penny saved is a penny earned," should be daily before the housewife. She should weigh in a less vague and general way the saying that "one cannot have his money and spend it too." Money has but a limited purchasing power: if it goes to gratify one desire, another must be denied. Few, very few, are able to satisfy all material desires. The mistake is made in giving too little thought to the various avenues of expenditure, the desire uppermost at the time being the one gratified, regardless of the relative importance of others. Combined with this are usually the failure to exercise foresight and the lack of sufficient knowledge of values to insure full money value for each outlay. "The woman who longs to get where she 'won't have to count every penny' will never have her longing satisfied until she makes every penny count."*

Business Side of Home-Making

As the economic importance of the home is more fully realized, the business side of home-making is emphasized. The home has a close and intimate rela-

* Miss Richardson: *The Woman Who Spends.*

tion to the business world in general. The housewife in her customary purchases comes in touch with retail trade of almost every variety and adds her contribution. If she makes use of the bank as the best medium of exchange, she shares in the interests of one of the large business enterprises. With a surplus to invest, she has to do with one or another branch of the business world in selecting the form of investment, and in looking after the income from it. To conduct any and all of these interests in the most efficient and successful manner requires as thorough training as for any other line of business. Only business-like methods can succeed. The reason why so many women fail at just this point is from a lack, in their early life and education, of the training which develops business ability.

HOUSEKEEPING A PROFESSION

Initiative

Housekeeping ranks among the professions as truly as any other occupation. It is more than a trade, since one who works at a trade performs each day the task assigned, the work being planned and directed by another. Thus little of the worker's energy is expended in deciding his activities. It is the *director* who must possess and exercise the power to guide; his work being to initiate, plan and direct. This requires larger capacity and ability than is required of the one who merely practices a trade.

It is the work of the housewife to initiate, plan and direct the business of the house. The woman who considers this work as the opportunity to assist in sharing the responsibilities of the wage-earner, and in developing the powers of those making up the family, has grasped the truth concerning the possibilities of her work.

Need of Education

There should be no more question as to the need of education and training for the woman who *selects* the food, clothing and works of art which minister to the highest welfare of a family than there is for the need of study on the part of the farmer, the manufacturer, or the artist who produces them.

Estimation of Values

Everywhere training is showing its benefits in the greater efficiency and skill of those who take advantage of it. Women will never be able to spend money so as to bring adequate results, until they have in some way acquired a broad training in the estimation of values. The word of the salesman is a poor guide, yet one who has had no training to aid her is unable to select for herself any more satisfactorily. Houses which are turned over to "experts" are usually striking witnesses of abundant expenditure, but pitiably fail to convey to eye or heart the refreshing individuality or the satisfaction to be realized in the cultivated woman's home.

Education of the Home-Maker

The fullest, most completely rounded education is none too good for one who is called upon to use and impart so varied information as is the housewife. The study of science is especially practical for one who aspires to master all the things that come within the range of her work. A knowledge of chemistry is necessary to an understanding of food composition, of cooking, cleaning, etc. The laws of physics are as closely related. For the mother, modern psychology is an indispensable study, if she is to understand her child, and wisely guide its development. If this knowledge may not be secured in school, a great deal may be done to supplement such training. Study in this course should do much along this line.

Practice Necessary

In addition to the knowledge gained through study, there should be a liberal amount of *practice* in the various duties before one assumes the care of a house. Unfortunate the home where the practical experience all comes after marriage. It comes at the hardest of periods and is unjust to any man. In no business can failure be graver or the results more serious. The fact that some very efficient housekeepers have evolved from unpromising beginnings is no argument. Such are, without exception, most eager for their daughters to receive training, since they know by dear experience its value.

Housekeeping on a Businesslike Basis

Much of the present aversion to household duties would vanish before adequate preparation to perform them. The American Kitchen Magazine published, in January, 1901, some suggestions of leading men on the general subject of *Housekeeping on a Businesslike Basis.* Some of their remarks are significant. One says: "Whenever one's knowledge of a subject has passed the stage of drudgery and becomes a science, its performance immediately becomes a pleasure. The ability to do a thing in the highest known perfection, A Right Spirit

or a little better than anyone else, is always a source of delight, and it matters little what that something is. This spirit imparts its influence to everyone in any way associated with the work. The men or women who know their business seldom have difficulty in keeping those under them happily employed. . . . . Wherever the circumstances of our life land us, we should make our stand, do our part of the world's work, and do it well. . . . . The woman who would have a home of her own and a happy one, should know, not only how to manage the chambermaid, but the cook as well. The moment that either discovers that there is method on the part of their mistress and knowledge superior to their own, they will comply with her requests. . . . . There will be no trouble with the kitchen end of the house when women take the same pains to know their business as men do.

Training and Devotion Essential

"The first essential is the proper training. The second essential is such a desire for success that she is willing to perform her part with industry and devotion.

Business Principles

"It is not as necessary to show that housekeeping has in it elements of business as to make housekeepers themselves recognize its business character and apply to it ordinary business principles. A quick attention to details, a fine sense of values, good judgment in buying and selling, and a ready adaptation of means to end with the least possible loss, are points of a good business man,—the housekeeper certainly has need of them."

Whatever the condition of a family, whether large or small, in city or country, in private house or apartment, the successful expenditure of money to supply the family with needed comforts depends vastly more upon brains than upon dollars, upon the standard of life than upon circumstances. To know where to economize and where to lavish, to be on the alert for the small wastes, so often disregarded,—only training and experience can realize the ideal in these things.

Extreme Economies

The extreme economies practiced in former years are beyond doubt questionable in these days of astonishing increase in the production of wealth. Time has become too valuable to be profitably spent in weaving rag carpets merely to save the rags. If done, there must be some aesthetic value found to justify it. The same holds true of many occupations of the earlier housekeeper. The taking of these occupations from the home and the development of them into independent industries has liberated much time and strength, which it is the duty of the housewife not to waste. The changes have been phenomenally rapid, and adjustment could hardly be expected to keep pace, but there is much to indicate an appreciation of the situation on the part of many women and a sincere desire and endeavor to co-operate in meeting the changes intelligently.

True Economy

There is no less need of the practice of economy in the expenditures of the present time than formerly, even if the methods necessarily differ. For instance, while we may afford ourselves finer materials and more variety in clothing there is a correspondingly greater demand for wise and intelligent choice of materials for bodily needs and the avoidance of such as purport to be what they are not. Otherwise extravagance in the loss of time through illness, or even of life itself, results. Economy in food no longer requires the family to forego certain food-stuffs which were formerly luxuries. The requisite is rather the exercise of foresight in buying the product when in season, or legitimately within the reach of the limited purse.

Standards of Life

One must have a standard, conciously defined and recognized, in order to choose successfully. A standard of life consists of those principles which guide one's motives and direct one's activities. Conscious standards are not often enough realized in things ethical. We have standards of weights and measures by which all weights and measures are tested. We have standards by which we discriminate in music, art, and many other things. But who can define his *Standard of Life* readily? We may reveal it to others, in fact we are constantly doing so as we decide this or that. The great difference between a successful person who accomplishes much, and one who never seems to amount to anything in particular, is the difference in which their standards of life have been made clear and conscious, thus becoming a vital, guiding factor in action.

We recognize innumerable varieties of standards, as the result of varying education and training, advantages and opportunity, or the lack of them. False standards arise from failure to discriminate between *needs* and *wants.* There are conflicting opinions as to what vital needs are, although it would seem self-evident that they consist materially, in *those things which man must have to live under the best conditions,* such as pure food, healthful clothing, sanitary houses, sufficient air and light together with those things which will minister to his highest intellectual and spiritual development. Through failure to distinguish intelligently the majority of people spend two-thirds or more of their income for what fails to bring them the best results in health and happiness. **Needs and Wants**

We are too inclined to scorn the women of former days because of their more limited horizons. We may profitably study their understanding of their conditions and needs and the wise adaptation to them, which gave them an important place in the work and progress of their time. The women who succeed today in the use of larger opportunities are those who, like them, dare to live in intelligent independence, true each to her individual standard of life. Such women do not indiscriminately copy the manners of living or dress of others merely to be like them or in fashion. They are not ashamed to acknowledge a liking for home-making and housekeeping. They spend with care and judgment. A suggestive, com- **Adaptation to Conditions** parison between the women of the past and those of the present is that of Miss Richardson in *The Woman Who Spends:* "In olden times women thought and thought and thought before they spent, often making the spending a burden. Now women often spend, and then think and think and think. Nor does the lack of thought beforehand ease the burden of the results of her spending."

Good Intentions

As urged elsewhere it is not enough that we be well-intentioned since even then we may be painfully or harmfully extravagant through ignorance. We must know not only that pure food, hygienic clothing and durable furnishings are well, but we must know what constitutes each and how to secure them. Otherwise we must be classed among the extravagant.

No true economy can be practiced in the home until a standard is adopted by all the members of the family, in which there is agreement of effort to promote the family well-being; at the same time that all unite to accept with intelligent grace the common deprivations necessary to lessen family waste either of money, labor, time, health, strength, or possessions.

Differing Standards

Standards in regard to living must necessarily differ greatly with different individuals and families. The education, tastes, and occupations of people differ so widely that it would be entirely impossible to establish a universal standard. That one may have greater demands than another is purely accidental, yet must be reckoned with. Even our individual standards are not stationary but are ever giving way to new and higher ones if we are as progressive as we should be. All this makes it difficult to proportion expenditures so that the highest good shall always be secured.

Value of Classification

The most important reason for attempting to classify our wants and our provision for their gratification, is that thereby we may provide ourselves with a definitely recognized standard which can be reckoned with, studied, and, from time to time improved. Man shares with the brutes a low or primitive range of desires consisting of the satisfying of the physical demands for food, rest, shelter and clothing. Gradually he comes to desire other things, his standard is raised, and by the repression of his desires in the lower range he is able to secure satisfaction in the higher. The day laborer necessarily has standards as to food which differ from those of the scholar. The scholar must expend more for dress, perhaps, regardless of the difference of income but this difference is not vital, since all genuine and legitimate differences seem to promote progress in the people. The danger lies rather in "accidental accompaniments" which are not necessities.

Style of Living

In deciding upon a standard of life, one acts upon his best judgment at the time, independent of others, except as he recognizes that he may improve his standard by comparison with theirs. "Style of living," on the contrary, is thrust upon one from without. Accepting it, he becomes its slave, entirely dependent upon what "they" will say as to this or that expenditure, never upon the consideration of the real good to be derived.

Accurate Record Important

Only by keeping an accurate record of expenditures can one follow the outgo so as to find how the standards of the family measure up to the ideal. Without indisputable facts in black and white one is easily deceived. It is natural to feel that economy is being practiced when many a coveted article is resisted. The year's bill with its record of many other indulgences is sometimes a rude but wholesome awakening. Twenty-five cents to-day and another to-morrow for some luxury in food seems too slight to take account of, but multiplied by three hundred and sixty-five the increase in the food-expense becomes a considerable sum. It is well to look frequently to aggregated expenses like these.

Basis of Classification

In arriving at a basis for the classification of expenditures it is helpful to compare those of a large number of families, studying the avenues of expense to determine in what way the maximum of health; physical, mental, and moral is reached. Several such comparative studies have been made and a few typical budgets have been selected to illustrate the method pursued in attacking the problem.

In making a classification of one's own, it will be most useful to decide upon a tentative division of the year's income under the heads which seem most valuable to keep as separate divisions. These proportions may be studied in per cents, or the salary for each week or month or quarter may be divided and the amount for each division reserved to defray the expenses which arise in connection with that division during the period. As time goes on one is able to see how accurately the provisional division was made to fit the needs.

Theoretical Division

Such a theoretical division should always be decided upon as a check to undue expenditure, as one will try to bring the actual expense within the limits that seemed wise to set when all things were taken into account at the time of deciding upon the proportions.

Tendency with Regular Income

A regular income is the fortunate arrangement in many families. This tends to develop thrift and to remove the tendency to run up bills leading to debts. The tendency for such is to live up to the limit of the income and the division for saving and higher life in general is usually small. It is found that salaried people seldom get deeply in debt, but also seldom accumulate very much.

For those without regular and known income the problem of apportioning expenditures is very difficult. The only safe course is to determine upon a definite minimum income. The surplus will then be an unexpected pleasure.

Division of Income

The actual per cent of the income allowed for each division will depend chiefly upon two things; namely, the size of the income, and the ideals or standards of the family. The necessities of life must be provided and if the income is small, barely enough to cover these needs, there is little choice left but to spend all for them. Yet as a matter of fact, choice is possible for most families. While a large wage-earning class are receiving smaller incomes than one would wish, at the same time we find choice playing an important role in determining the purchases of the day laborer, as well as of those who are not limited for money. In fact, it is with those who can least afford to be governed by caprices that the most pitiful lawlessness in these things prevails because of ignorance.

Real Values

Enlightenment through education in real values is needed by all alike, that correct divisions may be made and lived up to, and that the division for higher life, most often cut to a discreditably low per cent, may be recognized and properly provided for.

Budgets

The following table from *The Cost of Living* by Mrs. Ellen H. Richards gives some actual and typical family budgets:

Typical Budgets

Family Income Per Year.	Percentage for				
	Food.	Rent and Car Fares to and from Work.	Operating Expenses, Fuel, Wages, etc.	Clothing.	Higher Life, Savings, Charity, etc.
$3,098, three adults, two children....................	27.5	21.1	16.8	10.	24.6
2,500 (Mass.); three adults, no children	25.	25.	13.	12.	25.
2,500 (Mass.), two adults, one child, much company.	32.	18.	18.	10.	22.
1,980 (St. Louis), four adults, two children...........	36.3	24.2	20.9	18.60	
950 (Mass.), two adults, three children.........	20.	19.	16.	15.	30.
600 (Boston), two adults (women), two children.	23.	26.	4.	5.	26.1 Travel, Sickness, etc. 15.9
535 (N. Y.), two adults, three children..........	55.2	22.4	5.3	9.4	7.7
312 "mean" Englishman, two adults, three children.....................	55.2	15.5	8.9	13.1	7.3
300, Dr. Engell's estimates	62.	12.	5.	16.	5.
From *Cost of Living*, Mrs. E. H. Richards.					

Necessities Uniform

From these budgets it will be seen that little choice is given the families of most limited means. The necessities cost about the same for all. It is in the range of luxuries that the greatest divergence is to be found. Only there can limitations be wisely set. In those where choice is possible, one observes a variety of results, showing that one family preferred to economize in one way, another in another. The comforts to be secured through increase of rent appeal to one, those of additional service, another, and so throughout the list.

Extravagance

Extravagance is most frequently found in the Food and Operating expense divisions. Individual extravagance occurs most frequently in clothes.

Ideal Budgets

With these actual and typical budgets in mind note the Budgets, as suggested by Mrs. Ellen H. Richards, which give the ideal *theoretical* division of incomes varying from $500 to $4000. The interest and profit to the housewife in the comparison of these widely differing standards will be the stimulus to keep systematic accounts, that she may be able to determine the percentages of her own family expenses. Such an account with its day of reckoning is an excellent moral support since one will learn to think twice over the temptation to spend for personal gratification, or for those things which have at best little to recommend them either for pleasure or profit.

Ideal Budgets

Family Income.	Percentage for				
	Food.	Rent.	Operating Expenses, Fuel, Wages, etc.	Clothing.	Higher Life, Book, Travel, Charity, Savings, Insu'nce
Two adults and two or three children (equal to four adults):					
Ideal Division—					
$2,000 to $4,000	25	20 ±	15 ±	15 ±	25
2,000 to 1,000	25	20 ±	15 ±	20 ±	20
800 to 1,000	30	20	10	15	25
500 to 800	45	15	10	10	20
Under $500	60	15	5	10	10
From *Cost of Living*, Mrs. E. H. Richards.					

Four laws have been formulated by Dr. Engel, which state the tendency in the changes of per cents noted in such budgets as we have been considering:

DR. ENGEL'S LAWS

1. The proportion between expenditure and nutriment grows in geometric progression in adverse ratio to well-being; in other words, the higher the income, the smaller is the per cent of cost of subsistence.

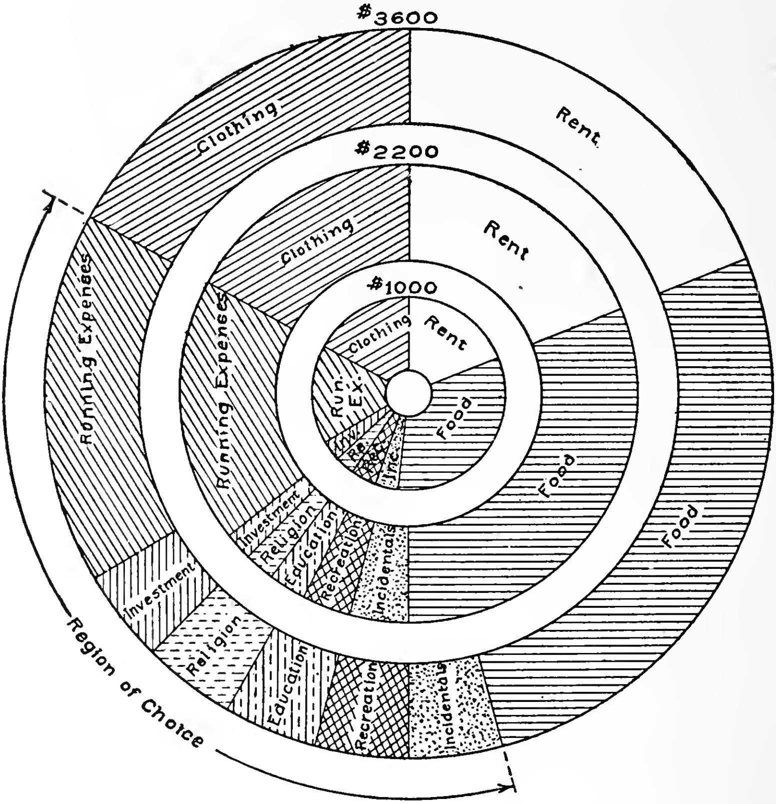
2. Clothing assumes and keeps a distinctly constant proportion in the whole.

3. Lodging, warming and lighting have an invariable proportion, whatever the income.

4. The more the income increases the greater is the proportion of the different expenses which express the degree of well-being.

DIVISION OF INCOME CHART

Typical Family of Two Adults and Three Children



Running Expenses include Wages, Fuel, Light, Ice, Etc. With $1,000 Income the Children Would be Educated in the Public Schools.

The above chart was adapted from a large colored chart prepared under the direction of Mrs. E. H. Richards for the Mary Lowell Stone Exhibit on Home Economics.

Division of Household Expenditures

The classes of expenditure discussed in the following pages are those which, on the whole, best represent the different divisions into which money expenditure may fall. These are *Rent,* or its equivalent paid for shelter, *Operating Expenses,* such as fuel, light, wages and repairs, *Food, Clothes and Higher Life.* The latter includes all that ministers to mental and moral well-being, as education, travel, amusements, charities, savings and insurance. These will be considered in order.

RENT

Buying or Renting

The question of buying or renting a house which shall offer shelter and make a home for the family is often a difficult one in these days. Formerly private possession was much more universal than at the present time. It is more or less impossible within a wide radius of the center of our largest cities to-day to buy a single house at any price. For this reason people are more and more forced to rent, and must share a house with other families, usually, either in double houses, apartments or flats. Many of the objections which are to be urged against boarding are equally forceful for this manner of living. The too close proximity of others is a misfortune, yet it is preferable to boarding, since some privacy and individuality may still be preserved. Some, feeling the natural instinct of ownership too strongly to be content to give it up so completely, will prefer to go into the suburbs and rely upon electric cars or other means of transportation, for going to and returning from business.

Disadvantages of Buying

The difficulties which present themselves when one considers buying, may be summed up under the following heads:

1. Scarcity of available houses in places of any size.

2. Greatly increased cost, due to increasing valuation of property.

3. Tendency of fluctuating business, causing changes in plans or place of residence, necessitating the disposal of a house at a sacrifice.

4. Unforeseen changes in business centers in our rapidly growing towns, and cities, greatly affecting the desirability of the location for a home.

5. Constant expenditures required to keep a house in repair, often in excess of rent.

6. Decreasing tendency on the part of young people to have a saving fund which can be used or which they are willing to use for purchasing a home.

Advantage of Ownership

The advantages of owning a home when it is at all possible or feasible, far outweigh these disadvantages. Renting tends to develop demoralizing habits of carelessness and indifference. The word "home" should have a meaning for us vastly deeper and richer than can be bounded by four walls, it is true, or than can be centered in material or outward covering, yet all such aids prove vital in developing and strengthening the highest regard for the name with children. The man or woman is to be profoundly pitied to whose mind the name does not recall a definite and loved spot as the home of childhood.

Nothing contributes more surely and steadily to the development of a worthy citizen and through him of a worthy community than proprietorship in his home. It removes the temptation to move from place to place —always a great hindrance to the development of an ideal home. The family that rents tends to disregard property rights and to enter with less pride or concern into the neighborhood life. As soon as a home however humble, is acquired, a pride is taken in it and its surroundings and the sense of personal responsibility for the tone of the community is much keener.

Legitimate Expenditure

In providing for shelter either by buying or renting, three factors should play a part, (1) sanitary requirements, (2) those things which, like location and architectural appearance, answer the social requirements, (3) and standards of living. Sanitary requirements may well be placed first. Money is well and economically expended which secures the best possible sanitary conditions. Failure at this point has cost many families far more than the two or three dollars' difference per month in rents by adding doctor's bills —most uneconomical of all expenditures—to the lowering of vitality and decreasing of efficiency.

Essentials and Non-Essentials

Distinction should be made between essentials and non-essentials, between showy cheats and real worth.

Bright gilding does not make good plumbing nor does an especially fine porch bespeak a carefully constructed cellar. Some of the principle requisites are: Ample air space for each individual, (300 cu. ft. for each person having been found to be the lowest amount permissible according to sanitary rules); light, fresh air and water in abundance. Drainage conditions should be above suspicion within and without. A house so constructed as to require the minimum of labor to care for is also a wise and economical consideration. The housewife will be surprised in her search for these requirements to find what poor provisions exist in most houses. The demand for the best sanitary conditions has been so slight up to the present time, that those who build have not found it essential to give them large attention, since selling or renting so seldom depends upon these things.

Reasons for Low Price

If a house is found which is offered at a price less than others which are similar in the vicinity, one of three reasons may be found to account for it. Either it is an old house out of repair, or is in an undesirable neighborhood, or it is simply cheaply constructed. In weighing its merits great care should be exercised to distinguish as to the cause. If it is such as to be a menace to health, physical or moral, one has no right to choose it. If it will cost more to put it in good condition to live in than the difference, or if operating expenses, as fuel, will be increased more than enough to offset the difference, then it is poor economy to select it; but if the difference is merely one in incidentals such as more or less expensive woods for finishing, etc., then it may be wise to sacrifice a little at this point rather than in something more vital.

Cost of Building

In building, the demands of modern life require, not including cost of land, an expenditure of about \$1000 per person, or \$4000 for the typical family of five persons. It is easy to vary this to the two extremes. In most localities, \$10,000 should build all that any family could use for themselves alone so far as *essentials* go.

The cost of building varies so greatly that no very definite estimates can be given. In parts of the United States where building materials and labor are high the cost of a house may be nearly double that in places where prices are low. The *recent* experience of others or the conservative estimate of a local architect or contractor is the only safe guide.

The difference in expense too often represents other than legitimate reasons: A large expenditure frequently represents bad taste and showy ornamentation rather than more abundant sunlight, fresh air and cleanly surroundings. A good rule to bear in mind is that "less should be spent for the mere house and more for what goes on in it—the real life."

Rental

In deciding what may be legitimately spent for rent one may safely estimate whatever is necessary to secure the requisites for health. It ought to be possible to secure safe surroundings at a cost not exceeding 20 per cent of any income between $500 and $5000 a year, not including the expense of heating and lighting. If more than that is necessary, it is an indication that the sanitary standards in the community are not as high as they should be. As a matter of fact low standards which the individual alone is powerless to correct often force the expense to 25 per cent to secure safety.

Location and Rent

The location of a house in its relation to place of business, school, etc., should be considered. If at a distance so that carfares are necessary these should be reckoned as a part of the rent. In considering the rent of a heated apartment about $5 per month should be credited for the heat, in addition to janitor service and hot water if these are furnished.

OPERATING EXPENSES

Supreme Tests of the Housewife

Operating expenses consist, for the most part, of the necessary expenditure to keep a house warmed, lighted, clean and in repair. The skill with which these expenses are managed is the supreme test of the ability of the housewife, materially speaking. Other decisions may be turned off more easily or attended to once for all, and there is some end to them. In these the highest success can only be realized by the woman who has a genius for details, who will allow nothing to escape her consideration, yet who has the ability to carry them with a degree of ease and mastery so that it will not be apparent to others, at least, that she finds them perplexing or burdensome. The over-anxious, wearied woman is as lacking in the element of success as the careless and heedless one. She may be able, through her greater watchfulness, to save more money, but family happiness is perhaps more endangered, through the depression of spirits and the friction which result, than in the other case. To remove friction and reduce to a harmonious unit are parts of what she must accomplish through the direction of the operating expenses.

Worry

Determining Factors

The same standards should control in deciding the avenues of expenditure here as in selecting a house or deciding any of the other divisions. Health, comfort and happiness in the highest and broadest conception of these words should be the only factors having weight. Whether my neighbor has a maid should be nothing to me in my decision as to the necessity of having one. To be met at the door by a suitably attired official ought not to be as important as it would sometimes seem to be, in leading us to decide whether we have had a pleasant and profitable call on a friend. All these things are well in their place, but they are by no means so vital that one should sacrifice far more important things and magnify these out of all proportion.

Much of the necessary operating expense is determined when the house is selected, and the two should always be considered together. If the number of rooms is limited, the expense of caring for them will be correspondingly less. If the house is conveniently arranged so that the work may be swiftly performed, the work of each helper will "go further" than if much time is wasted through unnecessary steps or movements. So, also, in the expense of heating. One should consider whether the house is arranged compactly or not, what the loss of heat through exposure of rooms will be, etc., so that the cost of heating can be correctly reckoned with.

Approximate Cost for Service

It has been estimated that, for an ordinary city house, the sum paid annually for wages of servants should be equal to one-half the rental value of the house. This can only be realized, however, by those who are willing to simplify their manner of living so as to reduce expenses more than the average at the present time, or by those who give assistance in the duties.

When servants are kept the cost of the other operating expenses will be increased without corresponding satisfaction. In general, they should be kept equal to the amount paid as wages. An excellent standard to keep in mind is the maintenance of the "maximum of efficiency at minimum cost." It is true economy to expend for what will remove friction or prove time-saving.

Wage

The wages of a general helper for housework vary according to location, from $3.00 per week or less in some small towns in the East and through the middle

West to $4.00 or $5.00 in the larger cities. This must be doubled in allowing for board and room and for the additional outlay because of more wasteful cooking and more careless handling of furnishings. One housekeeper who kept a careful record of expenses both when with and without help, found the weekly expense from one-fourth to one-third more when help was employed.

Hour Work

The average cost of hiring by the hour for work done in the house is from 15 to 25 cents per hour including the midday meal, if the helper remains over that time. Laundry work for unstarched, flat pieces, averages 25 cents per dozen.

Small Wastes

When all the main avenues of expense have been carefully considered to eliminate excessive or unnecessary expenditure, there remains for the thrifty housewife the daily exercise of much watchful care over the "littles" which otherwise astonishingly run up the expense. A three-burner chandelier ablaze instead of one Welsbach burner which would give better light at less than a third the cost; a range fire opened, at the loss of at least a hod of coal, to prepare a warm dish for supper when the use of a gas or oil stove for a short time would accomplish the desired result much more cheaply; daily orders in piece-meal over a limited telephone service, because the difference is not considered sufficiently important to necessitate the thought required to combine all the orders for that day, or for several days, in one message: these are all trifles in themselves, but five cents here and ten there make a surprisingly large difference in the sum total. The difference between skilful, thoughtful outlay and careless spending, is to be measured in the added comforts to be secured by the one who learns the secret of successful management in this group of expenses.

FOOD

The influence of food upon the welfare of the household must be first considered in apportioning the share of income rightly devoted to it. In referring to the budgets we find that as the income decreases the percentage devoted to food increases. Why is this, or why should it be so? It is because the life of the individual depends upon his nourishment. His shelter may be poor, his clothing inadequate for his needs, but food he must have and upon proper food depends his capacity for doing work and doing it well.

Proper Food

The child must be properly nourished that it may be a strong little animal, growing into healthy happy youth. The adult must be well nourished to be an efficient member of the community, whether as a wage-earner or as a household spender. The food supply must be right for errors and wrong doing here show their effects in a weakened power to perform work or resist disease. In this lies the justificatoin of the poor man who possibly spends two-thirds of his income for food.

Sources of Wide Variation

The wide variation, however, as shown in the budgets, does not indicate proper nourishment in one case, improper food in another. Over-nutrition is often as dangerous as under-nutrition and the cost of food does not determine its nutritive value. It by no means follows that because a family has large butcher's and grocer's bills it is therefore better nourished. The same causes affect the cost of foods as influence the price of other commodities. The demand for and scarcity of any article; being in or out of season; cost of transportation; loss through waste in foods that deteriorate quickly; fancy price asked for certain rare flavors, all these determine price outside of any consideration of nutritive value.

Waste of Money in Food

Bullock gives five ways in which he estimates that one-fifth of the money expended for food is actually wasted.

1. Needlessly expensive material, providing little nutrition.
2. A great deal thrown away.
3. Bad preparation.
4. Failure to select rightly according to season.
5. Badly constructed ovens.

Cost per Person

In 1900 when Mrs. Richard's book on *The Cost of Living* was published experiments in dietaries were made and the cost of the raw material required for so many persons a day estimated. The conclusions reached at that time were that twenty-five or thirty cents per person a day is ample to supply all the physical demands of one whose tastes have not been perverted by wrong habits of eating. Good, substantial living, meeting all the needs of people of simple habits, can be secured at less than that. When the expense exceeds that sum it is due to one or more of the following reasons:

High Cost of Food

1. Waste.
2. Buying out of season.
3. Choice of food of which there is a limited supply therefore price is high.
4. Perishable food stuffs.
5. Fads or fashions in dishes.
6. High priced products because of choice flavors as "Gilt Edged Butter," or food which is "in season" but a short time, as venison.

Since the year in which the experiments and investigations were carried on certain staple food stuffs have increased nearly twenty per cent in price, so that the margin for the same bill of fare now should be wider, or from twenty-five to thirty-five cents per person a day.

Sources of Waste

The housewife should carefully consider these estimates and the causes most fruitful of waste in the household. Far too lavish provision is often made in ordering. Study and observation must be given to the necessary quantity of meats, vegetables, etc., to be provided and served. Large portions are left to be improperly warmed over, wasted in the kitchen, or thrown away altogether. Waste in the household arises mainly from lack of thought, planning, or carefulness in detail, just as in any other business. A study of foods and food values is necessary in order to know what less expensive material may be provided to supply the same need, but above all else must the housewife who desires to make a study of these things, and reduce the waste in the household realize that no waste is greater than poor material, illy prepared. The more knowledge, the more science used in the selection and preparation of food for the table should mean more, not less appetizing results.

Numbers

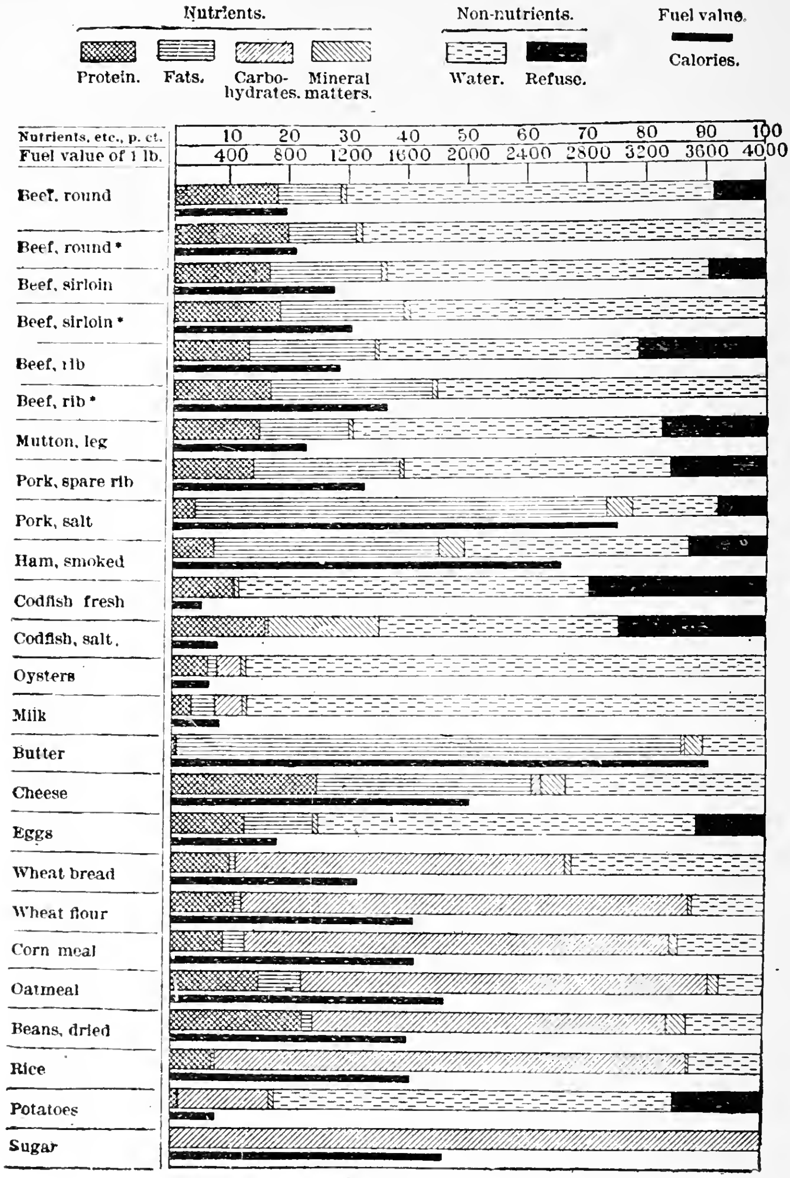
It is of course easier to provide a good table for eight people on $2.40 per day than for four people at $1.20. It must be remembered that many people live well on less; many more are well nourished on much less.

The pecuniary economy of food is seen in the accompanying charts, and those articles which would be classed under unnecessary expense may be easily separated from the more legitimate.

Aesthetic Demands

Of course the price paid for food cannot be regulated entirely by a consideration of nutriment alone. It must satisfy aesthetic demands as well. Food must be enjoyed in order to be thoroughly well digested. This is a strong argument in favor of a moderate use of animal foods. Although vastly more expensive than vegetable foods, they do gratify the palate of most people in ways which vegetable foods do not. This fact together with their superiority in being more

Chart of Composition of Foods

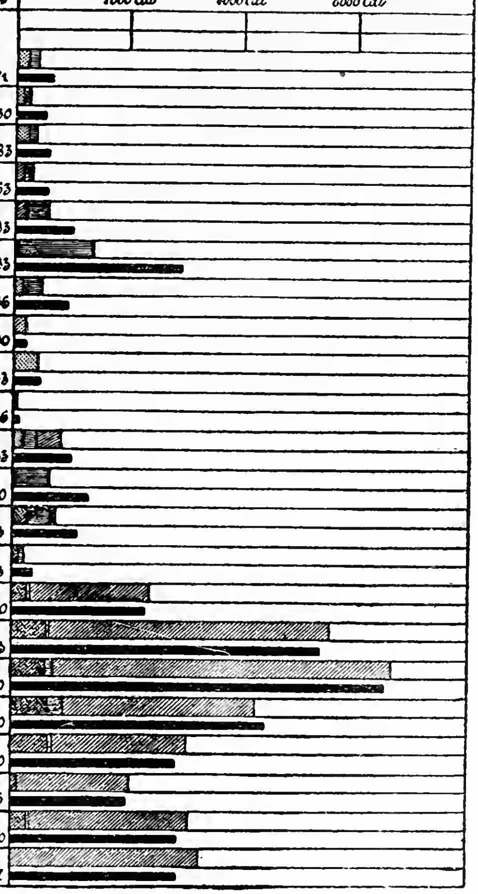


* Without bone.

Chart of Pecuniary Economy of Food

Protein. Fats. Carbohydrates Fuel Value.

FOOD MATERIALS	Price per pound — Cents	Ten cents will buy — Lbs.	Pounds of nutrients and calories of fuel value in 10 cents worth. (1 lb, 2000 Cal; 2 lbs, 4000 Cal; 3 lbs, 6000 Cal)
Beef, round	14	.71	
Beef, sirloin	20	.50	
Beef, shoulder	12	.83	
Mutton, leg	16	.63	
Pork, loin	12	.83	
Pork, salt, fat	12	.83	
Ham, smoked	18	.56	
Codfish, fresh, dressed	10	1.00	
Codfish, salted	7	1.43	
Oysters, 35 cts per quart	18	.56	
Milk, 6 cents quart	3	3.33	
Butter	25	.40	
Cheese	16	.63	
Eggs, 24 cents dozen	16	.63	
Wheat bread	5	2.00	
Wheat flour	3	3.33	
Corn meal	2½	4.00	
Oat meal	4	2.50	
Beans, white, dried	5	2.00	
Rice	8	1.25	
Potatoes, 60 cents bushel	1	10.00	
Sugar	6	1.67	



From Farmers' Bulletin, No. 142.

easily and completely digested are valid reasons for paying somewhat more for the sake of securing them.

CLOTHING

Real Purpose

Clothing, like food, should be considered first of all in its relation to the possible increase of health and efficiency. Like the function of food, this is too much lost sight of at the present time while the aesthetic side of the subject is receiving an undue share of emphasis. The cost of clothing is too largely the result of an attempt to gratify the desire to please the world at large, rather than of protecting the body. We all know too many instances of the rashest excesses to which this may lead, destroying all hope of realizing higher and worthier ideals. A safe-guard to such excess lies in an intelligent training and thoughtful study of these things.

Legitimate Expenditure

Sufficient and suitable protection from clothing, so that one is enabled to meet the varying changes of climate without loss of energy, is a distinct advantage, offering grounds for reasonable expenditure. This should debar either too scant provision, or too great excess, which weakens power of resistance. The aesthetic has a legitimate place in the consideration, but should be subordinate to health, if the two ever seem to conflict. There is, as we know, the greatest possible difference in people in ability to "make a little go a long way" in providing satisfactorily for clothing. Knowledge and care will aid greatly in helping one to conform to the laws both of health and beauty. A pleasing, becoming color or style is little, if any, more expensive than one which is unbecoming. One should seek to develop true individual taste and expression, relying less upon the not infallible dictum of dress-makers. To secure clothing, then, which shall be a protection from heat and cold should be the first motive. Along with this should go a recognition that the outer garments may be and should be a means of contributing to the pleasure of others, through a correct selection of pleasing colors and graceful forms. Both these may be entirely legitimate considerations, but there should not result, from over emphasis, a dwarfing of the more important things in life.

Good Taste

HIGHER LIFE

The preceding divisions have to do chiefly with those things which support and protect the physical well-being. The fifth important provision should be for the higher life, or the demands of the intellectual and spiritual nature. The most important business of any life is to develop this side to its highest possibilities and to find its fullest expression. Other considerations are in reality subordinate to this.

Necessary Consideration

Unless a definite allowance is set aside for the purpose material demands encroach until all is spent. Even if something more is realized each year than is spent, the money itself seems too often to be the most valuable possession, rather than the comforts and

Value of Definite Allowance

aesthetic ideals which it might secure. It is a battle, in these days of materialism, to reserve one-fourth of an income for the satisfaction of the needs of the higher nature, yet there is no greater need in our nation than that of more families who realize the imperativeness of doing it, and who independently insist upon proving it to be possible. Those who resolutely decide upon this course tend to more refined living, give "more thought to the meaning of life, to the object for which all exertion should tend, more thought for the manner of accomplishing a given result, less for the money value of it."

Realizing Ideals

It means making a place for ideals, recognizing their necessary place in life, and resolutely setting one's face toward realizing them. Such a purpose serves as an admirable check to the gratification of lower desires and unnecessary spending, while whatever is found to be necessary and worthy will have a double value because of the thought and care exercised in the decision.

Wide Range

There is a very wide range possible for different tastes in ministering to the higher life. One will prefer travel, another literature, a third art, while church and charity must find place in all higher life. It matters, perhaps, less what particular side is developed than that there shall be *conscious effort toward a higher and a fuller life*, and that *choice* rather than idle *drifting* rules. It is true that all altruistic motives which look to the good of another, be he kin or otherwise, are more full of elevating influence upon a life than those which seek merely one's own highest good. One should gain the habit of choosing those things that endure, and have abiding value rather than those of momentary or temporary advantage.

Wise Investment

Even when guided by an impulse to make provision for one's family, it is to be borne in mind that the best possible investment which can be made for a child is a liberal education. All that anyone in normal health and strength should need is a thorough preparation to do his or her work efficiently, with motives toward the best things which life has to offer and the possibilities of a better life than his parents have had. Too liberal provision is often seen to destroy incentive and the things of highest value are cheapened when they cost little effort. Progress can only be made through striving. Conscious effort is as necessary for the health of mind as for health of body. For this reason it is best that what we enjoy should be the result of choice and denial, and we should learn early to pay for what we get. A surplus should be reserved against emergencies, that a feeling of independence may be fostered, yet this should not be insisted upon to the point of crippling life.

Ways of Saving

As to ways of saving, the field is large. Some methods employed at the present time are to be commended in highest terms. Against others too severe condemnation cannot be passed. Among those forms which are safe may be classed life insurance, savings banks, loans on real estate and investments in stocks and bonds.

In selecting, one should consider whether the business which the company is transacting is legitimate and also whether it is probably permanent because it serves a real public use with elements of growth and lasting development, or whether it is merely a "flash in the pan" scheme. Again, it is important to know whether the company has sufficient capital to make the business a safe one, and whether the management, so far as can be determined, is wise and honest.

Life Insurance

Life insurance is becoming an increasingly popular form of saving. With a reliable company, and under some of the favorable arrangements possible at the present time, such as terminal endowment policies, yielding a fair interest for money invested, as well as insurance, it is without doubt one of the best methods. Some find the imperative demand to meet the annual payments a very helpful check upon expenditure. There is not the risk of loss through failure to pay at any time which formerly existed, since, in emergencies, money can be loaned on the insurance or one can secure at some sacrifice the return of the amount paid in.

Railroad Securities

Railroad securities are possibly first in value, such bonds, if good, being unquestionable security and yielding good return. There is little fluctuation in value, and the reports are frequent and controlled by state law, so that one may know the exact condition of the investment at any time.

Mortgages

Loans on buildings, or real estate are excellent forms of investment, if one knows beyond question the value of the property secured. These may not be as readily transferred or their value realized, as with stocks and bonds.

Safe Interest

In general it may be said that for the ordinary investors in our country any investment yielding over 4 1-2 or 5 per cent is to be classed as a risk, and is not consistent with sound finance. A safe investment yielding that return is far wiser than a questionable one promising more. A high interest rate is almost invariably, in the very nature of things, a warning of insecurity. Shrewd capitalists of the country are certain to know of any especially favorable opportunities and seize upon them, if desirable, so that the small investors should not look for phenomenal returns.

Get-Rich-Quick Ventures

The frequent reports of failures, and cases of those involved who have met with pitiable losses emphasizes the danger and evils of speculation. These often rise in the form of local crazes, with heated booming for a short lived career, or as investment in some gold or copper mines at too great distance to be personally investigated. These should be condemned and avoided as almost without exception dangerous. Women are found to be particularly susceptible to such alluring opportunities to "get rich quick" because of failure in training in sound business principles.

Value and Necessity

The management of the money affairs of a family is usually the most perplexing part of its domestic problem. Yet, in spite of this fact, the least candid study and thought are given to it. The value of accurate accounts, as well as their necessity, is recognized in the entire business world. Few associations of individuals are organized for any specific purpose without careful regard to the maintenance of the proper relation of income and outgo. The value and importance of this is no less to the housekeeper than to the banker or grocer. The appallingly frequent examples of reckless disregard in this respect, leading to a constantly increasing number of unpaid bills and final ruin, ought to teach the sad lesson of the unthrifty. Yet statisticians tell us that at least one-half of our well-to-do families are seriously handicapped by debt. Along with that fact should be emphasized another—the number of families in which accounts of personal and family expenses are kept is astonishingly small, and in few instances where such records are kept is sufficient study given to them to lead to advance in standard of living from year to year.

What Accounts Should Show

In conducting any business it is of the greatest importance (1) to follow the receipts and expenses, (2) to keep a record of investments and (3) to determine at the end of the year, or shorter period, the results of the business and the exact condition of the capital. The modern household is an intricate business concern. Its financial administration demands as perfect exactness, order and method as any other, if it is to attain in any degree its possible efficiency. Such exactness alone renders the accounts of any real worth. They may be made of priceless value in directing the activities and ministering to the comfort of all in the home.

The Account Keeper

The question who shall be head bookkeeper and director of the household expenditures will probably be best decided by determining which grown member of the family has a genius for accounts. It naturally falls to the housekeeper as the one who can manage best and has the most intimate acquaintance with the entire situation. In any case, it should be one who loves it or who sees in it possibilities large enough to create a willingness to give the necessary thought and time to make it a success. It has been made a profitable and interesting business training in some families for growing boys and girls. Possibly promotion from the keeping of their own personal accounts to those of the household might be made an excellent stimulus. With a clear, convenient system, adapted to the needs of the particular records to be kept, and with a business-like promptness in entering each night the transactions of the day while fresh in mind, what is often looked upon as a perplexing hardship may become an interesting study. A helpful aid to memory is a card neatly fitted into the purse, upon which sufficient entry may be made at the time of the expenditure to assist in recalling the details when they are wanted for entering in the account. A shopping list filled out with prices as one purchases is a useful aid to memory.

Systems

The system employed in keeping the accounts may be very simple. The only necessary requirement is that it be sufficiently complete to record in concise, available form the necessary facts to indicate clearly the details of income and outgo. It must be possible to compare these two sides of the account at any time in order to prove that the balance as shown by the account corresponds with the cash on hand.

Various systems have been devised and successfully used. The efficiency of anyone depends quite as much, perhaps, upon the thorough, painstaking effort of the user to bring it to its utmost point of efficiency and utility as upon the system itself.

Envelope Method

Some find a series of envelopes a very convenient form of keeping the records. Each envelope is labeled with the name of the particular division of the expenses which it is to hold. After it has been decided what proportion shall be spent for each division the sum is put into its envelope, to be drawn as needed.

A slip of paper or card in the envelope records each addition, and the expenditures from that envelope during the week or month, or a cash account is also kept of the household expenses and personal account. Any division like the following may be made with the envelopes:

Suppose a family consisting of a man and wife live in a steam-heated flat and have an income of $30 a week. The following divisions might be made each week:

Example

Rent	$7.00
Household expenses	7.00
Fuel and light	1.00
Man's personal allowance and expenses, including lunches and car fares	5.00
Madam's personal allowance	4.00
Extras and emergencies, including dentist, doctor, etc	2.00
Church and charities	1.00
Insurance and savings bank	3.00
	$30.00

For amusements there may be a separate envelope, or, as there are four months in which there will be five payments to the envelope, these extra four payments may be used for amusements in connection with household expenses.

Advantages and Disadvantages

A system like this has the advantage of keeping always before one just what is at hand to draw from. The leading disadvantages over other methods is its cumbrousness. It involves the keeping of a considerable amount of money on hand and also presents a great temptation to borrow from one envelope to another for making change, etc., which is likely to lead to confusion of accounts.

Cards and Envelopes

If the records for the envelopes were kept on cards, these might be filed in a card index for comparison and permanent reference as explained later.

On the whole, a system by which the accounts are finally entered in books intended for that purpose proves most satisfactory. Such books may be procured already ruled for entries, or a blank book can easily be ruled as desired. For a complete record the same books are useful as for other accountants—a journal, ledger and balance sheet. The journal and ledger may well be combined in one book, as will be explained in connection with Table III.

Journal

The household account records exchanges whereby the housewife buys the goods or services which her household needs, giving in exchange of her means. The simplest statement of such exchanges is made in a journal. A single page is used to enter both receipts and expenses. Thus:

TABLE I

1904.			Received.	Paid.
Jan.	1	Cash in hand	$20.00	
"	2	Washing		$1.50
"	"	Grocer		8.00
"	3	Coal		14.00
"	"	Flour		4.75
"	5	Salary	50.00	
"	"	Car fares		.50
"	"	Cleaning		1.25
"	8	Eggs		1.10
"	"	Washing		1.50
"	10	Potatoes		1.70
			$70.00	$34.30
			34.30	
"	"	Balance on hand	$35.70	

Itemized Accounts

If purchases are itemized elsewhere for reference, such an account as this may contain sufficient data. It is possible to itemize more fully in this journal record if desired, as is illustrated in Table II.

TABLE II

1903.			Cr.	Dr.	Daily Totals.
Feb.	1	By balance brought forward	$75.70		
"	2	To washing		$1.50	
"	"	" 2 tons coal at $7 per ton		14.00	$15.50
"	3	" 3 bu. potatoes at 80c. per bu		2.40	
"	"	" 5 doz. eggs at 22c. per doz.		1.10	3.50
"	5	" cleaning one day		1.25	
"	"	" rent for January		15.00	
"	"	" 8 lbs. beef at 14c. per lb		1.12	17.37
"	8	" washing		1.50	1.50
"	10	By salary	50.00		
"	"	To car fares		.60	.60
		Totals	$125.70		$38.47
		(Balance, $87.23.)			

Terms

In the second table it will be noted that the terms usually employed in bookkeeping are introduced. These are easily understood. The term "By" introduces all terms belonging to the credit or receipt column; the "To," items of the debit or expense column. The abbreviation "Cr." for credit heads the column of receipts, indicating that the house account has that much more to its credit, while the "Dr." abbreviation for debit shows to what extent the house has become indebted or has placed itself under obligation for benefits received.

Daily Totals

Table II also includes a column for daily totals, which carries the account a step further in efficiency. In the final footing up of the columns these totals are a convenience, since it is always easier to add a short list of large figures than a long column of small items. It is sometimes helpful also to be able to refer to the entire day's expenditures.

Use of Ledger

As will be readily seen, the details of expenditures, when entered as above in the journal, are not easily referred to. One could at any time make a summary of any division which would show the amount spent for any one class of purchases, as clothes, rent or food. As a matter of fact, few seem to make such reviews when the accounts are kept in this way, finding it a seemingly endless task to assort the different items after they have become so thoroughly confused as they do in the journal account. In this way the greatest benefit of an account is lost. Their highest value is in one's being able to bring each set of expenses together, so that comparison of different divisions may be made, and a proper proportion maintained. It is far better to transfer the details of an account to a second book, called a ledger, which may for convenience be divided into sections, each devoted to its particular class of items.

Credit Accounts

The number of credit accounts should be limited to as few as possible, usually to grocer, butcher and doctor. Frequent settlement of such accounts should be made. The family physician has too frequent occasion to comment upon the unbusiness-like way that family bills are allowed to accumulate from year to year without attention. If a physician is tardy on his side and does not present bills promptly he is usually agreeably surprised to have it called for, as it should be.

Combination Journal and Ledger

The most complete and concise way of recording the facts to be preserved is to be found in the combination of journal and ledger, such as is illustrated in Table III. This will prove in the end to be one of the most convenient, suggestive and helpful arrangements yet devised. Opposite pages of an account book may be used, the left-hand page for the journal record, the right-hand for the ledger. The ledger items are classified under a few typical heads and the amounts expended for each are entered apart from the whole. This renders it very easy at any time to consult any one division, where all the record is clearly before one. The divisions used correspond to those suggested in the discussion of Division of Household Expenditures, page 21. These are optional both in character and number, but will in the main prove to be excellent general heads. Others may suggest themselves as desirable for an individual family. Multiplication of details must be avoided as far as possible, to avoid confusion. Particulars as to prices paid may well be left to the pass books or bills of butcher or grocer, or in a separate memorandum book.

TABLE III

Date of Receipts and Expenditure.	Receipts. Sources	Receipts. Sums.	Expenses.	Sum.	Daily Total.	Food.	Car Fares and Rent.	Operating Expenses.	Clothing.	Higher Life.
1905.										
Jan. 1	Cash in hand.	$90.00								
" 2	....	....	Flour	$4.75		$4.75				
			Dress Material....	6.00					$6.00	
			Meat	1.25		1.25				
			Coal and Oil......	7.50	$19.50			$7.50		
" 3	....	....	Eggs	1.10		1.10				
			Car Fares.	.20			.20			
			Washing..	1.00	2.30			1.00		
" 4	Salary	150.00	Rent	35.00			$35.00			
			Car Fares.	.40	35.40		.40			
" 5	....	....	Groceries..	3.25		3.25				
			Meat	1.10	4.35	1.10				
" 8	....	....	Church Collect'n.	1.00	1.00					1.00
	Total	$240.00		$62.55	$62.55	$11.45	$35.60	$8.50	$6.00	$1.00

Memoranda

In carrying on weekly or monthly accounts with butcher, grocer or at dry goods stores various methods are employed for keeping a memorandum of the character and size of purchases made. If slips are sent with the goods when delivered they should be preserved on file, to be compared with the bill when rendered. Pass books are sometimes used. In that case the entries should be made in the presence of the purchaser, to avoid error or deception.

Balancing

Household accounts should be balanced at least every week. A daily verifying with cash on hand is easiest and saves time in the end. These daily balances may be indicated in pencil as the aim is to prove the account to be correct, thus showing that no item has been omitted. Every month's accounts should be balanced on the last day of the month and a new page opened for a new account for the next month. The first item on the new page should read as in Table II, "By balance brought forward——"

Yearly Balance

One should set a time for the final balancing of accounts and opening a fresh record. This is usually done at the close of the calendar year, although another time might be more convenient, as the holiday season brings other extras demanding time.

Balance Sheet

The facts to be preserved on a balance sheet are available after this summary of the year's expenses is made. The purpose of a balance sheet is to preserve from year to year a statement of the final condition at the end of each year for helpful comparison. It may be that the income has not been sufficient to meet the demands upon it, when a deficit with appear. Or the income may be just enough to cover expenses, or there may be a balance of the credit side. A properly managed household will show a steadily increasing gain of this nature, provided no exceptional and unexpected bills arise such as result from long illness and the like.

An example of a properly managed entry and a satisfactory showing is given in Table IV.

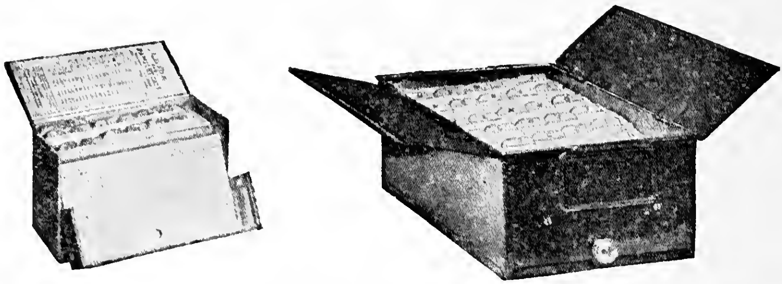
Household Account Book, with division of income, 64 page, cloth bound, 50 cents, from the School.

TABLE IV

	Cr.	Dr.
Income for year 1902	$2.500	
Expense for year		$2,250
Balance in hand		250
	$2,500	$2,500

Card Index System

The household accounts may be kept by means of the card index system, which is perhaps the best method of keeping any and all sorts of records, such as addresses, invoices and miscellaneous memoranda.



CARD INDEX BOXES.

A small linen or pasteboard box containing a set of alphabetical guide cards and some two hundred ruled cards in sizes 5x3 or 6x4 inches may be purchased for from fifty cents to a dollar. These cards are ruled horizontally and perpendicularly as in a cash book, or come without the perpendicular rulings. Various systems may be used. The most concise and simple is invariably the best, and it may be so done as to make further entering in a book superfluous.

Typical Method

One plan now being used is as follows: Under the letter *C* in the alphabetical index are three cards for

1905 JAN.	CASH RECEIVED	
1	Cash on hand	51.64
6	Salary	80.00
16	From J.M. $3.00 sale of books $11.00	14.00
23	" Magazine Nov. Article	7.50
FEB.		153.14
6	Salary	80.00
20	Extra work for Sterling	10.00
		243.14

CARD CASH ACCOUNT.

cash, (1) an account of cash received, (2) an account of cash disbursed and (3) the cash balance. It may take a card for each month for Cash Received or not, depending upon the items. In the case cited the number of cards used during the year for Cash Received was six, two months on each.

Cash Paid Card

Cash disbursed takes at least one card a month, possibly more if there are many classified accounts. The items on this card are the totals of items on single cards devoted to daily or less frequent purchases. That is, under the letter *R,* as indicated by the index at the right on the Cash Disbursed card, illustrated, is found the card "Rents" with record of rental payments, when, to whom, and how paid, if by check or cash. Marketing includes both the grocer's and butcher's accounts, hence the index letters *G* and *B*. These are itemized

1905 JAN.	CASH DISBURSED.		
1	Rent	Under R.	16.50
2	Gas	" G.	1.70
4	Milk.	" M.	2.80
31	Services {Laundry / Cleaning	" L&C.	6.00
"	Supplies	" S.	2.14
"	Car fare	" C.	3.35
"	Personal	" P.	8.00
"	Incidentals	" I	1.25
"	Marketing	" G.&B.&V.	22.62
			64.36

CASH PAID CARD.

on the cards "Groceries" and "Butcher." If the accounts are heavy it would be better to devote three cards to these items divided into groceries, meats, and vegetables.

The illustrations will probably make the divisions clear, but these divisions are not arbitrary, the person keeping the household accounts can adapt her own system.

Bank Account Card

If the housekeeper has a bank account a card should be devoted to this to check up with bank book and checks cashed and used for cash. This card should be as follows:

1905 JAN.	BANK ACCOUNT	
1	On hand	582.16
	Deposited in January	80.00
		662.16
FEB.	Drew checks as per book	33.62
1	On hand.	628.54

BANK ACCOUNT CARD.

With this card system a weekly balance may be kept instead of the monthly balance as illustrated. The accounts are so arranged that items may be found or traced with ease. For instance if in comparing the January expenditures on the Cash Balance card, it is found that it is much more than for February, it is desirable to know *why*. We take the two cards of Cash Disbursed, the one for January and the one for February and compare the items. There it may be found that the gas bill in January was more than in February, that more car fare was used, and evidently some extra supplies purchased. By turning to the card devoted to Supplies, these may be noted and the extra amount used at once found. **Balance Card**

Advantages

The entire account, daily, weekly and yearly, is in compact form and if mistakes occur it is a more simple matter to destroy and make a new card than to fix a book. Like any system of keeping accounts to be accurate and helpful this one demands promptness and accuracy in putting down items.

Filed for Reference

In order to be of use from year to year in comparing the increase or lessening of expenses the accounts must be filed away for reference. A set of cards takes up not more than six inches in length, four in height

1905 JAN.	CASH BALANCE (MONTHLY)	
1	On hand	51.64
JAN.	Received	101.50
"		153.14
"	Spent	64.36
FEB. 1	On hand	88.78
"	Received	90.00
"		178.78
"	Spent	53.42
MAR. 1	On hand	125.36

CASH BALANCE CARD.

and less than two inches space in thickness. The entire set can be put in a desk drawer or pigeon hole ready for easy reference. Or if preferred a small tin or wooden box designed for such purpose and made the exact size, may be purchased for the filing away of the year's accounts.

Unless desired for some special purpose it is not necessary to save the entire itemized account for the year, for the weekly or monthly grocery, butcher's, gas, milk and other accounts may be brought together each on a single card and kept with the cards devoted to the cash and bank accounts for future reference.

1905 JAN.	GROCERY (ACCT. WITH KOLBE)	
4	3 Doz. eggs @ 32 .96 salt .15	1.11
6	1 Bottle vanilla .15 6 lemons .15	.30
7	4 Lbs. Coffee	1.40
10	1 Box Domino sugar	.50
11	4 Lbs. butter 32	1.28
13	10 Lbs. granulated sugar	.60
16	3 " lard .30 1 bu. potatoes .60	.90
17	12 Oranges	.35
		6.44
18	Paid by check. No. 421	

GROCERY ACCOUNT CARD.

The chief disadvantage of the card system outlined, in comparison with the book system, is that the cash balance on hand is not so easily ascertained.

Necessity of Balancing

In any system, it is necessary to compare frequently the amount of cash actually in the purse (or purse and bank combined) with the balance as shown by the accounts. If this is not done there is usually an unaccounted for shortage which must be charged to "sundries," "miscellaneous," and the like—a most unsatisfactory procedure.

Classification Alcott Stockwell, in discussing "The Keeping of Household Accounts" in the April, May and June (1904) numbers of The Home Science Magazine, gives three tables of classification which may be helpful in suggesting headings for divisions of expenditure in the accounts. These are as follows:

TABLE I

Classification of Household Expenses.

1. Housekeeping
   a. Provisions
   b. Ice
   c. Fuel
   d. Rent
   e. Dometic Service
   f. Miscellaneous
2. House-furnishing
   a. General (including all furniture
   b. Kitchen and Dining-room
3. Library Supplies
   a. Books and Periodicals
   b. Stationery and postage
4. Miscellaneous
   a. Sundries (expressage. flower for house, thread, etc.)
   b. Other (fire insurance, moving, telephone service, etc.)
5. Gifts

TABLE II

Classification of Personal Expenses (in family).

1. Clothing
   a. New clothing, Foot wear, and Furnishings
   b. Repairs to clothing and Foot wear
2. Transportation (street car. railroad, hack fares, etc.)
3. Personal Services
   a. Toilet
   b. Medical
   c. Dental
4. Recreation
   a. Outings (including bicycle, pony, canoe, camera and supplies, etc.)
   b. Entertainment (may include anything as medium of diversion, as amateur photography, musical instruments)
5. Education
   a. Books, Stationery and Supplies
   b. Tuition and Lectures.
6. Miscellaneous
   a. Sundries (soda water, confectionery, cigars, etc.)
   b. Other (any large expense not included)

TABLE III

Classification of Personal Expenses (single individual)

1. Clothing
   a. New Clothing, Foot wear, and Furnishings
   b. Repairs to clothing and Foot wear
2. Board and Lodging
3. Transportation
4. Personal Services
   a. Toilet (shampoo, manicure, chiropodist, etc.)
   b. Medical
   c. Dental
5. Library Supplies
   a. Books and Periodicals
   b. Stationery and Postage
6. Recreations
   a. Outings
   b. Entertainments
7. Education
   a. Books, Stationery and Supplies
   b. Tuition and Lectures
8. Miscellaneous
   a. Sundries
   b. Others

Total Expenses

9. Gifts
10. Investments
    a. Bank
    b. Other
11. On hand at end of month

Division for Investments

In following these headings it would be well for Table I to include a division for investments, unless a separate small account book is left for these with such heading as:

a. Savings Banks
b. Life Insurance
c. Real Estate
d. Loans

Charities and Church may be classed under gifts or investments, preferably the latter, as they indicate within proper limits the most commendable form of investment.

Advantages Comparatively few women appreciate the advantage and convenience of having a bank account. There is a mistaken idea current that banks are solely for those who have a balance to invest. This is true only of savings banks; with this exception, the housewife may select the most convenient bank of whose financial soundness she is assured and open her account. In this way the bank becomes merely a temporary safe deposit vault, and checks, the easiest and safest way of making all except small cash payments.

Pass Book Having become identified, with her account accepted, the depositor is presented with what is called a *pass book.* This she keeps and presents with each amount of money to be deposited. The receiving teller makes a record of each deposit on the left-hand page of this book, and when the book is balanced from time to time a statement is inserted, on the right-hand page, of the amount drawn out and the balance remaining.

Deposit Ticket In depositing, the housewife or her messenger fills out what is known as a *deposit ticket,* which is always to be found provided at the bank. If it is necessary or more convenient at any time to send the deposit by a messenger he should always fill out this blank in the name of the depositor, since it is not necessarily her signature, but merely a record of her deposit. If there be checks to be indorsed before depositing, that is a different matter. Those must be indorsed before delivering them to the messenger, and should be made payable to the bank; they are then payable only to the bank. The deposit ticket is a printed form indicating deposits in specie, bills and checks. Sometimes the ticket reads for gold and silver, instead of specie, as is seen in the following form, illustrating a deposit ticket properly filled out for presenting to the receiving teller. This is handed in with pass book and deposit at the window marked "Receiving Teller," where the deposit is counted and the amount compared with the depositor's figures, checks examined to ascertain whether they have been properly filled out and indorsed and, last of all, the amount of the deposit is entered in the pass book, which is returned to the one presenting it.

DEPOSITED IN THE

Union Savings Bank & Trust Company.

By: Harriet B. Couch

Morrisville, Vt. Sept. 10 1905

PLEASE LIST EACH CHECK SEPARATELY.

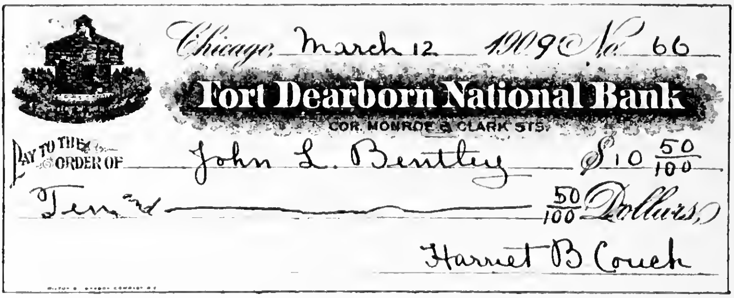
	Dollars	Cents
Bills	20	00
Gold		
Silver		40
Checks		
Winchester Co. Nat.	15	00
First Nat. Hartford	25	00
Total $	60	40

Deposit Ticket Properly Filled Out.

Depositing by Mail

Checks, drafts, money orders or express money orders can always be sent by mail for deposit with safety if properly indorsed.

Checks Every depositor is presented with a check book. This is a book of blank checks, arranged either several on a page, attached by a perforated line to a side, which is called a stub, or, as in "pocket" check book, with a single check forming the page. In this case


Chicago, March 12 1909 No. 66
Fort Dearborn National Bank
COR. MONROE & CLARK STS.
Pay to the order of John L. Bentley $10 50/100
Ten 50/100 Dollars
Harriet B Couch

A CHECK FILLED OUT.

pages are inserted between each second and third check, or between every check, upon which a record may be kept, as upon the stubs. A check is a written order, dated and numbered, directing the bank in which the writer's money is deposited to pay the sum stated to the bearer of the check, some person named, or to the order of the person indicated.

This check is equivalent to the sum of money named upon it anywhere the rightful bearer presents it. It may be deposited, presented in payment of bills or cashed upon being indorsed.

Indorsement To receive the money on a check it is necessary for it to be indorsed by the person to whom it is made payable. To indorse a check properly it should be held by the upper left-hand corner, turned and the name written across the back about on-third down the length of the check. Other indorsements should follow the first, in order. The signature used in indorsing a check should always conform *exactly* to that on the face, even if that should by mistake be not correct. The simple signature across the back makes it possible for *anyone* to draw its value who may come into possession of it. For the sake of safety it is always well to limit the payment by making it payable to the order of anyone to whom it is desired to transfer it. It is best to observe this under all circumstances, unless one presents the check in person for cashing, or must send it to be cashed by someone not known. It makes it impossible for it to be of any value to a chance finder should it be lost. Thus:

John L. Bentley

Simple Indorsement.

Pay to the order of *Henry E. Johnson* *John L. Bentley*

Safe Indorsement.

Sometimes a check is made out so that the payee's name differs from that used in the bank. This will happen frequently with married women. In such case it is usually necessary to sign both names. For example, a check made payable to Mrs. Henry Couch would be indorsed "Mrs. Henry Couch," followed by the proper signature, "Harriet B. Couch" underneath, since the given name of a depositor is preferred at the bank.

Double Indorsement

If for any reason one desires to draw cash on her own account it may be done by making out a check, using the word "Cash" or "Myself" in place of other name.

Vouchers A check eventually returns to the depositor's own bank, is paid, cancelled and returned to her when her pass book is balanced, as a voucher or receipt of payment. The vouchers are perfect receipts of all payments made by check.

Over-drawing Care must always be exercised not to overdraw in checks the amount of one's deposit in the bank. When this is done one suffers the humiliation of having the bank refuse to honor the check, and the person infringing is open to the criticism of being unbusiness-like at least, and there is usually a small extra charge to pay.

Counter-manding Should one desire to countermand the order of payment on a check after it is issued the payment can usually be prevented by notifying the bank in sufficient time.

Stubs Stubs are the inner margin of a check book, from which the checks are detached as used. Upon either these or the inserted pages of the pocket check book data should be recorded concerning the check which is detached. Space is given for noting the data, number of the check, amount, the name of the person to whom it is made payable and that for which it is given. These facts serve as guides in proving the vouchers when returned from the bank. Properly kept, the stubs indicate at a glance the amount still remaining in the bank.

Valuable Aid to the Housewife

From the preceding facts it will be seen that the bank may be made as valuable aid to the housewife in conducting her business as for anyone else who has exchanges to effect. By means of checks money may

DATE, 1905		DEPOSITS:		
		BALANCE BROT. FORWARD,	86	40
March	1	Salary	20	00
"	5	From A. L. C.	5	00
"	8	Salary	20	00
		TOTAL DEPOSITS,	131	40
		DEDUCT CHECKS DRAWN, NOS. 32–35	33	59
		BALANCE FORWARD,	97	81

NO. 32 PAY TO Gas Light Co.		6	20
DATE March 2nd 1905 FOR Feb. (Fuel 420 Lt 200			
NO. 33 PAY TO Orra L. Hutchins		10	90
DATE " 3rd 1905 FOR Meat			
NO. 34 PAY TO Jones & Stratton		12	49
DATE March 3rd 1905 FOR Groceries			
NO. 35 PAY TO Cash		5	00
DATE March 6th 1905 FOR Maid			
TOTAL,		33	59

THE TWO SIDES OF AN INTERLEAVED POCKET CHECK BOOK, FOUR CHECKS TO A LEAF.

be more easily and safely transferred than in any other way, since they can be enclosed in letters, if necessary, and they avoid the danger of mistakes in "making change," or of loss of money. Since they may be made payable to a stated person only, if lost they are of little value to the finder. Even if lost after indorsement, the payment may be withheld by notifying the bank.

Vouchers as Receipts

A check eventually becomes all the receipt necessary in paying bills, thus saving any further trouble of receipted bills. If checks are used entirely in payments, the vouchers constitute a comparatively complete household account in themselves, but this is rarely feasible, as employees find checks an inconvenient form of payment, since they are often not identified so that they can get them cashed; besides, checks are quite unknown to them, so that they are slow in appreciating them as money equivalent, and their hours are such as not to conform well with banking hours.

The pass book is important as a record of the depositor's standing at the bank. That this record may be kept accurately, it is necessary to present the book with each deposit. The depositor is never at liberty to make entries in it herself; that can only be done by the receiving teller. The pass book should be presented when called for and should be balanced as often as once a month if a considerable business is done through the bank; even if the pass book is lost, the money may still be drawn out at will.

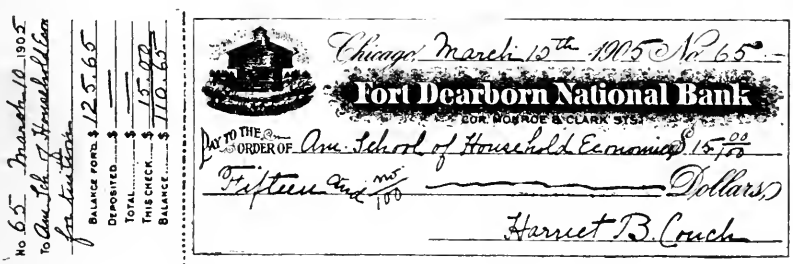
Comparing Vouchers with Stubs

Returned vouchers should always be compared carefully with their stubs. Should there be any discrepancy between the balance as given by the bank and that shown in the check book, one should determine whether this corresponds exactly with the amounts of any checks issued, but not returned.

Neither check nor pass book need affect in any way the household account book, except as they are made to be valuable aids. They form a very convenient department of the cash drawer, the cash in hand and cash balance in the bank together making up the sum total on hand.

Bank Account Book-keeping

In some cases if a bank account is properly kept it may serve as a fairly complete system of book-


No 65 March 10 1905
To Am Sch of Household Econ
for tuition
Balance Ford $ 125.65
Deposited $ —
Total $ —
This check $ 15.00
Balance $ 110.65

Chicago, March 12th 1905 No 65
Fort Dearborn National Bank
Cor. Monroe & Clark Sts.
Pay to the order of Am. School of Household Economics $ 15 00/100
Fifteen and no/100 Dollars
Harriet B. Couch

A CHECK WITH STUB ATTACHED.

keeping in itself. In such a system it is necessary to deposit *all* money received, making careful record on the blank sheets of the check book of the date, amount, source, etc. Then all bills possible should be paid by check. The vouchers are a receipt in themselves. These returned checks, with the receipted bills, filed in an ordinary 25-cent bill file, give a safeguard against paying the same bill twice. All bills should, of course, be checked up before being paid. The stubs of the check book show for what the money was spent—so much for groceries, so much for the butcher, for gas, milk, rent, dress goods, etc. When cash is necessary, as in paying employees or small incidentals, this can be drawn from the bank, or in some cases obtained from an obliging tradesman, who will exchange cash for checks. Memorandum should be made on the stub as to how the cash drawn is expended, or, much better, a petty cash account can be kept in a book or on cards. At stated periods a summary may be made from the stubs and from the receipted bills as to how the money has been expended.

Better than None

This system is not to be recommended for those who should look after the pennies carefully. The incidentals will be found to foot up to a surprising amount and it is always better to pay cash for groceries, meat, etc. However, such a system is better than none, and as it is practically automatic, it can be followed throughout the year with very little effort. The poorest system, kept accurately from year to year, is better than the most perfect system kept only intermittently.

Financially Organized Family

In a family which is properly organized financially there is a definite idea as to how the income shall be divided. A certain proportion is allowed for rent, food, saving, etc., as already indicated. Then each member of the family should have a personal allowance, to include definite expenses, of which a personal account is kept. As soon as a child is old enough to trust with 5 or 10 cents of its own he should be given such allowance regularly and taught how to spend as well as to keep account of expenditure. Only by experience can one learn how to spend wisely.

HOUSEHOLD MANAGEMENT

PART I

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. Leave space between answers. Read the lesson paper a number of times before answering the questions. *Answer fully.*

1. What do you understand by the terms *production* and *consumption* in economics?
2. Compare their relative importance in Home Economics at the present time.
3. What is true economy?
4. What do you consider valid reasons for maintaining individual homes?
5. (a) What do you understand by the term Standard of Life?

   (b) How are you conscious of such a guide in your own life? Have you been conscious of your standard changing from time to time?
6. What value do you see in a Division of Income along some such lines as are indicated in the text?
7. Comment upon the examples of both Typical and Ideal Budgets in the light of your own experience.

8. What do you consider a desirable division of a salary of $1,500 a year, the family, occupation and location to be chosen as you please? Indicate clearly and fully both conditions and divisions.

9. Estimate as nearly as possible the division of the income in your own household and criticise.

10. Why are household accounts essential?

11. How many housekeepers of your acquaintance keep careful household accounts? Do you discover any indications of greater success because of it when compared with those who do not?

12. What system of account keeping do you find most usable? Give details.

13. Explain "Balancing an Account."

14. What is meant by "Indorsing a check?" Illustrate and explain value.

15. (a) What are stubs? How valuable? (b) What are vouchers?

16. In what lines of expenditure does there seem to be especial lack of thrift at the present time? Suggest causes and corrections.

17. What do you consider the chief cause of the increased distaste for housekeeping among women and of the tendency to give up individual homes in favor of apartments? How do you regard the change?

18. To what extent have any subjects which you studied during your school life been directly and practically helpful to you in your home-making experience?
19. Is there any additional training or subject which it seems to you might be profitably added to the curricula of our schools or colleges for young women?
20. Have you gained any new or helpful suggestions for the more successful management of your home as a result of this study? If so, what?
21. What additional suggestions can you make on any of the topics taken up in this paper as a result of your experience or study?
22. Ask two or more questions on the subjects considered in this lesson.

Note. After completing the test sign your full name.

MY SYMPHONY

TO live content with small means ¶ to seek elegance rather than luxury, and refinement rather than fashion ¶ to be worthy not respectable ¶ to be wealthy, not rich ¶ to study hard, think quietly, talk gently, act frankly ¶ to listen to the stars and birds, babes and sages, with open heart ¶ to bear all cheerfully ¶ to do all bravely, await occasions, hurry never ¶ in a word, to let the spiritual unbidden and unconscious, grow up through the common ¶ this is to be my symphony.

William Ellery Channing

HOUSEHOLD MANAGEMENT

PART II

ORGANIZATION AND DIVISION OF LABOR

Order

Few things in life are more pathetic than a household in which no organization exists, no systematic direction of activities, no appreciation of Heaven's first law, order. The haphazard, aimless living in such homes leaves an unmistakable stamp upon the inmates. Without knowing it, the housewife in such a home suffers infinitely more friction, loss of time, strength and money than it would cost her to keep her housekeeping better in hand.

**What
Who
When**

To have sufficient system and organization so that one knows (1) what is to be done, (2) who is to do it, and (3) when is it to be done, is to have the chief requisites for the successful working out of ideals, coupled with ease and comfort of mind. Applying this knowledge each day, one may utilize whatever time is at her disposal for other enjoyments, conscious that she is not thereby neglecting what should ever constitute her first duty—the care of her home and family. It makes little difference whether it be the mother of several boys with limited means at her command or the woman who can afford to hire several helpers; there is keen pleasure and satisfaction for all in work so carefully divided that each has the gratification of knowing the importance of his portion and feels a commendable pride in his own contribution toward the whole. This gratification may be made as real for the helpers as for the one for whom the work is performed. The joy of definite duties carefully related to the whole, in contrast with the lifeless routine of ill-defined, meaningless details, appeals to the one as truly as to the other.

Requisites Each thoughtful housekeeper finds her own best methods of accomplishing this organization. Some general suggestions as to necessary equipments may be an aid. Certain things are absolutely essential for success, such as the following:

Brain Power *Brain Power* with *Mental Alertness* and *Activity*. Method is impossible to one unwilling to contribute these.

Knowledge A *Knowledge* as to how to perform the details of housework in a superior manner. Unless one understands what is necessary in the preparation of a certain dish, or the length of time it ought to require to clean a room properly, it is quite impossible to direct it so that the requisite amount of time and strength shall be expended upon it, and no more.

Health *Health* plays no small part. Much failure has poor physical conditions at the foundation. No truer criticism has been made of American women in general than that of a leader in the study of home problems, when she affirms that too many are content to be "just able to be about." Home is the place where suffering resulting from this low standard is certain to be most keenly felt. Without excellent physical vitality, the cares of a house must, perforce, seem mountain-high. The exuberance of spirits of one full of life and energy is transmitted like an electric current to all who come in contact with it, and inspiration, each for his task, is the inevitable result. Very unfortunately, the reverse is equally true. Failure to possess the cheerfulness and optimism born of perfect health creates conditions well suited to spread a contagion of a very depressing nature. Inability on the part of a leader to do his share is soon followed by a lessening of interest on the part of the helpers. A dropping off of punctual and hearty performance of duties results.

Self-Control

Self-control is another necessity. Ability to think coolly and calmly, even under pressure, and to plan carefully and intelligently at all times, goes a long way in directing others. This characteristic is too often thought to be entirely a matter of temperament, beyond individual control. It is a great mistake. Individuals do differ in a marked degree, it is true, in the natural possession of it; nevertheless with good normal conditions of health, especially of "nerves," that bane of woman's existence, this virtue is as possible of attainment as any other and well worth a struggle to secure.

Sympathy

A large *Sympathy*, which appreciates the difficulties encountered in doing the work, proves a priceless aid to the successful superintendent.

Forethought *Forethought* is an important requisite. One must have in mind a broad survey of the work to be accomplished. The outline of at least a week at a time should be clearly defined to oneself, each day being assigned its special work in addition to a regular routine preserved from week to week. In this scheme all work such as washing, ironing, sweeping, cleaning and the like will find a place, if these are all done in the home. **Routine** The routine should not be infringed upon, unless extraordinary emergencies arise. A system broken is hard to restore, and something is sure to be crowded out, if postponed. Each day's work should be so planned that the menu will be given to the cook, if one is employed, at least the day before, and marketing will be attended to, so as to secure early and prompt delivery next morning. A careful mental, or **Written Notes** better, *written* note should be made of all details liable to escape notice at the proper time. This avoids a confusion in the morning of being needed in several places at once, while the machinery will not be at a standstill, waiting to be set in motion again. It avoids waste of time at a very valuable part of the day. The early hours count for much in starting the work so that tiring haste and over-pressure may be prevented later. If helpers know, when they arise, what the day's work is to include, they can plan to far greater advantage, saving time and strength. Written orders are a great help here.

Adaptability of means to ends is a thing that the would-be organizer may well study in successful business men. A business man's office is so arranged that it is to the highest degree labor and time-saving. It is compact, orderly, simple, with nothing unnecessary filling space. Every thing is at hand and adapted to make his work swift and easy. The successful workman's tools are good in quality, in perfect order, and so arranged that every motion counts. He knows that it is economy to have them so. How many of our kitchens would stand the test satisfactorily in these particulars? Most kitchens, pantries and laundries are so arranged that there is a prodigal waste of time and strength in passing from one thing to another. One should see to it that the cooking table is not on the side of the kitchen opposite the pantry of supplies or cooking utensils, and both as far as possible from the stove. A little trouble and perhaps no expense will often better conditions. **Adaptability**

It would seem far more ideal a condition than has yet been reached were it possible to give certain fixed standards for the division of the work of a house so that helpers going from one to another would find practically the same duties expected of them. To attempt such outline, would be too hazardous to undertake. Were housewives who employ, asked to define the duties of "second girl," "nursery maid," or even of laundress or cook, hardly two would be found to agree, so individual has been the assignment according to the particular needs of each household. One ex- **Division of Labor** pects assistance in one line of work, another in another. In one house the housewife rarely appears, gives no assistance and maintains the most formal relations with those employed. In another she prefers to direct minutely and to assist in the performance of portions of the work, attempting at the same time to make her helpers feel a home-like enjoyment of what she is able to provide them. Such diversity renders it impossible to arrive at any general plan or division for each helper which shall be adapted to meet the needs of all who employ.

Diversity of Requirement

Even in homes where several are employed something of the same irregularity is found. A "second girl" at one place is expected to look after the doorbell, wait on table and do nursery work. Perhaps with her first change of place she is asked to assist the cook by preparing vegetables and does laundry work.

Study the Only Solution

The best guide at present is a patient, thoughtful study of the problems of one's own house until as equitable and consistent division is attained as can be made, meanwhile praying for speedy release from a condition so unsystematic and chaotic as that of the present time, and resolutely setting one's face toward the ultimate solution of some, at least, of the difficulties through better adaptation of household management to the demands of the age.

The Right to Servants

A woman has no right to a servant until she knows the value of time and strength in relation to the work to be done. She cannot understand her servant's problems until she understands a servant's duties.

DOMESTIC SERVICE

Chaotic Conditions

Even the most fortunate housekeeper recognizes in the present situation of domestic service a state of affairs sadly chaotic, perplexing and deplorable. Merely to cry out against it is futile and would be but adding to an already long list of complaints. The following pages are intended rather as an indicator of some indisputable facts, to be recognized and dealt with by would-be successful employers.

Changes

Domestic service in the United States has passed through great changes in the last fifty years. Conditions, in some respects, were never like those in any other country. Until within a few years in New England and the Northwest whatever assistance was needed in performing the work of the household beyond that rendered by the members of the family was secured by employing a neighbor's wife or daughter, who shared in all particulars the interests and privileges of the family in which she was employed. She was recognized in every way as an equal, sitting at the family table, sharing the common sitting room, often marrying into the family. While this continues to be true to a slight extent in rural districts to-day, there has been, generally speaking, an entire change, the present being a period of transition and reconstruction. The two factors which have had the greatest influence upon the domestic situation are immigration and the changes in the industrial system.

Influence of Immigration

The influence of immigration upon domestic service has been more or less similar to its influence upon occupations for men. As the unskilled labor of the ignorant immigrant has entered into competition with the labor of the more skilled and intelligent native workers the native employes have progressed, pushing up and out into lines of work which have been deemed higher, more lucrative, pleasanter. This has happened in domestic service until very few native Americans can be secured for housework at the present time.

Rural Supply

Rural districts have suffered a surprising falling off in supply due to this change, as the immigrants tend to congregate in the large cities, especially those who come to us from the countries of the principal supply of domestics—Ireland, Germany, Sweden, Canada and Newfoundland—and the country girl has learned to seek the city also.

Industrial Changes

Manufacturing industries have a large influence in determining the number of women engaged in domestic service in any city or community, as they seem to prove more attractive than housework at the present time. Whenever there is competition with other kinds of employment housework is inevitably the lesser attraction. It is done, if at all, only when there is no other alternative; a last resort rather than a choice. It is not surprising, in the light of these facts, that the kind of service rendered by those who are engaged in it is not as satisfactory as it should be and that the standards in the service are very low, with little apparent spirit of emulation or progress. Let us consider the leading elements in the problem from the point of view of both employer and employee, seeking to ascertain the real and alleged causes of this marked preference on the part of employees, and if there are any remedies which may be applied to the immediate relief of the situation.

Advantages of Domestic Service

If we turn to consider, first, the advantages of domestic service over other forms of labor open to women of the class thus employed, there are several decidedly advantageous conditions peculiar to the work. The conditions for preserving good health are superior to those in almost any other occupation. The work is normal, with greater variety, better provision of light and pure air and more consideration in case of temporary illness. Steady employment is afforded in work for the most part congenial to those who have any understanding of it. In spite of much said to the contrary concerning irregularity of hours, there is less rigid confinement than in most occupations.

Home Life

It affords more home life than other kinds of work, although this is in the home of the employer and is not considered as home life by the employee. The degree in which the employee is allowed or made to feel this differs greatly, as all know, with employers and, to a certain extent, the number of employees. That there is far less difficulty where there are many employees is shown in the fact that the majority of state institutions have no difficulty in obtaining help of all kinds. Even insane asylums, where the work is very hard, can actually make a choice of applicants for housework instead of having to seek for them. Even under the worst circumstances a certain sense of protection and comfort is offered in connection with the work, and at its best the comforts and positive luxuries which surround the maids far exceeds those they could have in their own homes.

Disadvantages

In spite of these important advantages, the work is most universally unpopular. All are familiar with the reasons offered for this. Irregularity of hours is a point frequently urged. It is true that the hours of labor are so loosely defined in most households that employees have little sense of having completed the work of the day. This is true to some extent in well-regulated households on account of the nature of the work. Lack of system and care in this respect too often unduly increases the irregularity and makes what might be a reasonable amount of work unreasonably heavy.

Loneliness

It is also true that the employee, although nominally in the family, is in no sense a part of it. This is a position infinitely lonelier than to be outside it altogether. Very few employes feel free to receive or entertain personal friends in a manner natural or pleasant to them, nor are they expected to do so. Attempts to secure personal improvement or pleasure are perhaps ridiculed. This is probably not intentional on the part of the employer, but seems to be the result of failure to appreciate the needs of the employees or to provide suitably for meeting them.

Promotion

Opportunities for promotion and advancement, which play a very important part in stimulating to effort in other employments, are almost wholly lacking in the present methods of conducting domestic service. The most that can be hoped for through a change is an easier place, a slight increase in wages, a pleasanter employer or some trival gain. The work is so ungraded that the unskilled, inefficient worker receives practically the same wages as the skilled and capable.

Wages

Disparity in wages is sometimes offered as a reason for the choice of other work, but this is readily proved to be invalid. A comparison with the pay in any other form of employment would be favorable for the wages of the domestic employee at the present time. Wages differ greatly in different sections, yet they bear sufficiently close relation to other expenses so that general comparisons may be made. Miss Salmon in her admirable work on Domestic Service makes the comparison between the average wages received by the domestic employee and the school teacher. In this she clearly shows that, considering the fewer demands made upon the domestic employee in maintaining her position in contrast with those made upon a teacher, and also the many aids and comforts which are not easily measured in full money values, such as board, lodging, laundry and the like, the average wages of the domestic employee is higher by a generous margin.

The average salary of women teachers is $545 a year; $260 must be deducted for board and lodging and $25 for laundry. There is left $260 with which she must meet such necessary expenses as clothing, traveling, social obligations and working capital, as books, etc. If one considers in addition, as is certainly legitimate, the necessary outlay for training in the one case, in contrast with the low requirements in the other, it becomes very apparent that one must look elsewhere for an explanation of the great popularity of the one form of service and the unpopularity of the other.

Social Stigma

There remains a final objection, which is in reality first in importance and which has more to do with keeping desirable helpers from choosing this kind of employment than any other. It is the reason invariably given first by those who express their feeling frankly and unreservedly. This is the social disadvantage experienced by those who engage in such service. This stigma is subtle, but very real in its resultant evils. It takes its rise in the false attitude of many employers toward housework, and the utterly false idea of what equality in this free American country really means by those whose limitations of ignorance or opportunity have led them to take a wrong view of the entire matter.

Employer's Standpoint

When we turn to the employer's point of view there is much to be said considering the unsatisfactory situation. Taking the present-day employee into the home is attempting to introduce into the life there one who is of different nationality and who has little in common with the other members of the family from any point of view. Inheritance, former environment and experiences could hardly be more unlike in the majority of cases. There can be little expectation of accomplishing or even approximating perfect assimilation.

Irresponsibility

As there is no opportunity, in the majority of households, to rise in this employment, the desire for change or betterment finds lively expression and diversion through new places. As a result the employer is put to her wit's end to cope with this tendency, and is often exasperated, and rightly, by her neighbor, who resorts to illegitimate means of influence by overpaying, and who ignores the fact that she is thereby only multiplying the difficulties. Much selfishness is revealed in the methods employed by harassed employers, who are often placed in so hard a position that it becomes a supreme test of character to decide what to do to secure and keep the needed help. The majority of employees are astonishingly oblivious to real present opportunities, so eagerly do they grasp after vague advantages through change. As a result, the average length of service in one place is less than one and a half years in cities, and in towns where the desire to go to the cities is strong it is still shorter.

Ignorance

The ignorance of the average employee of the present time is profound and very exasperating, the more difficult to cope with because of the assumed intelligence in most cases. The perplexities and trials of being forced to employ untrained helpers for work which requires skilled labor can hardly be exaggerated. That more of this crudeness is to be found in this line of work than in any other is indisputable. It is accounted for partly in the present failure to show appreciation of good work or to properly reward it. This is one of the greatest menaces to satisfactory service.

Summary These, then, are the objections to household service: It provides no real social life; it takes the worker from her own home and places her where, however comfortable she may be, she is an alien, often losing caste among her friends, hence having no social place; it offers no incentive to rise, no spur to ambition, except that of personal pride or desire to please, and this, if not lacking in the first place, may cease, because there is no real competition.

Also, it should be stated that all places are not comfortable; a cold, cheerless, illy furnished room cannot seem a rest or refuge after a hard day's work. Work over a hot stove, however neatly done, certainly does seem to demand for the person engaged in it proper hot water bathing facilities.

Time Off Fresh air is an essential to happy, healthy living. One afternoon weekly cannot enable the maid to store away sufficient fresh air to keep her through the following six days.

Simply from the selfish standpoint, that of getting the best work from the machine, reasonable forethought should be given, not only for the comfort, but for the personal freedom of the employee. This means that if the best work is expected from the worker an endeavor should be made to keep her in the best physical condition for that work. When the prescribed work is finished it is normal for anyone to desire to get out and away from the place in which she has been working. If a maid's sitting room were or could be a part of every house there would not be the temptation to seek the street or a friend's kitchen for rest and recreation. This sitting room is often an entire impossibility; it is frequently considered in that light because it entails a sacrifice of space or some expense. There is far too frequently an utter disregard of the actual condition of what may be termed the rolling stock of this business. It is economy to keep the machine well oiled, well repaired and well housed.

Pleasant Surroundings

Pleasant surroundings do much to lighten labor and make it attractive, whatever kind of work it may be. This fact large manufacturers and merchants have recognized and utilized to their great advantage. The housekeeper may learn the same lesson, and a maids' sitting room may become the rule rather than the exception.

Standards of Work

Reasonable forethought entails a recognition of the fact that as there are now few standards of work or methods of doing it, so that the new cook or maid, no matter how well recommended or even equipped, has no idea of how you desire your work done or how you wish it systematized. Proper and sufficient directions should be given and proper care that they should not be presented in a confused manner all at once.

Written Directions

Perhaps they can be given best in writing, a typewritten sheet placed in the kitchen or some suitable place and used for reference. To this can be attached the special direction for the following day each night or afternoon, and the chances are this plan will aid very materially in the smooth running of the machinery of the household. Such a plan need not be in too great detail, unless the maid be very untrained.

Daily Outlines

Miss Parloa suggests such a daily outline in her work on *Home Economics*, as follows:

1. Make the fires, air the dining room and hall.

2. Prepare the breakfast and set the table.

3. Put the bedrooms to air while the family is at breakfast.

4. Remove the breakfast dishes; put away the food. Sort the dishes and put to soak all dishes and utensils that have had food in them which is liable to stick.

5. Put dining room and sitting room in order, airing them well.

6. Wash dishes, put kitchen and pantries in order. Prepare dishes that require slow cooking and put them to cook.

7. Make beds and put sleeping rooms and bathroom in order.

8. Trim lamps.

9. Dust halls and stairs; sweep piazzas.

This plan is for a maid of all work, and naturally would be varied in many households, but indicates the idea. The more definite the work can be made, the better.

Personal Freedom

Personal freedom for the maid means about what it does for the mistress; freedom to choose and have her own friends, to have them call and visit with her; to receive them without unnecessary and seemingly impertinent interruption or surveillance; freedom to come and go within reasonable limits without asking permission or giving explanation each time. In short, it is an application of the Golden Rule, and means such treatment as will insure the respect, if not the liking, of employee for the employer. This may seem revolutionary, actually impossible to many, and probably is where there is a succession of unknown, untried, unreferenced maids passing through the kitchen every four to six weeks. This plan, however, has been tried with success in many places.

A Case in Point

In a small city in Northern New York, where the majority of people are in the maelstrom of the domestic situation, there is a family that secures help readily and whose maids remain with them until a proper reason, such as marrying, causes a change. The employer in this case considers that she employs the maids to do the work, not simply to be in the house. When the work is finished the maids are at liberty. If two are in the house, one is expected to be ready to answer the bell; if one only is employed, there never has been trouble or even necessity of making any rule about this mooted point. This housekeeper has argued that in general she would prefer to answer her own door bell and have the real work cheerfully, faithfully and well done, and that to get out of doors undoubtedly would be better for maid and work than staying in would be. This mistress has provided her maids with suitable reading matter for their leisure time, and shows that she is interested in the outside life of the girls without unduly interfering with it. In consequence she has good service, the maids are well and happy, and so is she, for friction is almost unknown in the running machinery of that home. Perhaps this should be noted, that in general the mistress does not have to answer the door bell, and many little thoughtful services are performed for her not nominated in the bond.

Reorganization of the Home

The real question is not the reason for the dearth of good household workers, but what suggestions may be made to assist the housewife in this trying situation.

In its ultimate effects the domestic situation of to-day will probably bring about a reorganization of the home. This is to be hoped and desired, if that reorganization means raising the work of the home to its proper position as a recognized business affair, whose director is required to have a knowledge and skill somewhat commensurate with the issues at stake, the interests involved. It is absolutely necessary that the director of the home should know and be trained for her business if she is to demand and obtain skill and training in those she directs. The recognition of this need is the first great step toward reform.

The second is the acknowledgment of the fact that in general the housekeeping of to-day is run on an antiquated plan, one not even fulfilling the needs of an earlier generation and entirely inadequate to cope with the tendencies of to-day. The plan has to be changed. No progress will be made if women spend their time in bewailing the present condition only; we must put our wits to work to better it.

Suggestions

These, then, are suggestions: First, that there should be more universal effort made, particularly in communities where clubs discuss these things, to secure certain just standards of work to be done for a certain just wage. The work of each household should not vary between unknown limits and the wages still be the same in each.

Establish Standards

Co-operation in establishing standards of work is much needed. Why should the cook who prepares three elaborate meals daily for a family of six adults, who often entertain, be paid the same wages as the cook next door, who prepares simple meals for three people who live most quietly and rarely have a guest? Workers in factories and stores at least are governed by the same number of hours. Just as the life, numbers and demands of different families vary, so does the work vary. A standard of wage cannot be established without a corresponding standard of work.

Work by the Hour

Secondly, that housekeepers should bring themselves to a willingness to adopt the hour plan, the worker coming in, and work being done and paid for by the hour according to kind or skill involved in accomplishing it.

The immediate objections to this plan are, first, its expense, and then the seeming strain upon the housekeeper, who must either piece out or piece together this patchwork scheme. Then arises the question: "Where shall we get the workers?" for in many places this is a problem.

Expense of the Hour Plan

As to expense, in only a few cases has it been compared, hence there is a lack of sufficient data. In general it may be computed in this way: Take first into account the wages of the maid or maids, add board and what may be called room rent, including light, etc., used. One family living in the West has carefully kept account of the expenses with and without a maid and have concluded that in general a maid of all work costs $5 a week above her wages. This is higher than Mrs. Abel's estimates, which were based on the actual experience of a family of seven.

An Actual Experience

The family lived in a small town in New York, and consisted of five men and boys and two women. These estimates are the comparison of two successive summers. In both cases the laundry was done outside, hence has no place in the comparison.

First Summer.

Wages of maid per week	$3.00
Board per week	2.50
Rent of bedroom	.50
	$6.00

The exact amount of room rent could be known, as the house was too small for the maid and a room was rented outside for her.

Second Summer.

(Work done by the hour.)

Dishwashing, two and a half hours for six days (fifteen hours)	$1.50
Cleaning (15 hours)	1.50
Dinner service, three hours for six days (eighteen hours)	1.80
Sunday dinners at hotel, seven, at 25 cents (less estimated cost of food material)	.88
	$5.68

From these and other data it might be determined that in general a maid costs her wages; that is, if paid $5.00 a week, the conditions are such that the probable cost for her board and lodging is $5.00 also; if paid $3.00, it cost another like amount for her "keep."

In Chicago so many of the very good apartment houses are constructed without accommodation for maids that the hour plan is popular. The general concensus of opinion is that the hour plan is less, not more, expensive, and has advantages not reckoned in dollars and cents. By those who have tried it the advantages of the hour system are stated to be that the work is in general better and more rapidly done; there is not such waste of material, and that the freedom from the responsibility and presence of an actual

In Apartments

alien in the house, especially in an apartment, is incalculable.

Where to Obtain Workers

The question of where to get these workers remains to be solved. That is a very individual one, belonging to the conditions of each city or town. As club women take this up, bureaus such as the Household Aids Company of Boston will be established, and even now from guilds and industrial unions, often from bureaus of charity, such workers are easily obtainable.

One young woman in Brooklyn, after desperate times with incompetent help, advertised for a married woman with children who could leave her home for a certain number of hours a day. She obtained a refined woman in reduced circumstances, untrained for any definite work, whose experience made her of the greatest assistance. She goes to the house for a stated number of hours each day to care for the babies, while the mother performs her social duties. This mother does her own cooking, having the dishwashing done by the hour. The expense is lessened, her home is charming, she feels she is leaving the children in safe, "grammatical," understanding hands, and she has leisure for profit and pleasure, for the higher life, which she says she never had in the old plan, even with a smaller family.

Natural Progress

We must realize that natural, industrial progress has taken one by one from the home the occupations formerly carried on there, until housekeeping no longer means the making of many things, but the proper expending of money for things already made.

We should not resist this tendency, but recognize and fit into it.

Sanctity of the Home

It must be remembered that the sanctity of the home is not preserved by the industries carried on there. To preserve one home at the expense of several others is neither economic nor ethical. When clubwomen talk about the sanctity of the home they should ask the question, "Whose home?"

Mrs. Mary Hinman Abel, who is a close student and a wise observer of economic conditions as they affect the home, says that the solution of present troubles must come in part from reducing the kinds of work done in the home. This is along the line of industrial progress as well as that of the least resistance in this case.

The laundry is disappearing from the house, following soap and candle making. True, there are many more poor laundries than good ones, but that there are good ones, and that these have been run with a profit, proves there can and should be more.

Establishment of Laundries

The establishment of laundries is one step, and a perfectly possible one. A well-educated Southern woman, after taking a course in household science at a Northern institution, started a laundry in a Northern city. The work was entirely done by hand and a fair price charged for it. She supervised the work and employed competent people to do it. It paid well in every sense for both owner and patrons. When circumstances forced her to lay aside the work her customers were as homeless people; they had no other place to go. What one woman has done other women can do, and it should be emphasized that this woman was well born, delicately brought up, educated and a Southerner, with the inevitable shrinking from labor outside that such a bringing up entails. She says that her patrons became her friends, that work she took up with shrinking became really delightful, simply because it was well done.

Good Employment Agencies

Another step is the establishment of more properly run employment agencies. Too many cases are known of employment agencies that encourage their maids to change often, to the end that they may gain additional fees. Employment agencies where references are required and looked up, where the maid is actually investigated and known as well as the housekeeper, where honesty is considered not only the best but the only policy are not castles in Spain. They can be established, supported and run by women and women's clubs.

The Future

Whatever solution the future may hold, employers are beginning to realize that it is not through greater individual indulgences, more equality or higher wages that the problems are to be solved. Employees do not ask to be admitted to the family circle. Self-respecting helpers would not feel comfortable were this provision made, nor is it a practical way of removing the difficulty. What they desire as a class is, rather, the opportunity of independence which other forms of employment afford and which is missed in this—a chance to perform their work and, apart from that, to live their own lives in their own way.

Definite Hours

However desirable any opening or advantage, the spirit of liberty demands that it be *chosen* rather than forced upon one. What domestic service is really claiming for itself is some adjustment whereby definite hours shall be secured, and, outside that, free choice of amusement, personal improvement, friendships—*life.*

Industrial Basis

This, when secured, will prove one of the most reasonable and satisfactory aids to the solution of difficulties of both employers and employees. The final adjustment to the same basis as all other industrial and business activities will be a work of time, no doubt, but it seems to be the inevitable goal.

Dignity of Labor

As employers and the world at large gain and keep in mind a truer conception of the importance of household employment in the economic world there will follow better practical results. As long as employers express scorn of these duties little can be hoped for in the way of "dignifying labor" in the home. The efficiency of the housework cannot be expected to rise above that of the mistress as manager. There is deep significance in the words of one who wrote: "To know the workman one must have been a workman himself, and, above all, *remember it.*" The housekeeper must know the household affairs and *respect* them if she would have others do the same.

There are some experiments being carried on at the present time that all should follow with interest. These go far to prove that the preceding statements are not without foundation. Notable among these is

Household Aid Society

the attempt which has been made in Boston to create an attractive home center for helpers, from which they go each day for a definite number of hours for employment in various homes which desire their services. The helpers are classified and graded, as already suggested, according to efficiency, the wages paid corresponding to the degree of skill attained. There is adequate stimulus to advancement, as instruction is given at the home center. The home life is natural and congenial, every attempt being made to enhance the wholesome pleasure to be derived from such a place. The rapidly increasing popularity of the experiment shows that no mistake has been made in the diagnosis of the employee's point of view. For the employer there is the difficulty of arranging the work to fit such a plan so that the desirable work shall be secured at a price not exceeding the expense of resident help. This is a difficult thing to do, a thing not yet accomplished, but which the ingenuity of woman will yet solve. Without doubt it will mean the simplifying of life in some homes, but if this is wisely arranged it will be a gain rather than a loss.

BUYING SUPPLIES

Women, as a usual thing, spend such small sums of money at a time in their purchases for the house, that they are apt to lose sight of the size of the total amount expended in a year. Not realizing the value of the aggregate it follows that they hesitate and study returns far more carefully and intelligently in investing one hundred dollars in any other way than in placing the same amount in household supplies. Those who realize the importance of economic buying follow current prices and buy when the market offers the best inducements. The difference in time expended in exercising this care is not as great as is fancied. Watchfulness and interest count chiefly. There are times of legitimate annual or clearance sales when real bargains may be secured. These should be watched for and taken advantage of in buying yearly supplies of things which may be safely stored. If the articles to be purchased are such as suffer from the competition of "style" one is especially enabled, with a slight sacrifice of style to quality, to reap a rich harvest at the expense of the foolish of the world who must have the very latest fad at whatever cost. The extremes of fashion are folly economically, in that they make it impossible to realize nearly the value of money expended.

Relative Importance

Legitimate Bargains

There is only a small range of supplies in which there is a marked style. Individual preference controls

Buying in Quantity

in the selection of most, so that when one has determined upon the most desirable brand, variety, etc., there are left but three things which must be weighed in deciding the amount to be bought. These are (1) room for storage, (2) ready money for the purchase, and (3) the perishable nature of the article. The economy of buying in quantity must, necessarily, depend to a large extent upon these points. When these can be satisfactorily met there is great advantage in buying in quantity. Thereby one has the advantage of wholesale prices or great reduction over retail prices on quantities not too large for a moderate-sized family to dispose of within desirable limits of time.

Small Quantities

The family that finds it necessary to buy its supply of coal by the fraction of a ton and flour by the pound, suffers great loss through the increased expense, paying often very nearly twice as much as the same grade would cost in larger quantity, and with no gain since these products gain in value rather than lose, by storage. Buying in small quantities at retail means paying a generous profit for grocer or messenger boy's wages in delivering the small amounts. Again, one suffers from having to look her supplies over frequently or has the annoyance of finding something missing when wanted.

Storage

The changed conditions of modern life from those of our grandmothers affect our habits in regard to storing supplies. Now that a large number of homes are rented, each room counting and swelling the monthly bill, it has naturally led to economy of space. The uncertainty of residence with some has its effect also, as the expense of moving is increased by quantity, and the danger of injury and breakage all have to be reckoned with. One great misfortune which results from these considerations is the inclination to turn to cheap grades which are more readily disposed of at such a time or cause less regret if injured. Thereby we are losing some of the refining influences of acquiring and possessing the best. This applies especially to furniture and utensils, which ought to be bought as though they were to last a lifetime.

Medium Purchases

There is a happy medium between the huge chests of linen in former time which held supplies not used for years, yellowing with age, and the modern tendency of hand-to-mouth provision, satisfying only the weekly demand. There should be always a small emergency store of linen. Additions can be too easily made to require that it be very large. In fact, since it may be added to, usually, any day, the principal gain is realized by being able to buy better at certain seasons, as in January, than others, and the same reduction in price by buying in quantity may be realized in this as in groceries. Dish toweling by the roll at 13½ cents instead of 15 cents a yard, sheeting by the web or piece at a similar reduction, etc., are illustrations of the benefits to be derived through such methods of buying. An especial reason for buying table linens in January, in addition to any attractive prices which may be found at that time, is that the fresh supply of goods is in then and one may so secure a better selection. For storing linens a special chest or linen closet is very desirable and should be included in planning a house, but when not provided, an ordinary closet may be used, drawers, a trunk or a home-constructed box, any of which answers every purpose if well cared for.

Storage Requirements

For storing groceries the requirements are a light, dry, cool room, as near the kitchen and pantries as possible. It should be supplied with lock and key, which the housekeeper or a trusted helper controls. Large quantities may so be put into it and smaller portions given out as needed for use. This is both an aid to economy (since the tendency is to use more liberally if there is a large amount at hand) and prevents such supplies as baking powder, tea, spices, etc., from losing in value through standing open. A year's supply is usually as large an amount as it is well to buy at a time. This is especially true of canned goods. These should be bought in the fall after the fresh supply is in market. By the dozen, or better yet, by the case of two dozen, canned goods may be secured at a reduction of from ten to twenty-five per cent. The same is true of the packages of cereals, although for small families cereals cannot be used rapidly enough to buy in large quantity. It will be found to be well worth while for those of limited space to attempt to make space somewhere for some storage room. With a large number of families that are not cramped for room it should be a matter of more consideration to utilize a portion for this purpose.

Ready Money

It is only the very poor who have an excuse for being too limited in ready money for such advance purchasing. It is but thrifty to see to it that there is at least a small capital which may be used for such advantage. When once started it is a simple matter, since after that the woman of forethought will look ahead and plan so that the funds will be at hand as the supply-time comes around.

Perishable Supplies

Of course there is no economy in buying at a reduction a supply which is so rapidly perishable in nature as to cause a loss of enough to off-set, or more, the gain through getting in large amount. This is but a waste of time and energy as well as money. Vegetables are much cheaper by the bushel or barrel, and fruit, as oranges, by the box, but one must have a cold storage room to insure the safe keeping of either for any length of time. Even then there must be care in looking them over frequently to remove any that are decayed. For most families, therefore, it proves more satisfactory to buy perishable articles as needed.

Quality

A great difficulty confronts the would-be-wise buyer to-day in the fact that it is hard to establish standards of quality without some sad experience. When the housewife manufactured her own soap she knew beyond a question what constituted an excellent article. Through handling different kinds of cloth, in weaving or sewing, standards were created in that direction. Ignorance of real value makes the thriving "bargain counters" possible with their "remnants" cut from the webs on the shelves and offered at a price equal or even in excess of that for which the same goods may be bought by the yard elsewhere in the same store. Shrewd, not over-scrupulous merchants are bound to take advantage where it is possible, and the ignorant, unsuspecting purchaser pays a dear price for his or her ignorance.

Remnants

Utensils

In buying *utensils* the maxim, "The best is the cheapest," is an excellent one to bear in mind. One who makes a trial of different grades has ample opportunity to prove its truth. Cheap goods often increases the expense 100 per cent, while at no time does one secure anything of the satisfaction in use that is secured in the better class goods. Cheapness means, perforce, haste or flaw in manufacture. This results, naturally, in ill-shaped, defective ware. Durability seems to be a thing no longer estimated, so little does it enter into account in manufacture or purchase. Nowhere is the difference more marked than in kitchen utensils. Spoons with soldered or riveted handles, ready to part company with the bowls on the first real test of strength or heat, are poor economy. The same is true of the enamel ware which crackles and chips off with the first accidental heating or "sticking on" of food, after which it is unfit for use. So one might enumerate many illustrations of false economy of this nature. It is the part of wisdom to pay a little more at the time and thus secure better wearing qualities and far greater satisfaction. The cheapest is rarely wise.

Medium Priced Articles

On the other hand, a medium-priced article in many things has real worth to recommend it to one practising close economy. In such purchases as bed or table linen and toweling, for example, the difference between a medium and high-priced grade may represent the difference between hand work and machine, between embroidered or hemstitched articles and plainer. Since this is not a question of durability, a purchaser has a legitimate right to weigh the differences in the light of her allowance and decide in favor of the plainer if it be wiser. It should, however, always be a decision based on an intelligent consideration of values. One should never be at a loss when detecting coarse, loosely woven and shoddy fabrics or other evidences of cheap work. Other differences she may be justified in weighing, never that.

Department and Specialty Stores

One may purchase most supplies either in a department store or in one devoted to a single or limited line of goods. There is, on the whole, a difference to be found both in quality and price of the stock in the two places. The grade of goods in the specialty store is usually better and the price somewhat higher. The department store has gained great popularity because of the convenience of purchasing everything in one place and because of competition in prices which seem at sight to favor trading there. The careful buyer will frequently find the difference in price more than equalized in the quality of the purchase. This is especially noticeable in kitchen furnishings. The sharpness of the competition has tended to lower prices in the specialty store as far as the quality of the wares will allow.

Classes of Supplies

Supplies may be classed as (1) furnishings or utensils which are subjected to wear and consequently must be replenished from time to time, as furniture, bedding, carpets, kitchen, laundry and dining-room furnishings; (2) such supplies as are consumed in one way or another and so must be replenished, as fuel, food, soap and the like, and (3) such miscellaneous supplies as daily newspapers, magazines, plants, flowers, etc.

"Must Haves" and "May Haves"

In buying these supplies one may divide them into essentials or *"must haves"* and accessories or *"may haves."* The first division one must secure at once. It is well to leave the second list to be remodeled after one has lived in a house for a while.

It is surprising to one who has some experience like camp life to find how few the absolute essentials really are. Many accessories have come to be looked upon as "must haves" through long use. The evidence of some utility in everything, together with refinement of taste in every selection, are the great essentials in giving a home the subtle charm and comfort which we covet. Furnishings need not be many in number nor elaborate in quality to satisfy these requirements. The greater the simplicity the more satisfactory, usually.

The following are lists of kitchen, laundry, dining-room and bed-room furnishings, with average prices. The amount of equipment required is determined by the size of the family and its demands. For two people of simple tastes the kitchen utensils may be quite limited and the dining-room furnishings few. The same things are required in bed-room fittings as for a large family, but not in such numbers. **Lists**

KITCHEN UTENSILS

Range	$30.00 and up
Coal hod	.75
Shovel, poker, lifter	.50
Towel rack	.25
Teakettle	1.25 up
3 Stew pans, 1 quart to 8 quarts	.75 to $3.50
Frying pan	.60 up
Double boiler	1.50 "
Broilers, fish, meat and toaster	.90
Frying basket	.20 to .35
Muffin pan	.50 up
Colander	.10 "
Coffee pot	1.25 "
Tea pot	.75 "
Chopping knife and bowl	.75
Meat chopper	1.00 up
Strainers	.10 "
Bread pans, 2 or more	.50
Bread board	.50
Meat board	.50
Rolling pin	.25 to 1.00
Flour sieve	.10 " .25
Scoops for flour, sugar, meal, etc	.10 " .50
Pans or basins, 2 or more	.30 up
Bowls, about five in assorted sizes	.75 "
Dishpans	.10 "
Drainer	.10 "
Dish cloths	.25
Floor and stove brushes	
Broom	.50
Dustpan	.25
Meat and bread knives	.75 up
Case knives and forks	.90
Vegetable knives	.20
Dripping pan	1.00
Egg beaters 2, Surprise and Dover	.50

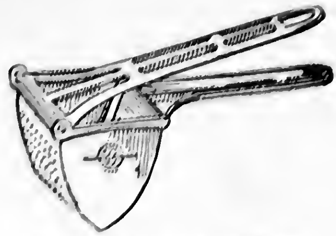
KITCHEN UTENSILS (Continued)

Graters	.35
Measuring cups	.25
Lemon squeezer	.10
Plates, granite	.40
Skewers	.25
Spoons	1.00 to 3.00
Bread box	.75 up
Hand basin for sink	.30
Funnel	.10
Vegetable or pudding dishes, 2 or more	.50 up
Potato masher	.25 "
Garbage pail	.75 "
Refrigerator	15.00
Receptacles for flour, sugar, cereals, spices, condiments, molasses, etc.	
Chairs, stool, table.	

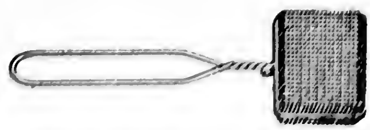
Prices The utensils on above list may be considered "must haves." The prices of the various things vary within quite wide limits, as will be seen. The housekeeper should know enough of the materials composing utensils to guide her in the choice of material and price. This she cannot know without some knowledge of the action of the ordinary acids and alkalis used in cooking and cleaning operations on tin, iron, porcelain, agate, etc. To the list first given may be added many other things, many of which would be "must haves" in some kitchens.

Estimate A fair estimate for fitting a kitchen with utensils given is from \$35.00 to \$40.00, including refrigerator, but not including range. \$100.00 is not too large a sum to apportion to proper kitchen fittings if the range be included, and it is desired to begin with enough good utensils to make the work easy.

Salt Box.



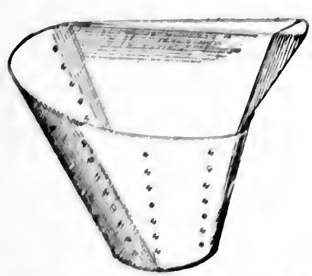
Potato and Vegetable Press



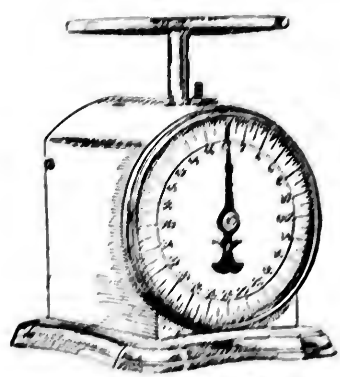
Soap Savers, to utilize scraps

Meat Chopper

Slaw Cutter, knife adjustable to cut fine or coarse.



Sink Strainer; keeps garbage from clogging sink and pipes.



Household Scales

SOME "MAY HAVES" IN KITCHEN UTENSILS.

LAUNDRY EQUIPMENT

Tubs, 1 or 2	$3.00
soapstone	7.00 or $8.00 each
Washboard	.25 to .50
Wringer	2.75 " 4.50
Boiler	1.75 " 3.00
Pails, 2 or more, "Fibrotta"	.50
Baskets, 1 or 2	1.25 to 2.50
Dipper	.15
Soap dishes	.15
Clothes stick	.10
Clothes line and reel for same	.50 to 1.10
Clothes pins, 1 gross	.25 up
Skirt board	1.25 "
Bosom "	.25
Whisk	.10
Sad-irons, 3 at least	.60
Iron stand or asbestos mat	.15
Holders	.20
Clothes horse	.75
Small vegetable or nail brush	.10
Scrubbing brush	.15
Ironing sheet	.30
Blanket or felt	1.00 up
Watering pot	.15 "
Average Estimate $18.00	

ADDITIONAL UTENSILS FOR SEPARATE LAUNDRY

Stove	$8.00 to $25.00
Coal hod	.25 " .75
Shovel, poker lifter	.25
Basins, 2	.50
Saucepan or kettle for starch	.50
Strainer	.10
Pans or tub for starch	.30
Earthen bowls, 3 or more	.30
Wooden or agate spoons, 2	.30
Table or laundry settle	2.00 to 6.75
Case knife	.15
Broom or floor brush	.50 " 2.00
Small brush	.50
Dustpan	.25
Scrub brushes, 2	.30
Chair	.70
Total Estimate, liberal $40.00	
" " fair 4.00 to $5.00	

LAUNDRY SUPPLIES

Soap, { soft, hard, and sand.	
Borax	.07 per lb.
Washing soda	.03 "
Chloride of lime	.10 "
Alum	.07 "
Paraffin or Spermaceti	.15 "
Beeswax (pure)	.35 "
Gum Arabic	.50 "
French ball blue or ultramarine	.25 "
Ammonia (pure)	.25 per qt.
Alcohol	.40 "
Kerosine	.09 to .15 per gal.
Hydrochloric acid	.10 " oz.
Acetic acid	.10 " "
Oxalic acid (crystals)	.05 " "
Starch	.10 " pkg.

Salt
Sandpaper
Bags for boards, line and pins
Bags for small articles in boiler
Bags for lace curtains
Cloths for covers
" " scrubbing
Clock
Sewing materials
Buttons
Pins and cushion
Scissors
Twine
Newspapers
Thin paper
Old sheets and flannel

DINING ROOM FURNISHING

Rug 9 x 12 ft	$10.00 to	$100.00 up
Shades	.90 per window.	
Table	6.00 to	$50.00 up.
Chairs, common	1.75 "	10.00 "
arm, high	3.00 "	15.00 "
Sideboard	15.00 "	50.00 "
Serving table	4.00 "	30.00 "
Table linen, 3 cloths		9.00 "
4 doz. napkins		10.00 "
2 carving cloths		2.00 "
Tableware (Dinner set, or its equivalent	12.00 to	40.00
stock pattern), semi-porcelain China	25.00 up	
Glassware	2.00 "	
Cutlery, knives, 1 doz. steel blades	3.50 to	8.00
Carving set	3.00 "	10.00
Silver-plated, quadruple		
knives per doz	3.50 "	6.00
forks " "	4.50 "	6.00
tablespoons " "	5.00 up	
dessertspoons " "	4.50 "	
teaspoons " "	3.00 "	
Silence cloth 4.6 x 8	1.00	

Average Estimate for small family, $75.00 to $150.00

BED ROOM FURNISHING

Matting	$10.00 up	
Rugs	5.00 "	
Shades and draperies (2 windows)	3.00 "	
Enameled bed with spring	8.00 "	
Mattress	5.00 to	$50.00
2 Pillows	5.00 up	
5 Sheets	2.00 "	
3 Pairs Pillow cases	.50 "	
4 Blankets	10.00 "	
2 Counterpanes	3.00 "	
Mattress cover	1.00 "	
Bureau	10 00 to	75.00
Washstand	4.00 "	25.00
Table	1.75 "	10.00
Rocker	2 00 up	
2 Chairs	3 00 "	
Couch	8.00 "	
Toilet set	3.00 "	
1 doz. Towels	.75 "	
4 Bath Towels	.50 "	
Average Estimate	$60.00 to $90.00	

KITCHEN FURNISHINGS

Floor Covering In selecting kitchen furnishings it will be found that a linoleum covering for the floor will give the greatest satisfaction, preferably one which is entirely plain or with a pattern which extends all the way through. Next to linoleum, a hardwood floor. An oilcloth is unsatisfactory, unless it be, perhaps, the best quality, for a small family which will not give it hard wear. A painted floor is hard to care for and is, in many respects, least desirable.

Stove In selecting a stove a steel range is by far the most desirable, if possible. It is more expensive in first cost than a cast-iron stove, but this difference is more than offset by efficiency, economy of fuel and durability.

Utensils Galvanized iron is the most desirable material for such utensils as coal hod, garbage and ash cans and the like, being superior because of its light weight, durability and cleanliness.

Materials

A nickeled teakettle with copper bottom is very satisfactory for general use, costing about $2.50. Aluminum ware is increasing in favor. Its price alone limits its use. The price of a teakettle is from $2.25 up, but the aluminum teakettle wears a lifetime. Stransky ware is, next to aluminum, the most durable of any for cooking utensils. It is moderate in price, the teakettles being $1.75 to $2.25. Tin is very undesirable for almost all cooking utensils, as water and acids act upon the tin, forming unhealthful chemical compounds. For such uses as are allowable, one should buy block tin with rolled edge. The grade is readily seen by markings on the back. The cheapest is marked X, medium XX, best XXX or XXXX. Those tins which have fewest crevices and seams are best.

Sheet-iron bread tins with dull surface are excellent.

Wooden Ware

Woodenware should be used as little as possible, as it is difficult to keep it sweet, dry and free from odors and insect life. Bread and meat boards and chopping trays are usually of wood. These should never be cheap in quality, as the wood of such is soft and not well seasoned, so that it cracks and peels easily. Wooden spoons should be those designated as the French holly.

Glass or porcelain jars are excellent for spices and such articles as rice, tapioca, coffee, tea, etc.

A MOVABLE KITCHEN CABINET, USEFUL WHEN THERE IS NO BUILT-IN CABINET.

These should be neatly labeled and conveniently arranged in order on shelves in a cupboard near the cooking table.

Iron Cooking Utensils

Iron for cooking utensils is almost a thing of the past. Although most durable, the weight is sufficient to banish it. Agate or Stransky have taken the place to a great extent. Agate ware has depreciated greatly in quality since first introduced. The best of it is more durable and safer than enamel ware. Sheet iron frying pans are best, as they endure the highest heat. Steel is next. Agate may be used for certain things.

Chairs

Chairs should be tested for comfort. Wooden ones, if properly constructed, may be very comfortable. The shape and length of back, seat and legs greatly affect the comfort. A high stool is a strength saver when working at the table.

Tables

Tables constructed for kitchen use are a great addition in modern furnishings. They are supplied with drawers for knives, spoons and such small utensils. Those of white wood are cheapest, pine being about 50 per cent more. The drawer increases the expense slightly, but this will not be grudgingly paid by one who has once enjoyed the advantage secured. The top should be unfinished, very smooth and even. It should be made of one piece of wood to avoid cracks. Oilcloth may be used as a covering, although less convenient because of the care necessary to avoid setting anything hot on it. Paint is altogether undesirable for the same reason.

In buying cotton and linen material for the various needs of the house, one must consider the use to be made of it and select accordingly. Towelling suitable for glass and silver is not suitable for cooking utensils, and vice versa. If cast off garments, old bed linen and the like are thriftily cherished and preserved, much expense is saved and frequently better cloths secured than in using new. For scrubbing purposes a soft cloth that will not scratch is desirable, at the same time it must have a certain firmness and roughness for the friction necessary. One of the best materials for general purposes of this kind is the woven underwear. Outing flannel and "mill ends" are also excellent.

For drying, cloth with good absorbing quality is necessary. Cotton is undesirable, especially if new and not worn until softened. Linen is best for the purpose and is easiest to care for. It gives off less lint than cotton. Cheap qualities are less well prepared and scratch.

For dish towels, a medium light weight linen towelling is best, a still heavier for the china dishes, while a firm, heavy crash, like the Royal Russian, is serviceable for cooking utensils. The latter is also excellent for kitchen hand towels.

For washing dishes the small mops are excellent for glassware and are preferred by many for the entire dish washing. They are inexpensive and are not difficult to keep sweet with proper care. Cheesecloth is very satisfactory for silver and glass.

Cheesecloth should be kept on hand for various purposes, as wiping meat, drying lettuce when washed, tying up fish to boil, straining soups and jellies, dust cloths and many other uses. It is easily cleansed, is soft and readily absorbent when old and is free from lint. For drying windows and lamps cheesecloth is excellent, or old napkins rough dried. Old cotton, as sheets and pillow cases, is fairly good.

Hand towels may be of crash, damask or huckaback. If the latter, the Scotch or Irish is the best. The choice of material depends upon individual preference of smooth or rough surface. The damask is soft, fine and smooth, the huckaback rougher. The Irish huckaback is woven with smooth dots for overthreads and is a fine grade. The Scotch is woven looser and is more showy. It is cheaper, but is good when washed. The damask toweling is a poor absorbent, because of its smooth, satiny surface. It is cheapest to buy huckaback by the yard and hemstitch it. Fringed towels should be avoided, as they are difficult to iron well and the fringe eventually wears off, leaving unsightly ends. If fringed at all it should be tied.

Turkish toweling of good quality is best for bath towels. Although cotton, it is so woven as to be readily absorbent.

Sheeting Sheeting was formerly woven in narrow widths only one yard wide, necessitating laborious seaming in the middle of a sheet. At the present time it is possible to secure sheeting woven for single, two-thirds or double beds, so that hems at top and bottom are the only needful sewing. Ready made sheets and pillow cases may also be bought in most places, less carefully made than home-made, but temptingly inexpensive, and conveniently ready for use. In providing in either way one should have the size of the bed carefully in mind and secure sheets and pillow cases ample in size.

Bleach Cotton suitable for this purpose comes bleached, half-bleached or unbleached. The unbleached is two or three cents per yard cheaper than the bleached, and is more durable, this being due to the fact of chemicals being used in the process of bleaching which affect the fibre. This is, however, not often selected on account of the color. The half-bleached is less objectionable.

Brands of Cotton Cloth There is considerable choice in the different brands of cotton. Among the best are the Wamsetta, Fruit of the Loom and Pequot.

Size of Sheets For a full sized double bed, one should buy the 10 quarters width of sheeting, for a two-thirds width bed 8 quarters, and for a cot or single bed 6 quarters. Pillow casing will vary to fit the size of the pillow, 5 quarters or 45 ins. being a large size and 42 ins. medium.

The price depends upon the brand and size. The best Wamsetta in the 10 quarters width is 40c per yard, 5 quarters width 18c, while cheaper grades may be had at 28c for the 10 quarters width and 12 1-2c for the 5 quarters. Price

Made sheets, entirely plain, in the best Wamsetta brand are about as follows:

90 in. x 99 in.	85c
72 in. x 99 in.	75c
Cheaper:	
90 in. x 99 in.	75c
72 in. x 99 in.	55c

The tubing for pillow slips, woven without seams, are about:

45 in.	14c
42 in.	13c
36 in.	12c
Made up	15c each, up

The unbleached may be secured of Pequot cotton in the made sheets, largest size, 55 cents each.

TABLE LINEN

Most of the material sold as table linen is imported. Its manufacture has been attempted in this country, but the temperature is unfavorable, so that the result is an inferior quality. Grades

There are three leading supplies—the Irish, Scotch and German, the Belgian, Austrian and French being included under the latter. The Irish is considered the best and is most expensive.

Bleaching The time of bleaching is a large factor in determining the value of the linen. Bleaching takes from the weight. The natural and best method is the grass bleaching in summer; next to that the snow. Artificial methods take from the strength of the fabric. It is difficult even for experts to detect the method. It is known by the times of coming into market. The grass bleached comes into the retail market about the middle of December, making this the desirable time to purchase.

Hints on Selecting A fine thread damask may not be a superior wearing fabric. The weight is the criterion. The best fabrics are not too fine, firm but not stiff and heavy with starch. Those with a more elastic, leathery appearance are better. Those patterns are less durable which have long unbroken threads.

German Damask The German damask has a closer, harder twisted thread than the others, making it a very durable linen. The Germans cater less to variety of pattern and therefore produce less showy cloths, but they are very durable and are also less expensive.

Patterns In selecting a pattern a medium-sized pattern, as the tulip is very satisfactory. It is a matter of taste to a great extent. Large patterns are more effective than small but the latter are good taste. Some patterns are so generally liked as to become stock patterns, as the snowdrop. These can be found in all stores. With-other patterns only a few are woven and these are distributed to a few stores or a few of each to each store. The Scotch have excellent patterns, are finished about as well as the Irish and cost less.

Size In buying one should, if possible, have the exact measurements of the table on which a cloth is to be used. An average length is 2 1-2 yards, 1-4 to 1-3 yard should be allowed to drop at each end if the table be square. Two dozen napkins should be allowed for each cloth.

Price Material may be purchased by the yard or in pattern lengths. The latter are 50-75 cents per yard more. The German linen runs from 50 cents to $1.50 per yards. The Scotch in the bleached run from 50 cents to $2.00 or over per yard. The Irish even in unbleached begins at 75 cents or $1.00 per yard and may be $2.50 or $3.00. The latter are, of course, very beautiful goods, but for common use and durability a good quality may be secured for $1.00-$2.00 per yard.

Napkins Napkins vary in size from 5-8, as they are termed at the store (17-22 in.) known as breakfast size, to 3-4 (23-27 in.) and 7-8 (29-31 in.), the latter being very large.

There is less difference in the price of napkins in the different makes. In either the 20 in. napkins vary in price from $1.75 per dozen up. Good ones are $3.00-$3.50 per dozen.

Silence Cloth A heavy cloth, known as the silence cloth, is an essential accompaniment to a well appointed table. This may be of felt, or two faced cotton flannel or may be a quilted or knitted cloth on purpose.

Canton flannel, 54 inches wide, 50c yard; quilted, 54 inches wide, 62 1-2c yard; knitted, 62 inches wide, 75c yard give relative prices.

CARPETS AND RUGS

A square of carpet with a border of hard wood brought to a high polish, or even a painted border or denim or some similar material is preferable to a carpet covering the entire floor and tacked down. Besides the greater attractiveness it is much more cleanly, as this can be taken out of doors for frequent beating.

Grades Of the different grades *Ingrain* is the cheapest. It is loosely woven, and although its wearing qualities are surprising considering the price, it is not the wisest choice for those who may choose. The dirt goes through it easily. Pleasing colors are difficult to secure as these carpets are colored with chemical dyes which are less soft and pleasing in effect than the vegetable dyes, which are used in the best grades. Ingrain carpeting is more suitable and serviceable for chambers than for living rooms. It is reversible.

Tapestry comes next in value, resembling Brussels on the right side but having a canvas back with colors on one side only. This wears fairly well.

Brussels carpeting is heavy, with colors on both sides. It wears excellently well and generally proves best for ordinary use. The Brussels carpeting has an uncut pile Cut pile carpets are called velvet carpets, as the Axminster and Wilton. The Wilton wear admirably well, and are very satisfactory in colors and patterns.

Suggestion for Buying

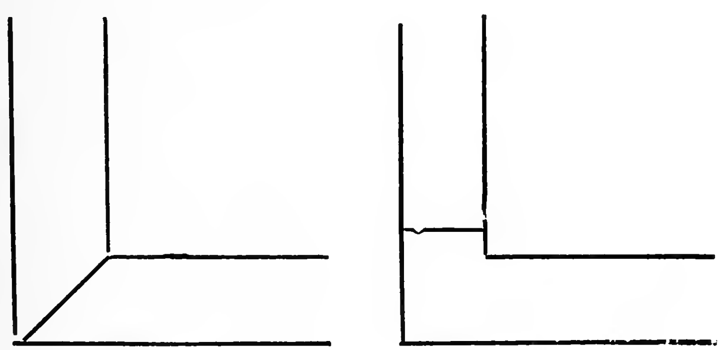
In buying by the yard the Ingrains are usually a yard wide, while Tapestry, Brussels and Velvets are but 3-4 of a yard. In practicing strict economy much may be saved by buying short lengths, small patterns or old styles.

Patterns and Color

Small patterns, sober colors and indefinite designs are more artistic, cheaper and more serviceable than the opposite. One should endeavor to secure a generally pleasing effect in a carpet so that the room for which it is designed will be made attractive without one's being especially conscious through what means the effect is produced. A carpet with striking pattern and color which arrests and holds attention is not pleasing.

Rugs

Rugs or squares should not have borders seamed at the corners. The joining should rather be directly across, thus:



Re-made Carpets A good old carpet can be utilized very satisfactorily by being re-woven by some of the reliable firms which have taken up the business. Even carpeting of different kinds may be used together in this way, if they are all-wool. A difference in color does not matter as the material is recolored as desired.

Kensington Squares Ingrain or Kensington squares, as they are often called, are more expensive when real and imported than the American squares. The price is by the yard. The usual size of 6 or 7 1-2x9 feet (2 or 2 1-2x3 yards) costs $4.00 or $4.75 up. By the square yard for carpeting a floor the Ingrain is 70-75c per yard.

Smyrnas Smyrna rugs are alike on both sides and are very serviceable. They cost $20 for a rug, 9x12 feet (9′x12′), $8.00-$9.00 for a rug, 2x3 feet (2′x3′).

Wilton's are most nearly like the Oriental rugs, and are better than some cheap Persian rugs.

Persians Persians, 6′x9′ cost $30.00 up indefinitely; Wiltons, 6′x9′ cost $22.00 up; 9′x16′ cost $36.00 up.

The prices given are not exact for all times and places, of course, but may serve as an indication of relative costs.

HOUSEHOLD MANAGEMENT

PART II

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. Leave space between answers. Read the lesson paper a number of times before answering the questions. *Answer fully.*

1. What is the value of system in house work?
2. Outline in detail a system for the household with which you are most familiar.
3. Judging from your own experience, how long should it take to perform the daily tasks of house work, such as dusting the living room, washing the dinner dishes, sweeping a bed room, etc?
4. If you have employed servants, have you met with satisfactory results?
5. If so, what do you regard as the causes of your success?
6. Have you made any observations in general, of aid in the study of domestic service problems?
7. Do you know of any efforts among women to correct the situation, either as steps toward solution, or study of the situation?
8. What is your attitude toward non-resident labor in the home?

9. Taking into account fuel, supplies, and your own time and labor, what can you say of the relative cost and results of laundry work done in and outside the house?
10. What constitutes a legitimate bargain?
11. What elements aid the flourishing "bargain" counters of our stores?
12. What has been your experience in buying as to "the best is the cheapest?"
13. Give a list of what you regard as ten real and profitable conveniences in kitchen furnishing.
14. Give a similar list of uneconomical articles, because rarely used or not as useful as supposed when purchased.
15. What kinds of linen are there?
16. What are the advantages and disadvantages of rugs? Of carpets?
17. Add any suggestions arising from the study of this section.

Note —After completing the test, sign your full name.

HOUSEHOLD MANAGEMENT

PART III

MARKETING

Buying

A practical knowledge of marketing on the part of the housewife affects to a marked degree both the comfort and expense-book of the family. Intelligence and skill in buying are only secured by careful practice. The purchaser must not fear to ask questions. Most men with whom she will have to deal will be found to be patient, helpful, painstaking and reliable, yet she must make sure by sufficient trials that the cuts of meat, etc., recommended are, all things considered, those that are best adapted to meet the needs of her family.

Regular Customers

It is usually greatly to one's advantage to select a regular place for marketing. Greater consideration is shown such customers and better satisfaction results. Time is saved, and usually it proves to be quite as economical, often more so. Disappointments are less liable to occur than in buying more generally.

Use of Telephone

The fact of buying regularly at the same place should not, however, lead to the erroneous idea that a telephone may be substituted for frequent visits to the market. This is a mistake which is increasing rapidly in America. Orders given in this way, by note, or to the driver at the door are liable to be less satisfactory than those which are given at the store where selection can be made by the purchaser. The telephone may be resorted to occasionally in emergencies, but should not take the place of regular visits. The greater satisfaction to be secured through personal selection, the greater variety secured by seeing otherwise unthought-of articles and the closer economy possible more than offset the additional time consumed.

Reasonable Time

More than a single day's order may be given at a time. All orders needing prompt filling, as meats and vegetables, should be given in ample season, usually the day before, so that there may be sufficient time to fill the order without discomfort to those who serve. This is only reasonable consideration for others, besides securing for one's self the avoidance of disappointments which are very apt to occur when too limited time is allowed in filling the order. It is evidence of an inexcusable lack of foresight when a housewife plans so little beyond the immediate need as to leave the ordering of roast beef for a twelve-o'clock dinner until 10 o'clock of the morning it is desired.

Supply of Meats

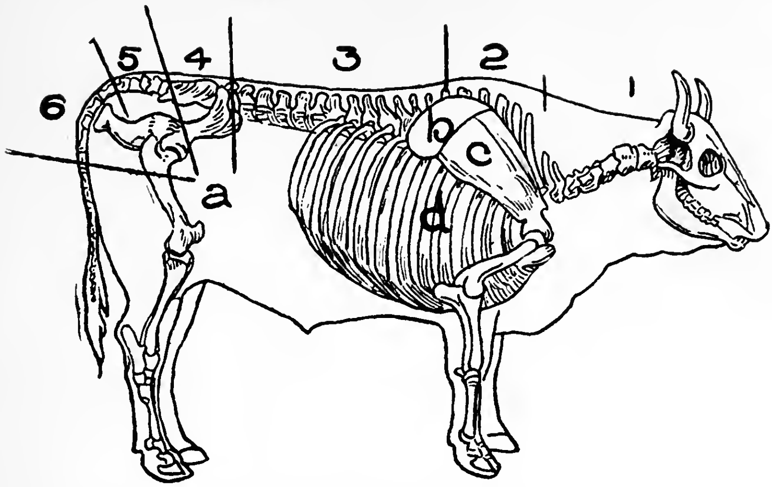
Meats are, perhaps, the most difficult to understand and to buy to advantage. A few years ago the supply of meats was practically all local, but at the present time only veal and lamb are supplied locally in places of any considerable size. The supply of beef and pork for the United States is almost wholly from the West, Chicago being the chief center, especially for the wholesale beef trade. Some of the objections raised by those who oppose the consumption of meat because of supposed unwholesome and unsanitary conditions of killing, storing and transporting, are practically without foundation at the present time. Conditions have been greatly improved within the last few years and great sanitary precautions are exercised. The large houses of Chicago are rendered thoroughly sanitary and are carefully inspected by United States officers who also inspect every animal killed, and tag the meat for shipping. Each quarter is numbered, the car in which it is shipped is also numbered and a record made of the meat sent. In this way any complaints can be readily traced. The transportation is now done by the use of refrigerator cars.

BEEF

The quality of beef depends upon several conditions. **Quality** The age of the animal when killed, the breed, the manner of fattening, the amount of exercise and the length of time the beef is allowed to cure before using, all effect the quality of the meat to a marked degree. The "prime" age of an animal for killing is 4 years, but the beef of a creature from 4 to 8 years of age is good. Beyond that age meat is apt to be tough and unsatisfactory. Although grass-fed animals are healthier than stall-fed, the latter is customary, or, at least, a combination of the two. Exercise toughens the muscles but if moderate, is considered desirable in rendering an animal healthier and the meat finer flavored. Beef has the finest flavor and is most tender when kept as long as possible before using. Three weeks is usually the shortest time allowed for this curing when conditions of storage are such as to permit.

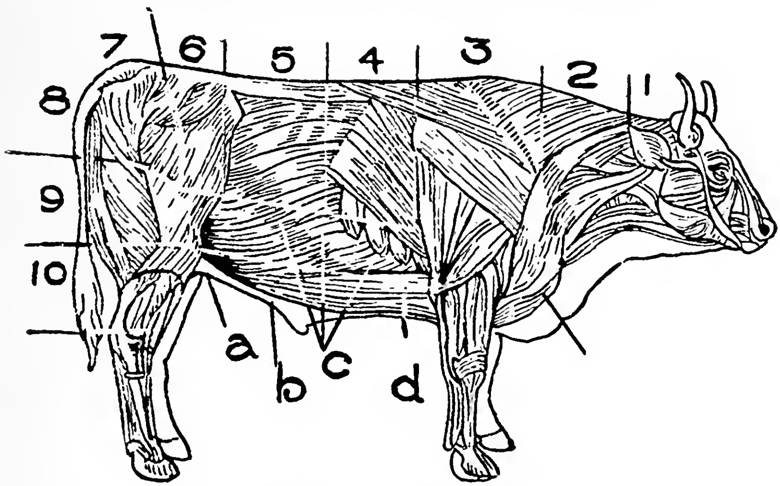
Texture and Color Meat should be selected which is firm and fine-grained. The color should be bright red, the fat yellowish white. The flesh and fat of old beef is darker, dry and coarser. Beef becomes dark through standing exposed to the air. One should distinguish carefully between a mere surface discoloration which may be trimmed off and the rest of the cut found to be entirely fresh and suitable to use, and the decomposition which gives a taint to the entire piece.

Position of Bones In buying, economy demands in general, that the amount of bone in a cut should be small in proportion to the amount of meat. In order to buy wisely and successfully it is necessary to have in mind a clear idea of the anatomy of the animal, also the muscle-fibre arrangement. These are seen in the beef in the illustrations. The vertebrae making up the backbone differ sufficiently so that with study one may recognize the different ones in the cuts of meat. The backbone is split in dividing the body into halves so that but one-half will be found in a joint of meat. Study the illustrations carefully.



SKELETON OF BEEF.

1, Neck; *2*, Six Chuck Ribs; *3*, Seven Prime Ribs and Loin; *4*, Thick or Hip Sirloin; *5a*, Top of Rump; *6a*, Aitch Bone or Rump Piece; *b*, Cartilage; *c*, Shoulder Blade; *d*, Cross Ribs.

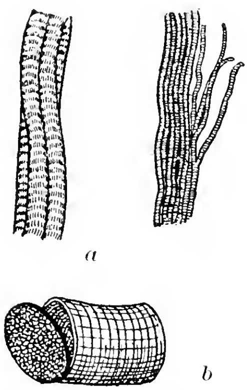


MUSCLE ARRANGEMENT OF BEEF.

1, Head; *2*, Neck; *3*, Chuck Ribs and Shoulder Blade; *4*, Seven Prime Ribs; *5*, Loin; *6*, Thick Sirloin, called Boneless Sirloin in Chicago, Back of Rump in Boston; *7-8*, Rump Piece in New York; *8*, Aitch Bone; *9*, Round; *10*, Leg; *a*, Top of Sirloin; *b*, Flank; *c*, Plate; *d*, Brisket. (Redrawn from *Home Economics* by Miria Parloa.)

Arrangement of Muscles

A knowledge of the muscle fibres and their arrangements is as important in buying, cooking and carving meat as familiarity with the location of the bones. The lean of meat is made up of muscular tissue. This consists of prism-shaped bundles, divisible under the microscope into minute tubes or muscle fibres. These fibres are held together in bundles by connective tissue which is readily distinguished by holding up a loosely connected piece of meat and noting the thin, filmy membrane. When meat is cut "across the grain" these bundles of fibres are severed and the ends appear. The membrane forming the walls of these tubes is very delicate and elastic.



a

b

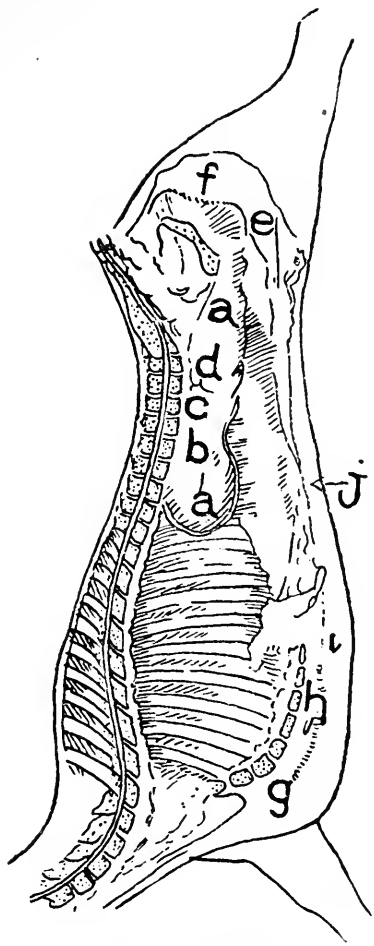
Fibres of Meat.

Carving

Carving has a great effect upon the apparent toughness of the cut of meat. In the accompanying illustration, *a* shows the muscular bundle, a fibre partially separated into its minute tubes, while *b* shows the fibre cut across the grain as it should be in carving. In this way the fibres are broken into smaller pieces as an aid to digestion and the contents of the tubes are set free, thus being more accessible for the digestive juices than when the meat is carved lengthwise of the fibres.

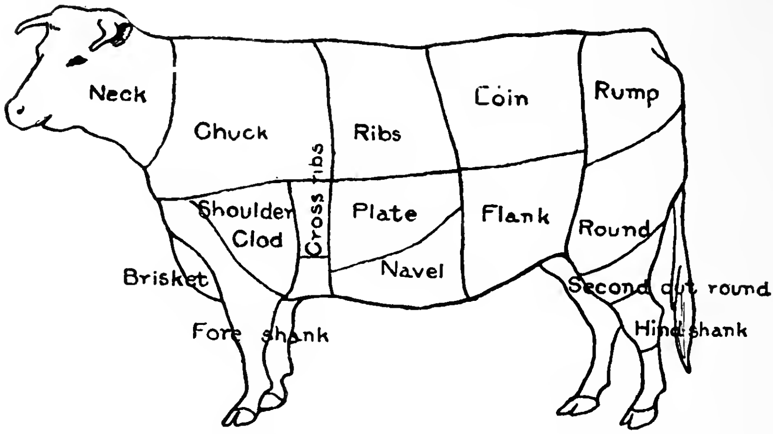
Cutting Up

In cutting up a beef the body is first cut through the backbone laying it open in "sides" or halves. Each half is then divided into quarters, called the fore quarter and the hind quarter, as will be seen in the illustration. The muscle fibres run very irregularly in the fore quarter. This, together with the fact that they are coarser and have on the whole more exercise than those of the hind quarter to toughen them, renders the meat of the fore quarter of a less desirable, cheaper grade. The finest cuts of an animal come from the middle of the creature, in the most protected, least exercised parts, decreasing in value as they lie toward either extremity.



SIDE OF BEEF.
aa, Suet; *b*, Thin End of Tenderloin; *ad*, Thick End of Tenderloin; *e*, Inside or Top of Round; *f*, Best Part of Round; *g*, Sternum; *h*, Thick Brisket; *i*, Thin Brisket; *j*, Flank.

Cuts differ somewhat in different cities. According to the Boston cut, for instance, three ribs are left on the hind quarter, ten on the fore quarter. In New York all the ribs are cut on the fore quarter. Beef is best from a creature weighing 800 to 900 pounds.



CUTS OF BEEF ACCORDING TO THE U. S. DEPARTMENT OF AGRICULTURE.

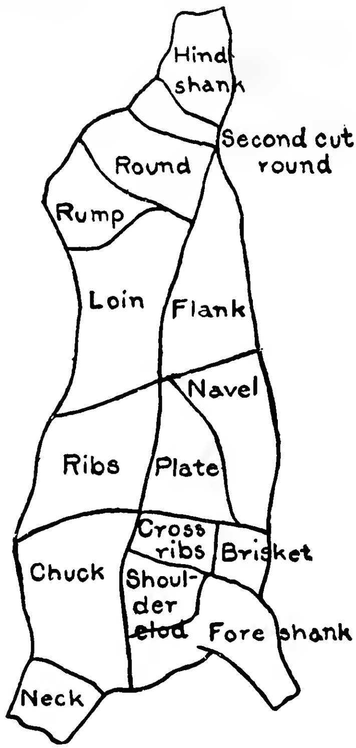
Fore Quarter

Weight An average fore quarter weighs about 200 pounds. It is divided into:

1. Neck.
2. Chuck.
3. Ribs.
4. Sticking piece.
5. End of ribs. } Sometimes called together
6. Brisket. } Rattleran.
7. Shin or shank.

The fore quarter as a whole being coarser is used chiefly for canned meat, stews, soup meat and corned beef. The *neck* is best used for mince meat. Prices on all meats differ too widely to make it possible to state with accuracy for all places, but that we may be guided somewhat by price in estimating values, average prices will be given. For this cut 8 cents a pound is an average price.

The Neck



SIDE OF BEEF, U. S. DEPT AGRICULTURE.

The Chuck

The *Chuck* lies just behind the neck, including the first five ribs. This cut may be used in a variety of ways, as cheap steak, roast, pot roast or stew. Several of the cheaper cuts indicated as possible roasts or steak cuts were formerly used much more commonly than now for such purposes. As our country has grown more prosperous there has been a great increase in the demand for the better cuts until many markets are forced to buy extra loins, etc., to meet the demand. A very fair small one rib roast may be cut from this portion. The chuck sells for about 12 1-2 cents a pound.

The Ribs

The *Ribs* are used chiefly for roasts and constitute the best of the fore quarter. The portion lying nearest the hind quarter is very nearly the same in quality. There is a decided preference in the rib roasts. The

First Cut of the Ribs

"first cut of the ribs," as it is called contains the first two or three ribs from the hind quarter, differing according to the size of roast desired. Cut long, that is with the thin end pieces left on, such a roast brings as high as 17 to 23 cents a pound, while "cut short," that is with the thin rib ends removed, it sells in some places as high as 20 to 30 cents a pound. Following this cut are the second and third cuts, the third joining the first cut of the chuck. These are not as high in quality or price, 15 to 18 cents a pound. The second cut is a very good roast.

Sticking Piece

The *Sticking Piece* is a cut between the neck and brisket, so called from the custom of bleeding there after killing. Although the fibre is coarse and tough in this piece it is an excellent piece when properly used. It is especially fine for beef tea, since for that, one should select as juicy a piece as possible. From the method of bleeding much blood collects in this piece and it is particularly juicy. It may be used for stews also where long, slow cooking renders the muscle fibre tender and sets free a portion of the rich juices.

End of the Ribs

The *End of the Ribs* is often called the plate piece or rattleran. Although this portion has a liberal supply of bones they are thin, and generous allowance is made for that fact in the price. It is an especially desirable piece for corned beef if it is to be pressed and served cold, as it has a good supply of fat blended with the lean and hardens to cut well.

The Brisket

The *Brisket* is much preferred for corned beef by some. It is a more solidly lean piece on the whole, thus carving better when hot. It is to a large extent a matter of choice as regards the amount of fat desired. There is a difference recognized at markets between the thick end of the brisket, called "fancy brisket," and the thinner end, the former being considered superior. The brisket corned brings as high as 15 cents a pound where there is good demand, while the rib piece is not over 8 cents, sometimes as low as 6 cents.

The Shin

The *Shin* is used for soup meat. It is divided into three pieces, more meat being found on the upper piece. Many make a great mistake in throwing away the smallest, most bony part supposing it to be valueless, which is far from true. It is rich in gelatin and those properties which are desired in soup stock. The shin usually sells for not over 5 cents a pound.

The Hind Quarter

Cuts

While there is a great variety in the possible cuts of the hind quarter they may be classed in general as follows:

1. Loin.
2. Rump.
3. Round.
4. Shin.
5. Flank.

Sirloin

The location of these sections will be seen by consulting page 135. The entire loin is frequently called the "sirloin." The choicest steaks and roasts are cut from this part. The first two slices from the end where the loin joins the ribs are called the first cuts of the sirloin. These are not as tender or desirable as those which follow. After these are removed, the tenderloin begins to appear which lies on the under or inside of the loin and being so protected is very tender. The slices which include the largest portions of tenderloin are considered the best and bring the highest price. Some of these slices when trimmed bring as high as 35 or 40 cents a pound.

Tenderloin

It would seem that the tenderloin is greatly overrated in some instances, since, except for the fact of its being especially tender, it is not more desirable. It is not as rich in juices or flavor as the rest of the loin. The entire tenderloin is used for what is known as a "fillet." When removed and sold separately for this purpose it costs as high as 60 cents to $1.00 a pound since the remainder of the loin is rendered thereby far less salable. On the other hand, for one who wishes a delicious roast at moderate expense this loin with the tenderloin removed is very desirable.

Fillet

In buying for a fillet roast it is far the wisest plan to buy the entire loin or section necessary to give the size desired, at 35 cents a pound, have the tenderloin removed for the fillet roast and the rest reserved for other uses, as steaks or later roasts. The thinner end of the tenderloin which extends into the rump is cheaper, about 35 cents a pound. Some cheaper fillets are sometimes to be found in the markets but are not desirable, as they are from inferior beef.

The *Rump* lies back of the loin. As a whole it weighs about 52 pounds. It is divided into three sections, known as back, middle cut and face. This portion is sometimes called hip or thick sirloin. It may be used for steaks or roasts, while some of the less desirable parts are used for pot roasts, braising, etc. The part nearest the loin is termed the back; it is the best part for all uses except for steaks. Next to that, the middle, the face having more muscle. **The Rump**

A cut from the rump which is excellent for a variety of uses in the Aitch bone. It is satisfactory for a cheap roast, braising and the like. It weighs about six pounds usually and may be bought for 7 to 12 cents a pound. There is not enough bone included to offset the difference between this price and the 25 cents a pound which portions of the rump may bring, as the middle cut. The face makes a good piece for corning. **Aitch Bone**

The *Round* is divided into top and bottom, so called because of the way in which the leg is laid upon the block to be cut up. The outside, being laid down, is called the bottom round, while the inside, being on the top as it is laid down is called the top round. The difference in quality to be found between the two divisions is what would be expected from the rule stated earlier concerning the greater toughness of the **The Round** more exposed and exercised parts of the animal. The bottom of the round being nearest the skin is the tougher and cheaper meat. The top round is used for a very fair quality of steak. The bottom round is better for braising, stews, etc. A vein divides the two sections so that it is easy to separate them. The top may bring 22 to 25 cents a pound, while the poorest parts may be secured for 12 1-2 cents.

Shin and Flank The *Shank or Shin* is used as that of the fore quarter, for soup. The *Flank* is usually corned, selling for 7 to 10 cents a pound. It is a thin piece and has a good mixture of fat.

Summary of Cuts of Beef

Passing over the various cuts of beef in review, then, we may consider the cuts most desirable for the different methods of cooking which we employ in the order of their desirability, regardless of cost.

Small Roasts The selection of a roast of meat for a small family is the most difficult, since the larger the roast the better. Nothing smaller than a two-rib roast is very satisfactory to attempt to roast. Unless one is willing to roast less thoroughly the first day and reroast the second, or is willing to serve cold roast, the selection is very much limited. For such a family a rump fillet or Aitch bone is, perhaps, most satisfactory. The finest larger roasts are to be obtained from the first three cuts of the sirloin, and next to these the first cut of the ribs. Following these are the second and third cuts of the ribs, the back of the rump and a chuck roast. A rib-roll is a roast prepared by removing the bones, rolling and tying. It is thus made easier to carve. If one has a roast prepared in this way, she should have the bones sent home to be used in the soup kettle.

Selection of Steaks

There is little to be said in addition concerning the selection of cuts for steak, since in general meat that is especially desirable for roasts is equally good for slicing for steaks. The best is especially desirable here, since there is less opportunity to practice skill in cooking, which in other modes of preparing may avail greatly to improve an otherwise undesirable piece. It is not as pleasing to the majority of people to have meat served as steak unless it be fairly tender and juicy. In the main it is more satisfactory to those who should economize closely to rely upon other cuts, buying an occasional good steak for variety and especial luxury.

Cheaper Cuts

While it is true that the better the piece of meat the better the result as a general thing, it is possible and desirable to save expense to some extent where it may be done without serious loss. The meat to be cut for Hamburg steak need not be of the best, since it is rendered more digestable by the mincing. The top of the round is quite good enough, while the bottom round or even the shoulder and flank are used, although less satisfactorily.

The top of the round, eighth to the thirteenth ribs, first cut of chuck, the cheaper of the rump cuts, the

Braising Cuts flank and leg may all be used for braising or pot roasts. By this method of cooking much is done to soften tough pieces, rendering them more digestible and acceptable, so that the cheaper cuts are made very palatable in the hands of a skillful cook.

Corned Beef The order of preference for corned beef might be, brisket, rump, piece from the chuck, plate, shoulder. Others would select the shoulder or chuck first for the reasons already mentioned. The flank is sometimes corned, but it is not considered a wise choice since it is not well protected by fat or bone as meat for corning should be to prevent the loss of the juices in the process of corning.

Cuts for Stews For stews it is desirable to extract some or all the juices from the meat. The meat is finely divided before cooking and the methods applied are those of slow, long cooking. The flank, leg and sticking piece are found to be very good for these purposes. Thus we find that all the animal may be used to good purpose in one or another of the ways indicated. The family that lives in the country and raises and provides its own supply finds it necessary to utilize all the parts. Those that depend on city markets are more ignorant of the different cuts and are as a result inclined to be much more extravagant, not having as wide experience in learning to prepare the cheaper cuts in an acceptable way.

Beef Heart *Beef Heart* is an economical and palatable meat. It is solid, and a good sized heart will serve fourteen people. There is nothing to be feared in having some left, as it is even better to serve cold for a breakfast or supper dish than when hot. The most satisfactory way of cooking is to boil it three or four hours, cool, clean of coagulated blood, stuff and bake slowly for three hours. It may be braised or stewed. It is one of the most inexpensive meats, costing not over 5 cents a pound usually.

Liver One should be very careful in using liver to determine that it is in a healthy condition, as it is an organ which is not infrequently diseased. It should be clear, smooth and without spots. Spots and streaks indicate a dangerous condition. Calf's liver is usually preferred as more tender and delicate, but the liver from good beef is cheaper and satisfactory. There is a great difference in it, some being hard and tough. Pig's is preferred by some. Calf's bring from 16 to 20 cents a pound, while beef's may be procured at from 8 to 10 cents.

Kidneys Kidneys are cooked by some, although not as extensively as the organs already mentioned. They may be stewed or braised. Care should be used in selecting, as in liver. Calf's are preferred, next lamb's, mutton and beef. Those weighing from one to two pounds may be bought for 8 cents each.

Tongue In selecting a tongue for cooking one should be chosen which is firm and thick, with plenty of fat, as the lean and flabby ones do not cook satisfactorily. Those of all animals are used, the beef more often, because of its size. They may be bought fresh, smoked or corned. Tongues weighing from four to six pounds may be bought at from 16 to 18 cents a pound.

Tripe Tripe is taken from the lining of the stomach of the animal. It is sold either simply cleaned or pickled. The honey-comb is the better. It is white and tender when taken from a healthy animal. The honey-comb costs about 10 cent a pound; the plain is a little cheaper. The cost of many of these things depends almost wholly upon the demand for them.

Sweetbreads Sweetbreads consist of the pancreas and thymus glands of the young calf or lamb which later in its life are absorbed or changed so as not to be edible. Those from a milk-fed animal are far superior, being white, firm and plump, while those from an improperly fed animal are dark, flabby and tough. They are generally sold in pairs. The pancreas is larger and better. They range from 25 or 35 cents to 50 or 75 cents a pair. What are known as Chicago sweetbreads may be bought in Eastern markets at times for $1.50 a dozen. These are packed on ice. Where the demand for sweetbreads is great, pork sweetbreads are often substituted. These are coarse and dark colored. The buyer should learn to distinguish these from calves' sweetbreads and refuse them.

Table of Cuts and Uses of Fore and Hind Quarters of Beef

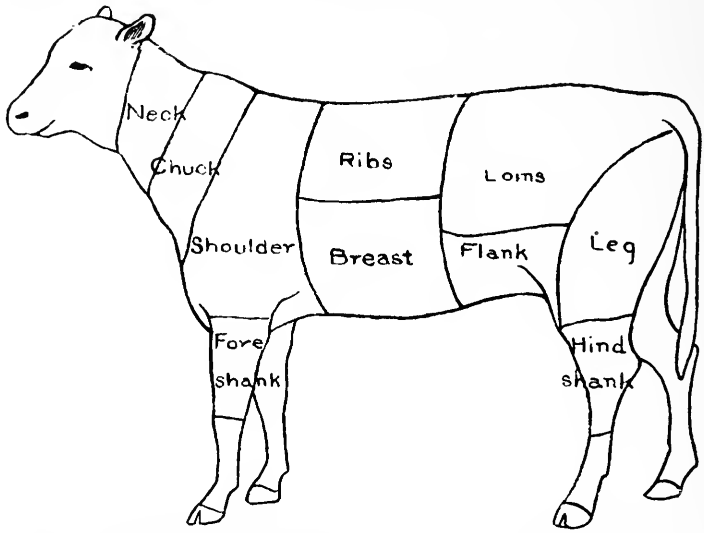
FORE QUARTERS.

4 Ribs		Good roast.
6 Chuck Ribs		Small steaks, pot roast, stews.
Neck		Cheap Hamburg steak, mince meat.
Sticking-Piece		Mince meat, beef tea, stews.
Rattle Rand	Thick end Second cut Thin end	Corned, especially cold sliced.
Brisket	Navel end Butt end or Fancy Brisket	Excellent for Corning. Perhaps best.
Fore-shin		Soup stock, stews.

HIND QUARTERS.

3 Ribs		Excellent roast.
Loin	Tip	Finest roast, steaks.
	Middle	Sirloin and porter house steak.
	First cut	Roast and steaks.
Tenderloin	Fillet or Steaks	Larded and roasted, or broiled.
Rump	Back	Best large roasts and cross-cut steaks.
	Middle	Roasts.
	Face	Inferior roasts and stews.
	Aitch Bone	Cheap roast, corned, braised
Round	Top	Steaks, excellent for beef tea.
	Bottom	Hamburg steak, curry of beef.
Flank		Stuffed, rolled and braised or corned.
Shin or Shank		Cheap stews or soup stock.

Season of Veal While veal is in season all the year in many markets, it is best in spring and summer, being at its prime in May. The quality of the veal depends to a considerable extent upon the age and manner of feeding. Six

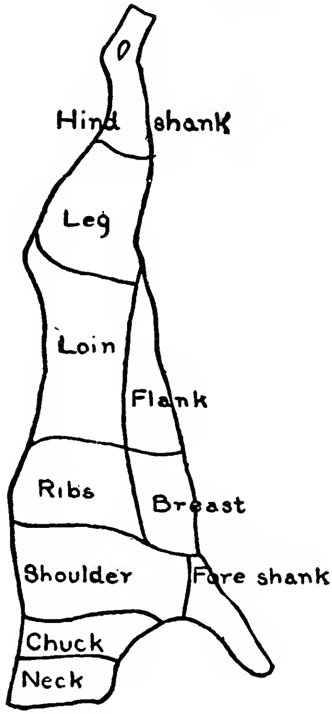


CUTS OF VEAL ACCORDING TO THE U. S. DEPARTMENT OF AGRICULTURE.

to ten weeks is the preferable age at the time of killing. When the calf is killed under four weeks of age the meat is injurious, so that it is not allowed to be sold, such being known as "bob veal." The flesh of such immature calves is soft, flabby and gelatinous, **Bob Veal** blue and watery in color instead of fine-grained, tender and white with a tendency to pink, as in the healthy meat. The meat is best of calves which have been fed entirely upon milk. Grass-feeding is the poorest of all

In France an especially fine quality is secured by careful feeding, raw eggs being included in the feed.

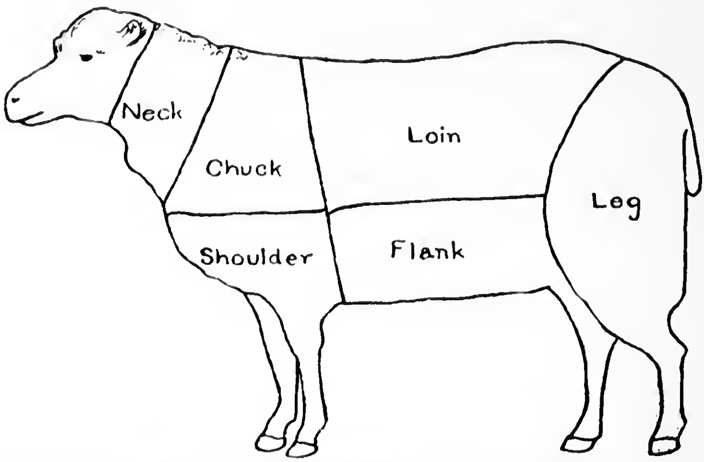
The cuts of veal are similar to those of beef, except simpler. The fore quarter includes only five ribs and is so small that it is easily boned and rolled for a good sized roast. The entire fore quarter weighs 6 to 12 pounds, and costs 8 to 10 cents entire or with neck removed 10 to 14 cents. The neck can be used for stew. The head and brains are esteemed by many, the head being used for soup, and the brains cooked in various ways. **Cuts Similar to Beef**



SIDE OF VEAL.

The loin includes all that is divided into loin and rump in the beef. This is an excellent roast, the leg alone being considered better. The leg is the choicest for roasts or for cutlets. The shoulder when boned, rolled and stuffed makes a very acceptable cheap veal roast. The breast is good for stew. The "knuckle" of veal corresponds to the shin in the beef and is especially fine for soup, being highly gelatinous.

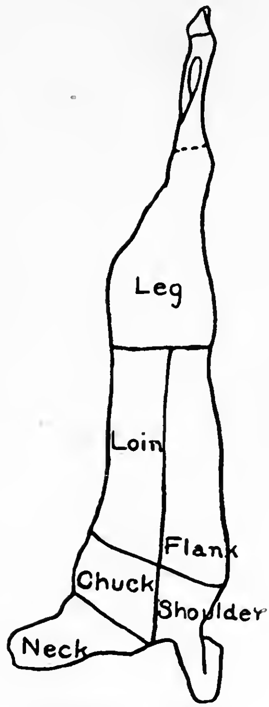
Mutton is, for most, a most nutritious and easily digested meat when of good quality and properly prepared, but it may be very uninviting through carelessness in cooking and serving. For this reason, no



CUTS OF LAMB, U. S. DEPARTMENT OF AGRICULTURE.

doubt, it is less in favor in this country than beef. Lamb is the name applied to the animal until one year old, after that it is properly mutton. The age is told by the bone of the fore leg, being smooth in the young animal but showing ridges which grow deeper and deeper with age. Mutton and lamb are in season the year round. The best mutton is from an animal not over 5 years old, plump with small bones. Like the beef long curing before consumption is desirable.

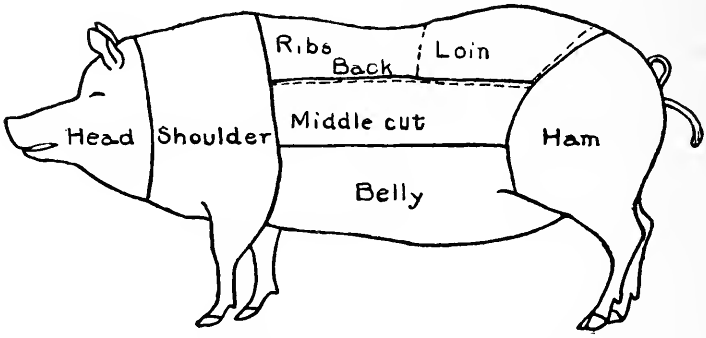
The usual cuts of mutton are the leg, loin, shoulder, neck, breast and flank. The leg is, all things considered, the best roast. The fore quarter, or the shoulder boned and rolled as in veal, is an excellent cheap roast, the choice depending on the size of the family. The ribs and loin may be used for roasts for a small family, but are more frequently cut into chops. The rib chops are smallest and, therefore, more expensive. They must, in fact, be regarded as a great luxury, considering the price and the proportion of bone, but they are much in favor for their delicious delicacy and fine flavor. The shoulder, breast, and best part of the neck are excellent for stews, pot pies or for boiling. The portion of the neck nearest the head is tougher and is best used for broth for which it is especially desirable, being rich in flavor and nutriment.



SIDE OF LAMB.

Season of Pork

Pork is good only in autumn and winter. A large part of the animal is so fat that instead of being sold fresh it is salted and sold as salt pork. The ribs and loin are the most desirable fresh cuts, being used either



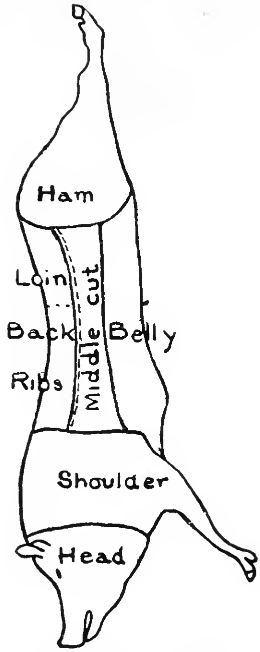
CUTS OF PORK, U. S. DEPARTMENT OF AGRICULTURE.

for roasts or chops. Care is needed to select a wholesome piece, suitable fresh pork having firm, clear and white fat and pink lean, while in the salted pork, one should select either a pinkish piece or one without color, a yellow appearance not being a good indication. A thick, mediumly fat piece of salt pork is better to buy than the thin flank pieces.

Bacon

Bacon is secured by smoking the fat pork in addition to the salting process. It is a most digestible form of fat and is enjoyed by many who do not care for other forms of salt pork. It is somewhat more expensive, salt pork selling for 11 to 15 cents, bacon for 15 to 18 cents per pound.

Sausages are made either of pork alone, or beef and pork, or of veal and pork together. Those sold in the market are usually put up in skins. In buying sausage one should be especially careful to buy a known and approved brand. Otherwise they are an untrustworthy form of meat, as fragments of all kinds are easily disposed of in this way. The price of sausage varies from 12 to 20 cents per pound.



SIDE OF PORK.

POULTRY

Care in Selecting

There is perhaps no other kind of meat in which there is more need of skill and care in selecting than poultry. Great care is necessary in handling, as the flesh easily becomes tainted or rendered unhealthful. Some states allow fowl to be kept for sale undrawn. This is not only a great menace to health, but a thing no thoughtful buyer will desire. The excess price charged for what are called Philadelphia Chickens comes from the method of killing and preparing for market. An improperly drawn chicken is nearly as bad as one sold undrawn, in some cases may be even worse. The laws regulating the sale of poultry in New York state are such that in the majority of cases chickens and turkeys are most miserably prepared for market.

Method of Plucking

The flavor of the flesh is also affected by the method of plucking, the dry picking being much to be preferred, although the appearance of the fowl may be less attractive. While scalding aids in removing the feathers it also affects the flavor, so that dry-picked sell at a higher price.

Tests

In young fowl and turkey the breast bone is soft, bending readily, and the flesh is smooth. Hairs over the flesh are an indication of age, pin-feathers of a young bird. The body should be plump and fat. A poor bird is bluish white, thin and often too liberally supplied with pin-feathers. Scaly legs are a further indication of age, the young having smooth legs. While the preference is always for chickens, especially for roasting, a good fowl may be thoroughly steamed before roasting and so rendered tender and very acceptable. It is much greater economy to buy fowl as one secures far more meat in proportion to bone, and fowl is considerably cheaper. The West has become a large source of our supply as in meat, especially in turkeys. Certain Eastern states like Vermont and Connecticut have acquired in the past an enviable local reputation, but at the present time a large part even of the Eastern trade is in Western turkeys, shipped East in refrigerator cars. Methods of cold storage have advanced so far that turkeys may be kept a year or more, but not without losing in quality.

FISH

Selecting Fish deteriorates and becomes injurious sooner than any other animal food. Great care should be taken to select that which is strictly fresh. It is impossible to transport it a great distance and keep it as fresh as is necessary for health. For this reason it is not wise for those who live inland to rely upon this class of food, except such as may be secured from bodies of water near home. Fresh fish is firm, with no evidence of discoloration. Scales and eyes should be bright, gills red and fins firm. One should study the comparative value of the different varieties, as there is great difference in nutritive worth, largely due to the greater amount of fat in some, such as salmon.

Kinds In general white fleshed fish has the oil confined in the liver and is therefore apt to be a little more digestible than the dark fleshed fish where the oil is distributed throughout the body. Note: Whitefish, halibut, etc.; salmon, mackerel and bluefish. There is a decided difference in texture, firmness and price.

Haddock Haddock is an excellent cheap fish for frying, being firmer than cod. It is usually from 8 to 10 cents a pound. Halibut is the preference of the more expensive, costing from 14 to 18 cents. There is less waste in halibut, as the slices are from so large a fish that the head and tail are not included as in smaller fish. This should be taken into account in ordering.

Baking Cod and bluefish are usually selected from the cheap fish for baking. Haddock is also good. The bluefish is preferred by most, being somewhat dry and of sweet flavor. It is always to be distinguished by a dark line running along each side from head to tail. While cod and haddock are in season throughout the year, bluefish are in season only from May to October except as they are frozen and kept in cold storage. A frozen fish is not as desirable as fresh, so that the season will govern choice somewhat. Halibut and mackerel are good to bake.

Boiling In selecting fish for boiling it is desirable to secure a firm fish and a solid piece which can be wrapped in cheesecloth and cooked without breaking in pieces. Halibut and salmon are especially good for this purpose. Haddock is the best of the three cheaper fish already mentioned.

Local Varieties The fish already mentioned are those which are best as ordinarily found in the city markets. Many other varieties which are very delicious when freshly caught lose in flavor so much that it is not very satisfactory to try to serve them except when one may secure them strictly fresh. Trout, flounders and perch are examples. It is an excellent plan to have some system of tables showing the season of such foods as have a distinct season which can be hung on kitchen wall or other available place to show at a glance the most desirable times to buy the various foods. For example, for fish:

Season of Fisb

The Season of Fish

Variety.	Price.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Bass—Striped	(To be												
or black	filled in						....	....	....	....			
Bluefish	from lo-					....	....	....	....	....			
Butter........	cal mar-						....	....	....	....			
Cod	ket.)	....	....	....	....	....	....	....	....	....	....	....	....
Flounders....		....	....	....	....	....	....	....	....	....	....	....	....
Haddock......		....	....	....	....	....	....	....	....	....	....	....	....
Halibut.......		....	....	....	....	....	....	....	....	....	....	....	....
Herring.......					....	....	....	....					
Lobster.......		....	....	....	....	....	....	....	....	....	....	....	....
Mackerel						....	....	....	....				
Perch.........						....	....	....	....				
Pickerel		....	....	....	....	....	....	....	....	....	....	....	....
Salmon.......						....	....	....	....				
Shad..........		....	....	....	....	....							
Smelts........							....	....	....				
Sword					....	....	....	....	....				
Trout.........							....	....					
Weak.........										....	....	....	
White.........										....	....	....	

Shell Fish

The same general directions hold for buying shell fish. Clams, oysters and lobster are not suitable to be eaten unless strictly fresh and procured from sources of which the healthfulness of the supply is assured. Injurious preservatives are sometimes used in shipping to the middle and Western states. Clams and lobster may be purchased the year round. Oysters, scallops and shrimps are in season from September to March. Fish is not a substitute for meat in nutritive value, because it has less fat but makes a pleasant change for those who are able to purchase under favorable conditions.

VEGETABLES

Vegetables are classified according to their form as follows:

Roots and Tubers	Potatoes Turnips Parsnips Beets Onions Radishes Carrots	Fruit Vegetables	Corn Pumpkin Peas Beans Squash Tomato Cucumbers Egg Plant
Salad Plants	Lettuce Chicory Romaine	Flower Vegetables	Cauliflower Cabbage

Season and Prices

In buying one should watch the market for the season, as it will vary somewhat. Vegetables which were formerly confined very exclusively to their season are to be purchased now at almost any time in large city markets which are supplied by hot houses and by shipping from greater distances than was possible before methods of shipping became so superior as at the present time. Yet the higher prices which prevail for fruit and vegetables which are out of season prevent a great number from buying except when the prices are normal. Nor is this a thing altogether to be deplored. It is a great mistake to rely to any large extent upon such products since the quality is never equal to that of products grown under natural conditions, while the frequent use of a vegetable throughout the year takes away the keen enjoyment to be realized by those who are content to take each as its season brings it. Vegetables are a very important article

Liberal Supply

of diet and should be liberally supplied at all times. For those who have learned to eat all varieties there is very fair variety of those which keep through the winter. The different varities with season and average price will be found in the following table:

Season of Vegetables

Variety.	Price	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Artichokes........	5c qt	x	....	....							....	....	....
Asparagus........	15c pk.			....	....	x	....						
Beets..............	5c b'nch	....	....	....	....	....	....	....	x	....	....	....	....
Cabbage...........	10c head	....	....	....	....	....	....	....	....	....	x	....	....
Cauliflower.	10c "	....	....	....	....	....	....	....	....	x	....	....	....
Carrots...........	3c b'nch	....	....	....	....	....	....	....	x	....	....	....	....
Celery	8c head	....	....							....	....	x	....
Chicory	10c "						....	....	....	x	....	....	
Corn...............	8c doz.							....	x	....			
Cucumbers	2c each			....	....	....	x	....	....				
Egg Plant..	10c "				....	....	....	....	x	....			
Greens—													
{ Beet,.......... } Dandelion	15c peck			....	x	....	....						
Mushrooms.	30c lb.	....	....	....	....	....	....	....	x	....	....	....	....
Okra	40c hun.						....	....	x	....			
Onions...........	15c peck	....	....	....	....	....	....	x	....	....	....	....	....
Oyster Plant or Salsify..........	15c b'nch	....	....							....	....	x	....
Parsnips.	3c lb.	....	....	....	....	....	....	....	....	....	x	....	....
Peas (fresh)......	10c peck				....	....	x	....	....	....	....		
Potatoes—													
Sweet...........		....	....	....	....	....	....	....	....	....	....	....	....
Irish............	75c bu.	....	....	....	....	....	....	....	....	x	....	....	....
Pumpkins.......	2c lb.									....	....	....	....
Radishes..	3c b'nch			....	....		....						
Rhubarb...	2c lb.	....		....	....	....	....						
Romaine.........	10c head	x				....	....	....	....	....	....		
Spinach	15c peck	....	....	....	....	x	....	....	....	....	....	....	....
Squash—													
Summer..	3c each					....	....	x	....	....			
Winter.........	2c lb.	....	....	....	....					.	....	....	x
String Beans.....	10c qt.					....	....	....	....	x	....		
Tomatoes........	5c qt.	....	....	....	....	....	....	....	x	....	....	....	....
Turnips..........	2c lb.	....	....	....	....	....	....	....	....	....	....	x	....

X marks the height of the season, or when it is at its best.
The prices given are the lowest, or those at the height of the season.

Quantity for Serving

It is sometimes puzzling to determine the quantity to order for the number of persons to be served. The following estimates may be a guide:

Artichokes, 1 quart	will	serve	8	people.
Asparagus, 1 bunch	"	"	4	"
Beets, 1 bunch (5)	"	"	6-8	"
Cabbage, 1 good, solid	"	"	8	"
Cauliflower, 1 small	"	"	4-6	"
" good size	"	"	8	"
Carrots, 1 large one	"	"	2	"
" small bunch	"	"	4	"
Celery, 1 head (3 bunches)	"	"	8-12	"
Chicory, 1 head	"	"	4	"
Corn, 1 doz.	"	"	11-12	"
Cucumber, 1 (in salad)	"	"	4	"
" " (sliced)	"	"	2-3	"
Egg Plant, medium	"	"	6-8	"
Greens, 1 pk	"	"	6-8	"
Onions, 1 qt.	"	"	4-6	"
Oyster Plant, 5 stalks	"	"	6-8	"
Parsnips, 2 (1 lb.)	"	"	4-6	"
Peas, 1 pk	"	"	4-6	"
Radishes, 1 bunch	"	"	4-6	"
Rhubarb, 1 lb. (in sauce)	"	"	6	"
Romaine, 1 head	"	"	4-6	"
String Beans, 1 qt.	"	"	4	"
Tomatoes, 1 qt. (5)	"	"	6	"
Turnips, 1 (2½ lbs.)	"	"	4-8	"

Selecting Vegetables

All vegetables should be fresh, as it is very difficult to cook those that are wilted and they lose much in flavor. Greens and salad plants should be crisp and tender without evidences of lying until bruised and partially decayed. Cabbage and cauliflower should have solid heads and not be discolored. Medium-sized vegetables are preferable to either extreme, usually. If small there is large waste, while too large ones are apt to be coarse and woody in texture. This applies especially to beets, parsnips, peas, beans, rhubarb, etc. The heavier potatoes are in proportion to their size the better, but medium sized ones are less likely to have hollow hearts. The varieties differ greatly as to quality. One must, in general, learn by trial the best to be obtained in the local market. The Early Rose is an excellent variety.

Squashes and Pumpkins

In selecting pumpkins choose a heavy one with hard shell and deep yellow color. Of winter squashes, the dark green Hubbard is the best. It should be very hard and good sized. The crooked neck is the best variety of summer squash. The evergreen and country gentleman are excellent varieties of sweet corn. Spanish onions are the best, being more delicate than native but are somewhat higher in price.

ANIMAL PRODUCTS

Butter Milk Eggs

Butter, milk and eggs are all of a nature to require the utmost care in purchasing and in storing before use. They are easily tainted so as to be spoiled for one of sensitive taste, while milk, especially, is probably the most frequent transmiter of disease, with the exception of water, of all our foods and drinks. Butter should be of the best, but a high price is not always a test of merit. While some creamery butters bring a very high price and take high awards for flavor, so that creamery butter as a whole commands a higher price than dairy butter, it is not the most desirable. All good creameries maintain a high sanitary standard and conditions under which the butter is made are doubtless superior to those in the majority of private dairies, yet one must go back of the creameries to the farms from which the creameries are supplied to determine the final healthfulness of the product. It is here that the difficulty lies with creamery butter, since the farmers that keep the poorest cows and who do not understand dairying under right conditions are those that supply the creameries, so that one cannot be sure that butter made from the cream produced under such conditions is healthful. It is far better, so far as is possible, to buy from an approved private dairy.

Source of Milk Supply

The same may be said of the milk supply. One should follow to its source and know without a question that there can be no pollution if any milk is consumed in a raw state by the family. This becomes doubly imperative where there are children in the family. If necessary, a cent or two more in price per bottle is little for the sake of safety.

Eggs are highest in price in winter. A housekeeper may take advantage of low prices in the spring or fall by buying a supply in advance, but she cannot do this unless she can be sure of a cool place to store them and is willing to take the trouble to coat each egg over so that the air may not penetrate the shell. Wrapping each in separate paper is a fairly good protection. Care must be used not to use anything that will cause an unpleasant flavor, as the shells are very porous and the contents readily acquire odors of anything near. A 10 per cent solution of silicate of soda is an excellent preservative.

Testing Eggs

A salt solution is a good test of the freshness of an egg. Two tablespoonfuls of salt for a quart of water may be used. If fresh, the egg will sink in it; if not perfectly fresh, will show signs of rising, while a bad egg will float at once.

DRY GROCERIES

While most of what has been discussed in the previous pages relates to food which must be purchased as needed, because perishable, there is a class in buying which much time and thought may be saved by supplying enough for at least a month in advance. This is dry groceries such as sugar, flour, cereals, flavorings, coffee (unroasted), tea, chocolate, spices, soap, starch, and all like necessities.

Storage A store-closet large enough to allow the purchase of these things at a wholesale store, and so arranged as to temperature, dryness, light and ventilation as to keep them in perfect condition is a saving so great as to astonish one who trys the method for the first time. Often the difference amounts to twenty per cent.

Quantities Sugar should be bought by the hundred weight at least, flour by the barrel, canned goods by the dozen or better by the case, cereals by the dozen packages after the fresh fall supply is in, vanilla by the quart (at the drug store to secure better quality), baking powder by the 5-pound box from which smaller quantities are transferred as needed to the box in use, soap by the box, that it may have a chance to dry out thoroughly and so waste less readily, and so on through a long list. For a very small family the list would naturally be shorter. Anything that does not deteriorate in storage can be bought to much greater advantage in quantity.

Brand of Goods In groceries it is not well to buy an inferior grade. Here the best is the cheapest and wisest, especially in these days of intense competition and fraud. It is well to know a good brand and insist upon having it. Foreign labels are not a surety of a good grade of goods, in fact some of our best American firms put up their best quality of spices, for instance, under their own name and the poorer grades are labeled with French labels and sold to firms that deal in a cheaper line of goods.

Adulterations Through the reports of the Government upon adulteration as given in the Bulletins and the report of different state and city inspectors one may ascertain to some extent which are reliable and which are not.

CONCLUSION

Percentage in Saving The household manager should learn to think in percentages. One cent less on a ten cent article seems a trivial saving, yet it is ten per cent—ten dollars in every hundred. It is fair to state that there will be a difference in money paid of from ten to twenty per cent between careless and careful purchases.

It should be remembered that the customer who *knows* and is particular receives the best of goods and services.

Judgment The successful business man is an expert in judging the materials in which he deals; he is perfectly familiar with the range of prices and quick to take advantage of all favorable conditions. The household manager needs to be just as familiar with all the goods which relate to the home and with their prices.

The Expert Household Manager

One becomes an expert only through experience, but experience is not gained simply by ordering goods; appearance must be noted carefully and results compared intelligently to acquire the trained eye and the trained judgment necessary to the successful household manager.

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HOUSEHOLD MANAGEMENT

PART III

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. Leave space between answers. Read the lesson paper a number of times before answering the questions. *Answer fully.*

---

1. What factors combine to make meat suitable for the table?
2. (a) By what should one be governed in selecting a cut of beef? (b) What cuts have you found especially satisfactory?
3. How is a side of beef cut up in your own market? What are the prices?
4. Describe the "bottom round," stating its location in the animal, quality, suitable uses, approximate value, etc.
5. Compare with "top round."
6. Compare a cut from the brisket with the flank cut.
7. What cuts of beef have you never used?
8. Have you any especially satisfactory methods of preparing cheap cuts, other than noted in these books?
9. Describe a desirable piece of salt pork.

10. A satisfactory fowl to roast.
11. A satisfactory roast of pork.
12. The best cut of steak.
13. French lamb chops.
14. What objections are there to canned meats?
15. Compare fish with meat as a food.
16. Make a table giving the season and prices of vegetables to be obtained in your local market similar to that on page 137.
17. State objections for excessive use of vegetables out of season.
18. What answer would you give a mother who states that her children like no vegetables except canned tomato, preferring it to the fresh fruit even in season, and asks if there is any harm in letting them have it exclusively, every meal?
19. Have you tried buying any groceries in quantity? If so, with what success in price, quality, and keeping?
20. What purchases do you find hardest to make? Why?
21. Can you add any suggestions or comments to help others?
22. Are there any questions you would like to ask relating to Household Management?

Note.—After completing this test, sign your full name.

SUPPLEMENTAL PROGRAM ARRANGED FOR CLASS STUDY ON

HOUSEHOLD MANAGEMENT

By Bertha M. Terrill, A. B.

MEETING I

Place of Home and Home-maker in the Economic World.

(Study pages 1-8.)

1. Economic Function of Woman, Divine. ($0.15, postage 2c.)
   Cost of Living, Ellen H. Richards. ($1.00, postage 10c.)
   Standards of Living, Chapters I and II.
   Household Expenditures, Chapter I.
3. The Standard of Life, Bosanquet. (1.50, out of print.) Chapter I.
4. Household Economics, Helen Campbell. ($1.50, postage 16c.) Household Industries, Chapter VII.
5. See works on Political Economics on place of Consumption in discussion of Wealth.

MEETING II

(Study pages 9-41.)

Division of Incomes.

1. The Woman Who Spends, Bertha J. Richardson. ($1.00, postage 10c.)
   Chapters on Needs, Choices, Imitation versus Independence, Satisfaction, Responsibility.
2. Cost of Living, Ellen H. Richards. ($1.00, postage 8c.)
   Housing, Chapter IV.
   Operating Expenses, Chapter V.
   Food, Chapter VI.
   Clothing.
   Higher Life.
3. Cost of Shelter, Ellen H. Richards. ($1.00, postage 10c.)
4. Cost of Food, Ellen Richards. ($1.00, postage 10c.)
   See articles on "Increase in Household Expenses." Harper's Bazar, Sept.-Dec., 1906.

MEETING III

(Study pages 42-68.)

(a) Household Accounts.

(a) Value—Worth the time and effort?

(b) Different Methods.

(c) Discussion of Personal Choices.

Reference—How to Keep Household Accounts, Haskell. ($1.00, postage 10c.)

(b) Banking.

(a) Use to housewife; opinion of members.

(b) Varieties of Banks. Local Banks.

(c) How made most useful?

Reference—How to Keep Household Accounts, Haskell. ($1.00, postage 10c.)

See article on Finance, by Dr. Campbell, in Cosmopolitan Magazine.

(Select answers to test questions on Part I.)

MEETING IV

(Study pages 71-96.)

(a) Organization in the Home.

1. Household Economics, Chapter XII. Campbell.
2. Cost of Living, Chapter IX. Richards. ($1.00, postage 10c.)
3. Cosmopolitan Magazine—April, May and June, 1899.
4. "The Eight Hour Day in Housekeeping." American Kitchen Magazine, Article in January, February and March, 1902.

See Supplement, pages 181–191.

(b) Domestic Service.

1. Domestic Service, Salmon. ($2.00, postage 18c.)
2. Household Economics, Chapter XI, Campbell. ($1.50, postage 16c.)

MEETING V

(Study pages 97-125.)

Buying Supplies.

(a) Bargains—real and fictitious.

(b) Grades—best, the cheapest?

(c) Comparison of Department and Specialty Stores.

(d) Seasons for buying supplies.

(e) Buying in quantity.

(f) Local stores.

(Select answers to test questions on Part II.)

MEETING VI

(Study pages 127-163.)

Marketing.

(a) Meats—Local cuts.

(b) Vegetables.

(c) Groceries. Get estimates in quantity from wholesale store.

(d) Comparison of local markets in sanitary conditions and practices, cold storage facilities, cuts of meat, prices, etc.

Reference—Home Economics. Chapter on Marketing. Maria Parloa. ($1.50, postage 16c.)

(Select answers to test questions on Part III.)

SUPPLEMENT
HOUSEHOLD MANAGEMENT

By Bertha M. Terrill, A. B.

A rare opportunity is afforded us, through these correspondence courses, of sharing the experiences of many different housekeepers of widely differing locaations and conditions. Through this supplement I am glad to have the opportunity of passing on the most valuable contributions, and I anticipate that they will amplify helpfully the material of the text.

DIFFERING OPINIONS

In some points there has seemed to be universal agreement. In others, there have been flatest contradictions of opinions, amusingly so, sometimes, if one could forget the trials and struggles involved. One, for instance, affirms with much positiveness that help by the hour, in place of resident labor, is entirely impossible. "How can shop and store hours be compared with those in a house, or the work be readjusted to conform to such a plan? Hasn't the problem two sides? Is it unreasonable of me to desire a late dinner when we are hurried at breakfast, irregular for luncheon, and dinner at night is the only meal the family may take together and enjoy leisurely?" The next paper taken up assured me, no less positively, that the plan is admirable, the writer has tried it and finds it a great relief and no more expensive, all things considered.

LAUNDRY WORK

The question of laundry work, done in the house or sent out, brought forth as contradictory views, although such conclusions could easily be derived as that all would find it a relief to send laundry work out if it could be done as well, under as sanitary conditions, and no more expensively. (Not many seemed to have much idea of the actual difference in expense.) It was easy to see, also, that in practically no community thus far reported from, are there satisfactory laundries, and prices are reported as too high to be tolerated. Where are the clubs ready to devote some of their time and attention to the solution of this problem for their communities? One has done so, very satisfactorily.

These differences of opinion spring largely from the great differences in local conditions and in personal experiences, yet they emphasize the fact that each home has its own peculiar problems to be worked out, and the most that can be hoped for from suggestion from without is the laying of fundamental principles, together with opportunity of studying the experience of others as a guide in deciding our own course of action.

DIVISION OF INCOME

There is less material contributed on Household Accounts than I could wish, less, I hope, than may be in a few years, if all the housekeepers who have registered resolves to know more of this side of their business in future, live up to their intention. Evidently one in fifty would be a generous estimate of those who keep anything bordering upon helpful accounts at present, even among our students.

Fortunately some have been keeping careful records and the papers of such have been full of interest. They show that the budgets given in the text are fair—both the actual and the ideal, for some rarely wise, able women are finding the ideal budget possible today and are living close to its standard.

I wish it were possible to present every detail of the management of such, that "he who runs may read" their valuable lessons. There is no evidence of unworthy curtailment. One catches, on the contrary, the spirit of highest, worthiest enjoyments and contentment.

Here is one in a city of an Eastern state, where husband and wife without children have an income of $1,200 in yearly salary, paid monthly,

MONTHLY BUDGET, FAMILY OF TWO

OUTGO.

Rent	$16.00
For 3 rooms and bath on 2nd floor, with storage and cellar privileges. Low for location.	
Car fares	$3.50
Food	$22.50
Average per year not over $15.00.	
Operating expenses	$6.50
Gas, light and heat, average	3.50

Laundry	1.50
Cleaning, 2 half days	1.50
Life Insurance	7.00
Investment	10.00
Personal allowances	30.00
Incidentals	4.50
Total	$100.00

Each is allowed $15.00 for clothing, gifts, charity, higher life and personal saving.

A physician's family of four in Southern California with income of $1,500, spend for rent 10 per cent, operating expenses 33 per cent, food 25 per cent, clothing 15 per cent, and higher life 17 per cent, while a family of four in Montana with the same income ($1,500) rent a good-sized house with yard large enough for kitchen garden and small poultry yard for $18 a month, or 14 2-5 per cent, and spend for operating expenses 15 per cent, food 20 per cent, clothing 18 per cent and higher life 30 per cent.

These three are interesting taken together, as showing some conditions which lie practically beyond individual control, yet which may have decided effect upon the result. The operating expenses in the physician's family, for instance, have to cover office rental. care, lighting, heating, telephone, etc., which is in reality not a part of the household expenses. Contrast also the accommodations possible in the Eastern city at $16 rent per month, and that very low for the place, and those available in Montana for a similar price.

It has long been observed that salaries and wages do not vary in different localities in any way commensurate with the great difference in living expenses.

In Washington, D. C., a family of husband, wife and four children, aged 6 to 16 years, with income of $1,500, spend for rent $360, operating expenses $80 to $90, food $400, clothing $350, with balance of $300 for higher life.

MONTHLY DIVISION OF $125

Rent	$25
Food	30
Fuel and Gas	10
Clothing	10
Laundry	5
Furniture	10
Higher Life	10
Bank Account	25

"Three members of the family who are not at home during midday take lunch consisting of buttered toast or bread and preserves that I had put up during the summer. We do not use cereal at every breakfast nor do we have dessert after every dinner, but about four times a week. I have used tomatoes rather frequently, although they are high in price, but we enjoy them and prefer them to something else costing less. I 'can' my own fruit which can be used in many ways as a dessert.

"Out of $30 I spend $10 for such provisions as sugar, tea, coffee, butter, flour, meal, lard, yeast, powder, salt, pepper, cereals, starch, blue, soap, etc.

This gives $20 for meats and vegetables and the family is thus maintained on $5 a week.

"My son makes all fires and goes errands, cleans front and back yard. My daughter arranges the table, airs bed rooms and puts them in order before going to school. Once a week my laundress scrubs kitchen and cleans vestibule, front porch and bath room. I superintend the cooking and house in general. My husband frequently aids in marketing."

MENU FOR A WEEK

Sunday

(Breakfast)

Fruit—Oranges (Two cut in half)

Sliced Ham (broiled) Scrambled Eggs (two)

Hot corn bread (two eggs)

Coffee (with cream)

(Dinner)

Roast of Beef

Mashed potatoes Cream of asparagus on toast.

Bread—with butter. Lettuce Salad.

Rice pudding.

Monday

(Breakfast)

Cream of Wheat.

Scrapple (fried crisp)

Hot Biscuits. Sliced Tomatoes.

Coffee.

(Dinner)

Sliced Beef heated in meat sauce.

Boiled Onions Cream Sauce (a la cream)

Rice. Celery Salad (celery, eggs, spring onions and parsley)

Bread. Tea.

Tuesday

(Breakfast)

Oat Meal.

Bacon. Egg Omelet (with parsley)

Wheat Muffins. Coffee.

(Dinner)
Clear Soup.
Brown Hash. Beaûregard Eggs on toast.
Sliced Oranges and bananas with cocoanut.

Wednesday
(Breakfast)
Sausage Corn Muffins, with butter.
Poached Eggs. Coffee.

(Dinner)
Ham (Boiled) Spinach with Egg (hard cooked).
Bread.
Sweet Potatoes Delmonico (potatoes and cheese)
Prunes. Tea or Cocoa.

Thursday
(Breakfast)
Cream of Wheat with bananas and milk.
Frizzled Beef. Toast (buttered)
Sliced Tomatoes.

(Dinner)
Soup. (Vegetable).
Ham Croquettes with Tomato Sauce.
Macaroni with Cheese.
Pickle. Bread. Celery Salad.
Canned Peaches (Home Made.)

Friday
(Breakfast)
Cream of Salmon. Potato Chips.
Hot Biscuits. Coffee.

(Dinner)
Baked Shad, or Trout. Mashed Potatoes.
Sliced Tomatoes with Salad Dressing.
Corn Bread. Tea.

Saturday
(Breakfast)
Mush with milk.
Bacon. Scrambled Eggs. Potato Chips.
Plain Bread or Toast. Coffee.

(Dinner)
Sliced Ham. Creamed Cabbage.
Boiled Potatoes. Bread.
Apple Sauce. Tea.

DIVISION OF $4,500

Family in Providence, R. I., physician, wife, two children, two maids, laundress one and a half days a week:

Rent, 10 per cent	$4 50
Food, 14 per cent	6 30
Operating expenses, 20 per cent	9 00
Clothing, 9 per cent	$405
Incidentals, 2 per cent	90
Office Expense, 25 per cent	11 25
Higher Life, savings, etc., 20 per cent	9 00
Total	$45 00

DETAILS OF OPERATING EXPENSES.

Services (including wages of 2 maids, laundry, ashes removed, snow shoveled, rugs beaten, windows washed, etc)	$5 50
Fuel	1 30
Lighting	60
Telephone	64
Water tax	16
Ice	20
Household Supplies	60
Total	$9 00

She says: "Nothing is more helpful to the practice of economy than a record from year to year of all expenditures. I have been a more successful housekeeper since I began keeping careful accounts. I have reduced my monthly food bill from $60 to $50 and less since I offered my cook 10 per cent on what we saved each month."

FOOD ECONOMY

The practice of wise economies has been so successful and gratifying in one family of my acquaintance within the past few years that I must share some of the details with those interested.

The mother has succeeded in saving enough in four years to take herself and son on a European trip as a supplement to his education. The family live in the middle West and consist of three ladies and a boy of eighteen.

The mother writes: "I am almost ashamed to mention the small sum we live on. It is by saving all left-overs, and by the exercise of quite a little forethought and some self-denial that it is accomplished. I do not mean to practice economy at the expense of health, however." The daily average for each person for the year for good material was 12 2-5 cents one year, 86 4-5 cents a week, another, 85 1-6 cents.

A small garden, cared for on shares, aided somewhat, although not largely. It supplied apples and pears in season and for preserving and a part of the summer vegetables and potatoes.

Sample menus with the hints accompanying them will be as suggestive as anything could be, to show the methods of economy.

On a basis of 85 to 90 cents per person a week:

Winter—Breakfast, 6:30 a. m.

Oatmeal with cream and sugar.

Bread of Franklin mills and Pillsbury flours mixed.

Muffins or pancakes.
Butter.
Postum with 1-3 hot skimmed milk.
Jelly or fruit syrup.

In summer various wheat cereals are used, as Ralston's Breakfast Food, Cream of Wheat and the like.

In the spring toast and eggs occasionally.

Dinner—12 m.

1. Stuffed beef's heart.
Stewed onions. Mashed potatoes.
Spiced pears.
Entire wheat bread and butter.
Gelatine dessert with whipped cream.

2. Remains of beef's heart warmed.
Creamed turnips.
Fried mashed potatoes. Green tomato pickles.
Rice with butter and sugar.

Not more than two hearts are served in a year. They are excellent for variety, but not desirable too often. A variety of meats and vegetables is given. In a three weeks' menu a chicken appears, serving two meals, roast pork, mutton chops, oysters, Hamburg steak, creamed dried beef, cod fish, salmon with white sauce, beef steak and boiled ham. The meat from soup bones is used in a pie or seasoned well and served on toast. Two turkeys are served in a season. A good roast once a month and steak or chops once a week.

Occasionally a bisque or other soup is served when the materials are at hand, but, as a rule, the soup course is omitted with meats, being reserved for days when fish or lighter courses are served.

There is never a spoonful of anything wasted. A cupful of corn left from one dinner is scalloped for the next. A little tomato may be added to it for a change. Spoonfuls of fruit left from suppers are made into dumplings for dessert. Pies are seldom served. Hickory nuts and dates are a favorite dessert. Tomatoes are home-canned. Lima beans are used occasionally as one vegetable.

When spring comes and eggs are plentiful omelettes are used, milk and egg puddings and custards.

Supper—5 p. m.

Bread and butter.

Buns, cinnamon rolls, etc., cookies, gingersnaps or cake.

Fruit. Cheese.

Peanut butter or a little cold meat. Sometimes milk toast, warmed potatoes or macaroni.

If for guests, pressed veal, scalloped oysters with olives and jelly in addition.

A great variety of fruits is used. All varieties are preserved. In summer and fall fruit is a frequent dessert.

We are all more or less familiar with the enforced economies of life, but this is an example of voluntary curtailing for a larger good, without harm. Would that more homes could catch the spirit of this housekeeper who writes: "There are so many things I rather spend money for than for food!"

In a study of present standards of life as interpreted through facts in regard to food (Report of Lake Placid Conference on Home Economics, 1902) some things are emphasized which many housekeepers are ignoring, wilfully or otherwise, and which affect the cost of living seriously as well as the comfort and health of the family.

The data was gathered from homes in which the wage-earners were professional men. Wherever several maids were employed the increase in expense of food is disproportionately large. A family of three is instanced.

With three employes, cook, waitress and companion, with income of $3,400, 26.5 per cent is spent for food. In contrast, a family of the same size with $100 less income, that employs a nurse maid and one general helper, spends only 13.9 per cent for food. In the first case much of the ordering and preparation of the food is left to employes; in the latter the housekeeper attends to the ordering and plans the meals herself.

The menus submitted at that time show a surprising lack of variety and an ignorance of simple, inexpensive foods that can be used interchangeably. "Soups were very little used. Cheaper cuts of meat almost invariably took the form of stews. In no case were lentils or peas substituted for beans. Fish, which is one of the less expensive and most digestible foods, was used sparingly. Macaroni, spaghetti, rice, hominy and other cereals were almost never substituted for potatoes. The possibilities of cheese seemed quite unexplored. There was very little variety in vegetables in spite of the fact that in almost every case the families lived in large cities where the markets were bewilderingly rich with a great variety."

These facts are but further evidence of the misconception in these days on the part of many, of the duties of the housekeeper. What greater duty can she have than looking after her share of the business engagement entered into when she assumed the responsibilities of a home and pledged herself to faithfulness in her part?

These duties are worthy of, yes, require, if properly attended to, the mental ability and intelligent care and interest of the trained, skillful women who assume them, and it is a pity that so many homes are being wrecked and others falling far short of their finest possibilities because of such neglect. I sometimes try to picture the outcry there would be if the wage-earners in our homes were equally lax in their responsibilities of providing! And yet, as I have tried to point out in the text, care in the consumption is as important in the home-finance as is providing, and the difference in comfort is greater, proportionately.

What is to start a great wave of pride over our land that shall stir every home-maker who is at present indifferent to, or ignorant of these great facts, with an ambition to prove her right to her position and make her a worthy partner in her home-world, not a mere enjoyer of another's strenuous labor!

I know protest will at once arise in the form of such questions as "Where is the overworked home-maker to find time to do any more?" "What if the husbands prefer to hire help that their wives may have freer, happier lives?" "What can women do who haven't strength to assume such duties?"

If you ask, I must answer frankly, that the noble home-makers whom I look upon with unbounded respect, and whose homes and lives are a constant uplift to all who know them, never seem to have difficulty in adjusting these matters. Do we not all know, in reality, that time is ours, after all, to spend as we choose to spend it. We may have fallen into the poor method, have followed the way of all about us until it seems imperative to spend it all as we do, but if we looked at these matters as really serious we should find adjustment some way. Health and strength are so largely in our keeping, also! Confusion of too many outside interests, over excitement, lack of well-ordered, systematic living are depriving many a woman of the life rightfully hers. Lack of sufficient healthful exercise does the same for others. How few seem to understand it! At least the results would seem to indicate it.

DOMESTIC SERVICE

And now we come to the perplexing, annoying problems of Domestic Service! We wish we had some effective solutions to offer! Some women, in discussing the condition, have contributed valuable hints regarding successful methods employed which, if not wholly new, might well be reconsidered by many an employer.

Hugo Münsterberg, contrasting conditions in America and Germany, writes: "The conviction of every American girl that it is dignified to work in a mill, but undignified to be a cook in any other family, would never have reached its present intensity if an anti-domestic feeling were not in the background. If we seek for the most striking features of woman's work here and abroad, it would seem that the aim of the German woman is to *further* the interests of the household and the American to *escape* from the household."

It is a striking fact that in almost every instance the students who have written on the subject place the lion's share of the fault with the employer. What inference shall we draw? It reminds us of a School of Housekeeping which was started to train employes, but after a two years' study of conditions it was changed to a course for employers in recognition of the fact that they, first, needed training.

I quote below from a few of the papers:

"All who have help do not need it, many can ill afford it. Some time ago I heard the eldest daughter of a family of five girls urging her mother to get a servant since they were now in a large house. The mother asked what a servant would do in a family of so many girls. In reply the girl said, 'we shan't be considered anybody if we don't have a servant.'

"It is in a spirit like this that much of the trouble lies. When women are willing themselves to learn the art of good housekeeping and are willing to do a part of it, no matter how small the share, to show the interest, and then by kindness, gentleness and thoughtfulness seek to help the servants along in the world, the situation will be greatly improved."

It is the women with this spirit and attitude who are having least trouble.

"I always employ intelligent help and do by them as I wish to be done by. When a young girl is intelligent one has splendid material to work with in training her to do as you would your own daughter.

"I have had help, who, after leaving my home when I needed help no longer, would return at odd times for a half day when they thought I stood in need and offer to give me their time without pay, wishing thus to show their appreciation of my kindness toward them. I believe my success is due to consideration and thoughtfulness of their little fancies.

"Thoughtfulness goes a great way in winning the love of one's help. When I do my shopping I always remember my help as any other member of my family, not with the thought of being repaid in services, but through kindness. I have no patience with the person who does another a kindness merely to gain some selfish point."

One woman attributes her success to personal attachment and a consequent desire to please. She says:

"So few have any idea of how to buy clothes or get any value for their money that I made it a point to show them how they could have good clothes inside and out instead of the showy things they were having. They appreciated the interest I took in them. I think that women who employ are themselves largely responsible for the conditions of domestic affairs. Reprimanding before others, constant nagging and giving few liberties are the methods of many."

"Most women in service change in the hope of 'bettering' themselves, which is laudable but often disappointing. It would seem profitable for employers to devise a scheme of increasing wages at stated intervals until a certain point is reached, after that a sum as yearly reward for continued service. I knew a family where some such plan has been followed for a number of years with great success. The lack of promotion in household service must be deadening to ambition."

An Iowa student writes:

"My observation has been that well ordered households and households where the servants know just what they must do and be held responsible for, have been more successful even though the work was more arduous than homes where there was no system, the mistress capricious and all sorts of personal service was required. I believe that when housekeeping becomes a business, women will have trusted and valued employes as do their husbands."

HELP BY THE HOUR

Here is an interesting experience of help by the hour contributed by the Director of the School. "After our raw boned, unprepossessing, though faithful Irish girl married a German with four children (to her subsequent regret) we had the usual string of unsatisfactory maids, so we decided to try help by the hour as recommended in *Household Management.* The following 'ad' was put into an evening paper:

"Wanted—A helper for light housework from 8 to 12 every morning. No washing. Pay $4.50 a week. Extra pay for extra time.

"We expected to have only a few applicants, but that same evening, which was cold and rainy, ten applied and during the next two days the number was raised to *over fifty.* The first applicant was accepted and while she proved fairly satisfactory, some of the others who applied looked more promising. After about two months we put in another advertisement asking for service from 7:30 to 12:00; pay, $4.00 a week. This time we had forty applicants. After about six months we advertised again, making the hours from 7:30 to 12:30, pay $3.50 per week. This third time we had about thirty applicants. Under the last conditions the rate of pay comes down to 10 cents an hour.

"This experience would seem to prove conclusively that, in Chicago at least, there is no lack of women willing to do housework, while it is almost impossible to obtain a satisfactory servant at $5.00 a week. Over 120 women in our locality were anxious for practically the same employment *under different conditions.*

"The arrangement was not satisfactory as to hours, so we made the arrangement with the present helper to come at 8 o'clock and stay until 11 and come again from 4:30 to 7:30 p. m. every week day, and on Sunday from 10 until 2 o'clock. This makes forty hours per week regularly, the rate of pay being as before, 10 cents per hour. The worker lives within a ten-minute walk.

"We have a laundress one day a week who does the washing and makes a start on the ironing, which the helper finishes during the week. She receives $1.50 for nine hours' work.

"Breakfast is a simple meal with us. When we have cooked cereal it is cooked the night before. Fruit, eggs or bacon, coffee and toast complete the meal, which is easily prepared in less than half an hour.

"Breakfast is finished when the helper arrives in the morning. She makes the beds, dusts the floors and cleans the bath room. Then clears off the breakfast dishes, washes them and straightens the kitchen and dining room and is ready for the ironing or for any special cleaning. She leaves the table set for lunch and goes home to her own lunch. In the afternoon the helper washes up the luncheon dishes which have been rinsed and left in the kitchen; prepares dinner and serves it at 6:15. She usually gets the dinner dishes washed and leaves the table set for breakfast by 7:30, but sometimes has to stay half an hour extra if dinner is late.

"When we wish to go out in the evening we have to leave someone with the children, so the helper is kept until we return, or if especially late, she stays all night for 25 cents extra. The extra time runs from nothing to $1.00 a week, according to circumstances.

"Our experience has been that this is a much less expensive arrangement than paying a maid, who sleeps and eats in the house and does the laundry work, $5.00 a week. The helper has no meals in our house unless she stays over time, in which case 10 cents is deducted for the food and time spent.

"According to the prize schedules published in the department of 'The Housekeeper and Her Helper' in the Ladies' Home Journal for September, '06, in a one-servant household the working time of the maid was about 70 hours per week—a fair average. This allows for two afternoons a week off and the evenings after the evening meal is cleared away but does not take into account the time spent by the maid in eating her own meals. This might fairly be reckoned at seven hours a week, leaving a balance of 63 hours spent in *actual work*. In most households the food which the maid consumes could not be reckoned at less than 30 cents a day or say $2.00 a week. If the maid receives $5.00 or even $4.50 a week in wages, it is apparent that her services cost over 10 cents an hour for the time actually spent in work, allowing nothing for the rent of her room and extra supplies and waste.

"Our experience has been that food bills are a third less ($10 to $12 per month) than when we had a resident maid. This is accounted for in part from the bills have averaged $1 a month less than before. Then we have the use of the room which the maid would occupy and do use it. The proportional rental for the room might be reckoned at $4 or $5 per month.

"With our family of five—two children and a baby—housekeeping is a much more difficult problem than in the average household. We live in a heated seven-room apartment, hot water and janitor service furnished. In summer the washing is appalling and sometimes the flat work is sent to the laundry. It seems as if double the amount of cleaning were necessary in a soft coal city like Chicago compared with that in a suburb of Boston. Certainly a *third* more cleaning is required.

"Our experience has been that those who apply for work are much more intelligent as a class than the general run of servants and that they work very much more rapidly and efficiently. More careful planning and more forethought is necessary than with 'all the time' help. The feeling of relief comes, however, because we know, and our helper knows, that plenty others to fill her place can be found if she is not satisfied with the work, or if she does not come up to our requirements. So far as our family is concerned we feel that the servant problem has been solved."

SYSTEMS OF WORK

Two systems of work for the week have seemed especially suggestive. In the first the housekeeper does her own work. I am particularly impressed with the wisdom of the plan for Monday. It is always harder to have washing come on Monday than on any other day. It is simply a long-honored custom. We need to break away from such if they are not sensible. Extra cleaning is needed Monday when none is done on Sunday.

SCHEDULE

Monday—Pick-up day after Sunday. Brush Sunday clothes and put away. Clean bath room and put clothes to soak for washing.
Tuesday—Washing and cleaning kitchen.
Wednesday—Ironing, and arranging clothes to be mended.
Thursday—Clean bed rooms and hall. Sew or mend.
Friday—Clean sitting room, parlor and dining room. Bake bread.
Saturday—Clean kitchen, lamps. Cooking.

Most households consist of several departments. In this there are two maids and a laundress once a week. The duties of the housemaid are: *Every day* (if winter), close ventilators, see that registers are open. Get dining room ready for breakfast, taking out to kitchen dishes needing to be heated. If summer, open windows, arrange living room. Serve breakfast. Clear table, leaving dishes rinsed and prepared to be washed. The bed rooms, which have been left ready, bed clothes, airing and windows opened by occupants are put in order. Breakfast dishes washed.

SCHEDULE

Monday Morning—Two of the bedrooms are swept and "thorough cleaned."
Tuesday Morning—This maid irons the table line, small pieces, napkins, doileys from her own choice.
Wednesday Morning—Bathroom and another bedroom "thorough cleaned."
Thursday—Silver cleaned.
Friday—Drawing room.
Saturday—Library and dining room and hall.

"Luncheon served at 1, dinner at 6. Each girl has every other evening. Each has an afternoon. We have dinner on Sunday at 1:30, after which both maids have the rest of the day and evening, only on extraordinary occasions being asked to return for any supper. Then if possible, each is asked in turn. The housemaid is responsible for keeping the china closets in order and her kitchen (in other houses it would be 'butler's pantry.')

"The cook prepares three meals per day, breakfast at 7:45, luncheon at 1, dinner at 6. She is responsible for the cleanliness and order of the kitchen, the adjoining pantry and ice closet, the back porch and maid's water closet. She assists the laundress with the ironing. She arranges her own time for her cleaning, reserving Saturday for extra baking. The furnace man cares for the furnaces, sifting also ashes from range and cares for walks, shoveling snow in winter, cutting grass in summer, also works by hour at washing windows, beating rugs, etc."

VALUE OF THE INDIVIDUAL HOME

"The home is the center of all that is best in life. It is the greatest moulder of character. All the qualities of Christian manhood and womanhood, love, reverence, unselfishness, forbearance, order, regard for property and for the rights of others, should find their beginnings here. The strength of civic and natural life, respect for government, honest administration of public trusts, depend in large degree upon the high ideals of the home life. Family traditions are better fostered. The home is the housewife's 'place of business.'

"Whatever affects the home affects the state. The moral standing of a nation depends upon the home life of its individuals. We cannot get a true idea of the sacredness of life without having some place, however humble, where high standards of living govern the actions of its individuals. We have poems that stir the emotions and quicken into activity the best interests on the subject of 'Home,' but what poet ever attempted to stir the hearts of a nation to heroic deeds by writing a poem on the 'Boarding House.'"

HOME CARE OF THE SICK.

IT IS the minority, not the majority of people, who can afford the luxury of a trained nurse, especially in cases of protracted and chronic illnesses.

Aims of the Lessons

These lessons are intended to help those who cannot always command the services of a trained nurse, to teach how to carry out the doctor's orders, what to look for and observe in his absence, so that by giving him a definite report of what the patient's condition has been he may be able to work more understandingly, be able to diagnose the disease more quickly, be surer of how the patient is progressing, and of the influence the medicine ordered is having. And to teach above all how to handle and move patients without tiring them, how to render them comfortable, thereby ensuring rest of nerve and body.

The Doctor's Province.

What to do in illness is purposely omitted in these lessons, except in very simple troubles and in cases of emergency. The "what to do" is for the doctor to decide, the "how to do" for the mother to know. Incalculable harm is continually being done by the latter encroaching on the doctor's prerogative. Many a mother has treated her child for supposed colic and only called the doctor in after some days when the pain has refused to yield to her treatment. In very many cases the treatment has been the worst thing possible for what has proved to be appendicitis, gastro-enteritis, or other serious abdominal trouble.

What the Mother Should Know

There are few who can afford to run up the doctor's bill by calling him in unnecessarily. To avoid this, and yet not run the risk of endangering the lives of those entrusted to her care, especially the little children who cannot tell clearly where the pain is or how badly they feel, it is imperative that every mother should know how to count the pulse, take the temperature, and be cognizant of at least a few of the primary symptoms of the most common diseases, especially the contagious ones, where the lack of early recognition and isolation may imperil the health or life of others.

The following table gives the primary symptoms, period of incubation, and usual time required for isolation of the most common contagious diseases. The number of days between exposure to and the development of a disease is called the period of incubation.

FIRST SYMPTOMS IN SOME OF THE MOST COMMON DISEASES

CONTAGIOUS DISEASES

DISEASE	PERIOD OF INCUBATION	SYMPTOMS	TIME OF ISOLATION
Mumps	Days 14-21 average 18	Swelling of the glands between ear and jaw, on either side or both.	From day when swelling first appears till 10 days after, usually 3 weeks.

CONTAGIOUS DISEASES (Continued)

DISEASE	PERIOD OF INCUBATION	SYMPTOMS	TIME OF ISOLATION
Chicken-pox	Days 12-16 average 14	Slight fever, after 24 hours small pimples appear on back and face.	From onset until last crust has fallen, usually 14 days.
German Measles	Days 6-18 average 14	Very slight fever, rash (if any) appears first on face, may only last a few hours. There may be headache and nausea.	From 2 days before rash till symptoms are gone. Sometimes 2 weeks.
Measles	Days 9-16 average 12	Sneezing, running from eyes and nose, face swollen, sore throat, cough, fever gradually rising, rash appears first on face and neck.	From first catarrhal symptoms until desquamation ceases, usually 24 days.
Small-pox	Days 9-16 average 16	Chill, rapidly rising temperature, intense headache, pain in back and legs, rash, small, red, hard pimples, appearing first on face and wrists.	From onset until last crust has fallen, usually 6 weeks.

CONTAGIOUS DISEASES (Continued)

DISEASE	PERIOD OF INCUBATION	SYMPTOMS	TIME OF ISOLATION
Scarlet-fever	Days 1-7 average 7	Sudden vomiting, sometimes chill or convulsions, high temperature, sore throat, tongue coated on edges, bright red in center, general malaise, typical rash appearing first on chest and shoulders.	From appearance of rash till desquamation has entirely ceased; usually 6 weeks.
Diphtheria	Days 1-6 average 6	Especially in the beginning of the disease the temperature is not as high as in tonsillitis; headache, nausea, sore throat, with white patches on the tonsils.	From onset till germs have entirely disappeared.

As it is sometimes difficult even for the physician to distinguish between diphtheria and tonsillitis without taking a culture for examination, when white patches appear on a child's throat it should be isolated and a doctor called in at once.

DISEASES NOT CONTAGIOUS

Children's Diseases

Colic. Give castor oil, then a few drops of peppermint in hot water (never soothing syrup); keep the baby warm and lying on his abdomen. Gentle rubbing in a circular direction, and the application of hot flannels will generally relieve it. If not, a physician should be notified as continued abdominal pain is a symptom of many serious disorders.

Cholera Infantum. Caused by over or improper feeding, heat and impure air. Symptoms: Diarrhoea and intestinal pain, excessive thirst, but no appetite. Try no home remedies, seek medical aid at once.

Intestinal Obstruction. Symptoms: Obstinate constipation, followed by vomiting and abdominal distention; usually not much temperature. Get medical advice promptly, as immediate operation may be imperative.

Convulsions. Caused by indigestion, worms, difficult dentition, or fright. Muscular twitchings coming on suddenly, sometimes even during sleep. Send for the doctor immediately, but do not await his arrival to put the baby in a hot bath. Give castor oil and an enema, according to directions given on page 55, using, if the child is small, a rubber catheter for a rectal tube.

Pneumonia. Primary symptoms: Chill followed by high temperature, cough, pain in chest, expectoration which gradually becomes rust colored and bloody. Put patient to bed and send for the doctor immediately.

Typhoid Fever. Primary symptoms: Temperature rising a little higher each day, nausea, headache, pain in back and limbs, nose bleed, sometimes constipation, sometimes diarrhoea, watery, yellow stools, abdominal pain. Put patient to bed and only allow liquid diet until the doctor comes.

Meningitis. May develop suddenly with continuous convulsions, or come on gradually with symptoms of fretfulness, restlessness, headache, vomiting, and intolerance of light and noise. Put patient to bed in a quiet, dark, well-aired room and only allow liquid diet till the doctor comes.

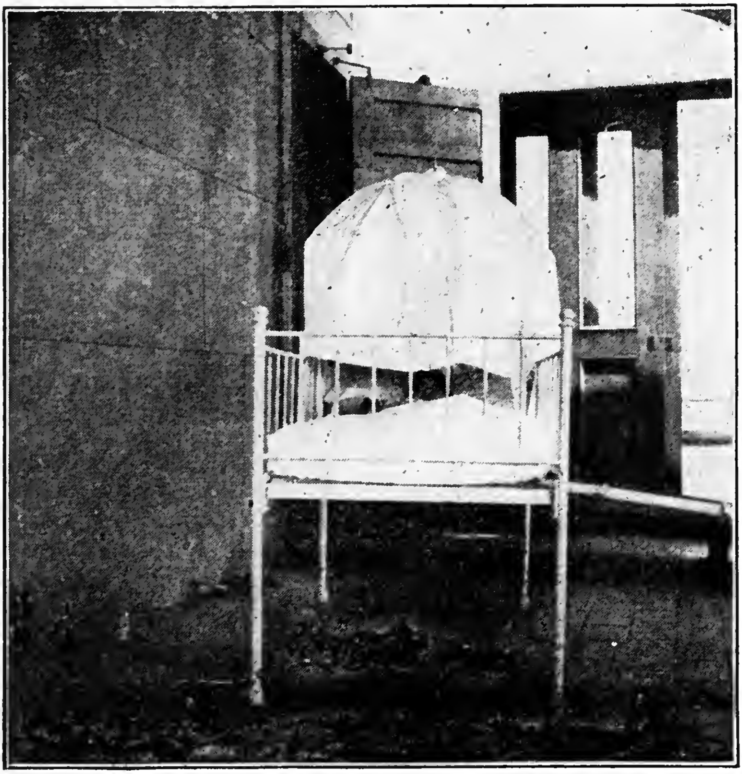
Croup. There are two forms of croup—the true or membranous and the false or spasmodic. The former is always associated with diphtheria, but since the use of antitoxine it has become a much rarer complication, seldom occurring when antitoxine is used. It comes on gradually.

False Croup

False croup comes on suddenly, generally in the middle of the night; it is as a rule the result of exposure to damp and cold, excitement, or indigestion.

The spasm is the result of the spasmodic closing of the glottis. Though not dangerous, it is very distressing and calls for immediate treatment. Relief usually can be obtained best by applying hot fomentations to the throat, inducing vomiting by giving a drink of tepid water and salt—a teaspoonful to the glass—and by steam inhalations.

The most effective way of giving inhalations is with the croup kettle and canopy. The quickest way to improvise these is to tie an umbrella to the top of the child's crib and over this drape two sheets, pinning them to the sides of the bed. They must overlap about one inch and hang down far enough over the sides and back of the bed to be tucked under the mattress. The lower third of the front space is left open for the admission of fresh air. Water is kept boiling in a kettle at the back of the bed by a gas or oil stove

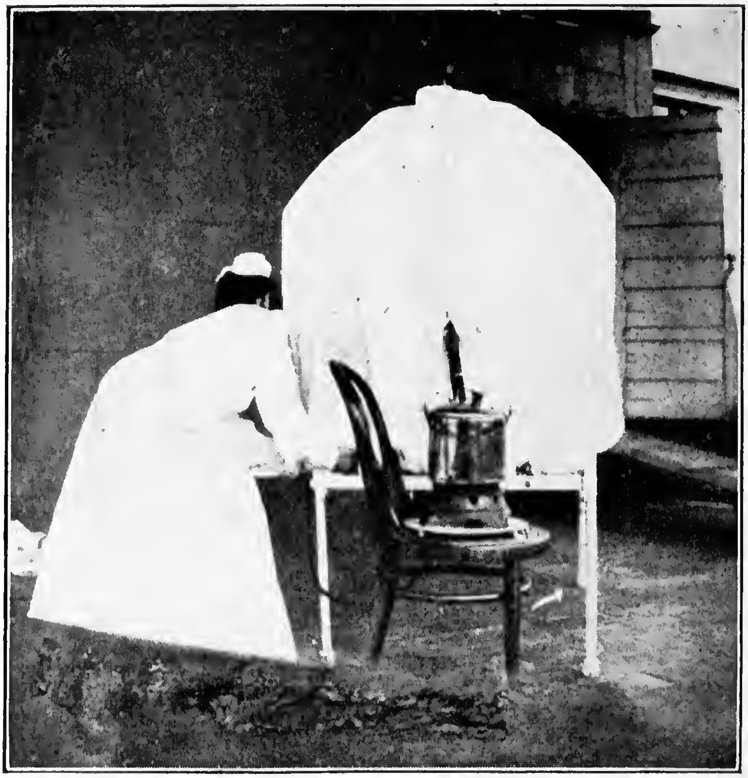


Canopy for Giving Steam Inhalations Made with a Sheet and Umbrella

and a cone of cardboard or stiff paper is attached to the spout and inserted between the overhanging sheets to carry the steam over the child's head.

Minor Troubles

In nearly all cases of slight indisposition, even diarrhœa, a cathartic such as castor oil or calomel, followed by salts such as Rochelle salts, magnesium sul-



Rear View of Croup Canopy Showing Stove, Kettle, and Tube for Steam

phate, or seidlitz powder, five or six hours later, together with rest and fluid or soft diet is indicated. *Give as little medicine as possible without a doctor's order.*

THE CHOICE, FURNISHING AND CARE OF THE SICK-ROOM

Sunshine, pure fresh air, and freedom from noise and odors are the principal things to be considered in choosing the sick-room. When possible it is advisable to have a room with a southern exposure. If there is a fireplace or grate in the room so much the better, as a chimney is an excellent medium for ventilation.

Despite the fact that the sick-room at the top of the house gives many stairs to climb, it is better to have it there. It is further removed from the noises of the street and house and the air is generally purer.

Furnishings

Only necessary articles of furniture should be retained; all heavy hangings, draperies, and upholstered furniture must be removed. Care must be taken, however, that the room is not made too bare and unattractive. Short, washable curtains; clean, white linen covers for the tables; a few fresh flowers will help to make the sick-room bright and cheerful. Flowers should be removed at night, the water they are in changed daily, and they should never be tolerated after they begin to fade.

The Bed

The ideal bed is iron or brass; single or three-quarter width. The double bed is unadvisable, for owing to its width, the mattress is apt to sink in the middle and it is then almost impossible to keep the under sheets drawn tightly enough to prevent wrinkles. The bed should be at least twenty-five inches in height, but if it is not, can easily be made so by placing heavy blocks of wood under each leg. Hollows about two inches in depth should be made in the blocks to fit the ends of the legs. Especially if the patient is liable to be ill long, the trouble of doing this is well repaid by the added convenience in lifting and working over the patient.

The Mattress

A hair mattress is by far the best kind to have; the feather one the worst. Not only is the latter too heating, but when occupied it is almost impossible to make the bed properly.

The bed should be placed far enough from the walls to give access on all sides, care being taken to avoid having the light in the patient's eyes.

Lighting

The best plan is to have the window behind the bed; then more sun and light can be admitted without disturbing the patient. Except in certain cases, it is a mistake to keep the sick-room darkened.

Besides the bed, there should be two or three chairs in the room; one a comfortable arm chair with high back. If upholstered, it should be encased in a pretty, light, washable cover. Rocking chairs should never be permitted in the sick-room; when sitting in them one is almost sure to rock, and the motion is very apt to irritate the patient.

Two tables are necessary; on one should be kept writing material, where the doctor can write his orders and the nurse keep the record of the patient's condition. The second table can be near the bedside to hold the patient's bell; also her food-tray; the latter must always be removed as soon as the meal is finished. Never leave empty or half empty glasses of milk, cups of broth, etc., standing by the patient.

Bedside Table

There is a bedside table—made on purpose for use in the sick-room—which is very convenient. The top extends over the bed in front of the patient; it is adjustable and has a foot piece which goes under the bed and keeps the table from upsetting. (See page 30.)

Medicine bottles and all necessary utensils should be kept in an adjoining room, if possible.

The floor should be swept with a soft broom covered with cheese cloth, or other soft material which is free from lint. Carpets are very objectionable; small rugs which can be removed and shaken daily, being preferable. If the carpet must remain, see that it is kept well dusted, and that no dust is raised while doing so. The best way to do this to to sweep with a damp broom, going over it afterwards with a damp cloth pinned over the broom. Do not have this too wet or it will injure the carpet.

When it is necessary for the nurse to sleep in the room, the cot is the most convenient arrangement, as it is comfortable, inexpensive and can be easily removed in the day time.

Dusting

Never use a feather duster but clean, soft dust cloths which may be washed out every day. Except for the varnished furniture, it is better to have the duster slightly damp, as this will prevent scattering of the dust.

Ventilation

The air in the sick-room must be as pure as the air outside. The value of fresh air as an aid to recovery is sadly underrated. The open fireplace is one of the best methods of ventilation. A current of air can be created in summer by placing a lamp or a candle in the chimney place, and in winter a wood or a coal fire. Next to a fireplace, an open stove gives the best means of ventilation.

Window ventilation is best obtained by double windows with double sashes. The lower sash of the outer window is raised about two feet; the upper sash of the inner window lowered about the same distance. The passage of air being thus directed upward, a direct draught upon the patient will not be produced, if windows and doors on the opposite side of the room are kept closed. Where there are single windows, the same effect can be obtained by tacking the lower end of a piece of cotton, about twelve inches in depth, to the frame of the upper sash and to the top of the window frame; then lower the sash about ten inches. When less air is desired the lower sash can be raised and a board fitted to the opening; the air then passes upward between the sashes.

Airing

In addition to this slight continuous ventilation, the window must be opened and the entire air of the sick-room changed at least twice a day. In doing this, be careful that there is no draught and that the patient has extra blankets. If there is no screen at hand, a large umbrella will prove quite effective in protecting the patient's head from the direct current of air. If it is necessary to warm the air before it enters the patient's room, the window in an adjoining, well-heated room may be opened, the door between the rooms being left slightly ajar. The corridor or bath room (especially the bath room) should not be used for this purpose.

Fuel and Ashes

Hard coal should be used if the room is heated by a stove on account of its freedom from dust.

In removing the ashes, they should be sprinkled with water first to prevent flying, then quietly shoveled up. The coal can be added in paper bags filled outside, thus avoiding all noise likely to disturb the patient.

The temperature of the sick-room should be 68 degrees F at night and 70 degrees F during the day.

CARE OF THE PATIENT

A few essential points to be remembered in caring for the sick may be stated briefly.

Care of the Nurse

To properly care for a patient those undertaking the responsibility of the nursing must take proper care of *themselves.* Rest, recreation, and out of door exercise are positive necessities.

If the same member of the family has both day and night nursing to do she should always dress herself as comfortably as possible for the night. A cold bath in the morning, with complete change of clothing, will be found very refreshing.

Dresses of light wash material should always be worn when attending the sick, but dresses and skirts must never be stiffly starched, as the rustling noise they make is very annoying to patients. Squeaking shoes are another abomination.

"Nevers"

Never whisper in or near the sick-room.

Never discuss the patient's condition with her, or with anyone else in her hearing.

Never tell the patient what her temperature, pulse, etc., are, not even when they are normal.

Never tell the patient what medication you are giving her.

Never lean nor sit on the patient's bed, and be careful not to knock against it in passing.

When Speaking

When speaking to a patient always stand in front of her, where she can see you; be particularly careful not to speak to her suddenly from behind, for when people are ill and nervous they are easily startled.

Keep door and window hinges well oiled; nothing is more aggravating than a squeaking door.

When windows rattle, wedge them apart between the sashes with pieces of wood or newspaper.

At Night

Especially at night, or, rather, when getting ready for the night, attention must be paid to anything likely to prove a disturbing element to the patient's rest.

Before the patient goes to sleep see that you have everything at hand that you are likely to need for the night: Extra blankets—a shade for the light, if necessary—coal prepared in paper bags, as previously described—milk—water—all the medicines you will require—ice, etc. Wrapping the ice in flannel or newspaper will keep it from melting. A hat pin makes an excellent and noiseless ice-pick. A large tin pan, enveloped in a blanket, will make a serviceable refrigerator in which to keep your ice, broth, milk and water.

A shade for the lamp or gas can be easily made out of green or other dark colored cambric, but be sure that the globe over which it is pinned is far enough from the flame to avoid scorching the cambric.

Bed Making

An uncomfortable bed is a great addition to the miseries of an invalid, therefore, one of the first essentials to be learned is how to make a bed.

The mattress is covered by a sheet, stretched tightly and tucked firmly as far under it as possible; folding the corners like an envelope helps to keep it firm.

The Draw Sheet

Another sheet called the "draw sheet" is also used under the patient; this is put on with the length across the bed, thus allowing a considerable fold under the mattress, thereby securing a further means of keeping the sheet tight. When putting the draw sheet on care must be taken to have it perfectly straight; it is first tucked in on one side, well under the mattress. In tucking in the second side it is best to begin in the middle, going first towards the bottom, then from the middle to the top, pulling it very tightly. The top sheet and blankets (single blankets are preferable to double) should be put on separately, the corners being folded in, in the same manner as the under sheet. If it is not convenient to obtain a spread of dimity, or other light material, it is better to use a sheet, as the ordinary spread is heavy and gives comparatively little warmth.

Protecting the Mattress

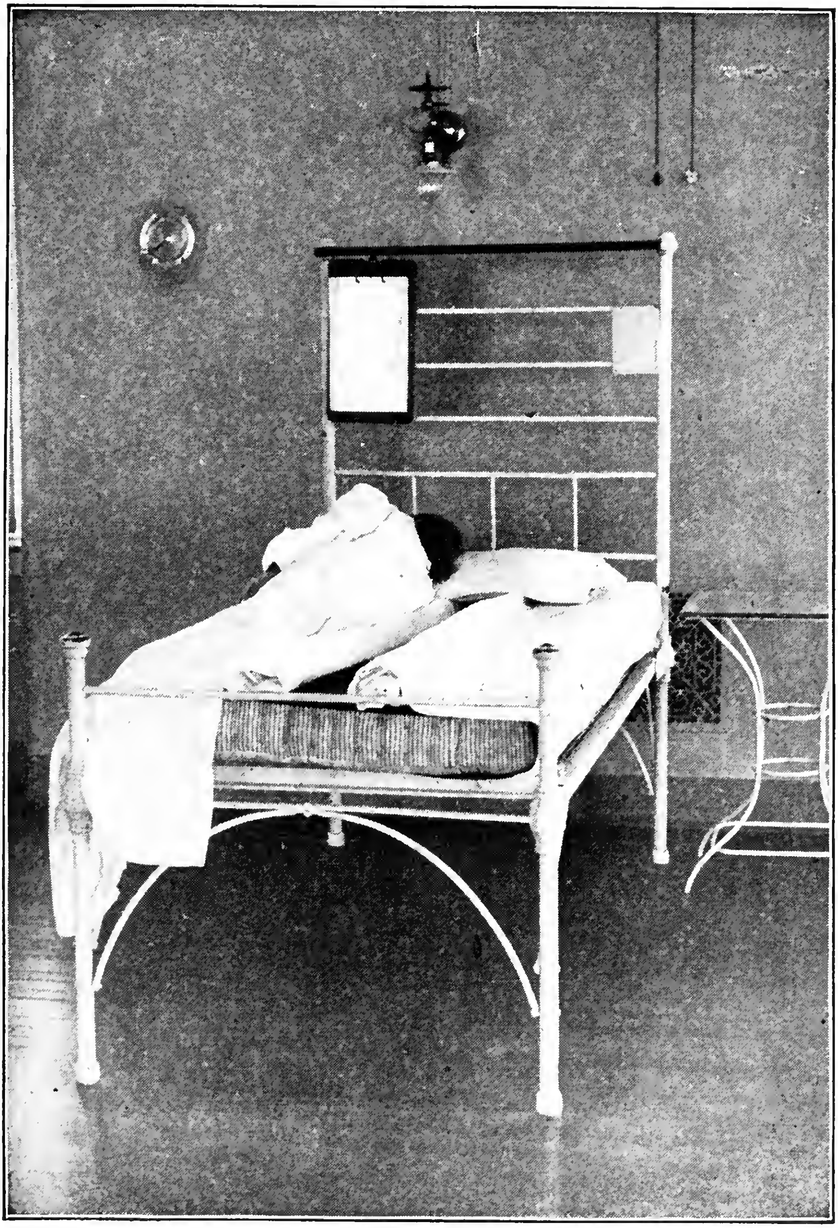
When it is necessary to protect the mattress a rubber sheet is placed between the lower and draw sheets. White double faced rubber is the nicest for home use. The single faced rubber will answer the purpose and is cheaper, but it is not so easily kept clean. Either can be obtained at any rubber store.

When impossible to get the regular rubber sheeting thin oil cloth, such as is used for covering tables, will serve. In cases of emergency, several thicknesses of newspapers may be used until something better can be obtained.

CHANGING THE BED OF A HELPLESS PATIENT

Before starting to change the bedding be sure that you have everything necessary near at hand, and that the bed clothes are all well aired, perfectly dry and warm.

First take off the spread, fold it neatly; next take off the top blanket, and hang it out to air. Fold the other blanket and upper sheet over the patient, leaving the ends just long enough to cover her when you turn her over. This method answers a threefold purpose: (1) it has a neat appearance; (2) it replaces the



CHANGING THE DRAW SHEET

discarded blanket, and (3) the clothes are not in the way while you work. Loosen the lower sheets by raising the mattress with one hand while drawing out the sheets with the other. Raising the mattress is important, because the draw sheet has been tucked so far under the mattress that otherwise you risk not only jolting the patient but also tearing the sheets. Remove the pillows and if the patient does not object to lying flat for a while leave them out; if she does, one can be replaced. It is necessary to take them out to turn them and to make sure that there are no crumbs caught between them or in the pillow cases.

Changing the Night Gown

The night gown is the next thing changed. Have the patient lie on her back and flex her knees; if she is well enough she can easily raise herself while in this position; if not, place one hand under the buttocks and raise her, as you draw the gown up with the other hand, then raise the shoulders in like manner, drawing the gown up over them and the head before taking out the arms.

In putting on the clean gown roll the skirt up, and put the patient's head through the hole. Putting your hand through one sleeve grasp the patient's hand and draw it through; then do likewise with the other sleeve. The gown is then pulled down in the same manner as the soiled one was taken off.

The easiest way to change the under sheets is first to turn the patient on her side.

To do this, stand on the side towards which you will turn her, slip one hand over and under her, with your arm slightly crooked, so that the hand and forearm will support and control one shoulder, the elbow support the back of the head, and the arm the other shoulder. Slip your other arm under the patient slantwise across the buttocks, so that the hand is under the small of the back. In this way the patient is well supported as you gently turn her towards you. If there is an assistant, one can hold her thus while the other manipulates the sheets; if not, and the patient needs to be supported, a pillow placed well up against her back will answer the purpose.

Turning the Patient

The sheets to be changed are folded close to the back of the patient, making the fold as flat as possible. The clean sheet is either folded fan shape or rolled to its centre, the roll or fold, as the case may be, is placed close to the sheet being removed, the loose edge is tucked in, as far under the mattress as possible, the patient is then rolled gently over on to the clean sheet, the soiled one removed, and the clean sheet well stretched, and tucked in according to the directions given in the making of the bed.

Changing the Draw Sheet

The top sheet is next changed. Placing the clean sheet over the sheet and blanket which are still over the patient; on top of this put the blanket which has been airing, draw the other blanket and sheet from underneath, then tuck in the clean ones, put on the second blanket, if one is necessary, then the spread, and arrange the pillows.

Changing the Top Sheet

The draw sheet, upper sheet, and night gown should be changed twice a day when the patient is not too ill; if they are not soiled when removed, air them well, after which they may be used again.

When the patient is not allowed to be bathed, her back should be washed with soap and warm water, rubbed with alcohol and powdered with talcum powder. This should be done while she is turned on her side for the changing of the sheet. When the night gown is closed in the back it is sometimes more convenient not to put the clean gown on until the patient's back has been washed. In such circumstances wrap a small shawl around the patient.

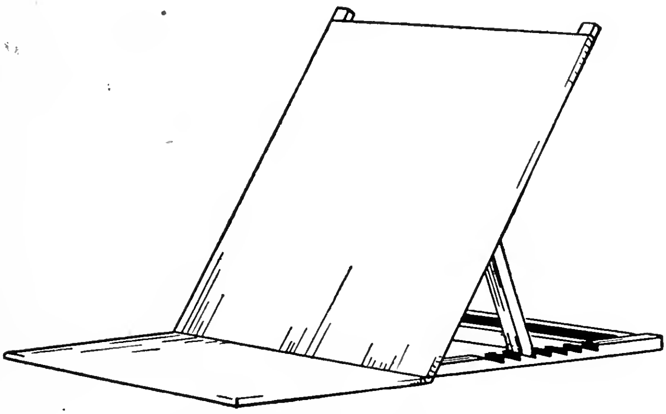
Special Gowns

When for any reason it is inadvisable to move the patient, and it is necessary for her to lie on her back, it is convenient to have short gowns, open in the back, buttoned at the back of the neck and shoulders. The skirts can be drawn from under the patient, enabling her to lie on the sheet, which it is comparatively easy to keep free from wrinkles. Another important advantage of the short gown is the ease with which it can be changed. Large collars or ruffles at the neck of the gown are very objectionable in illness.

When changing the gown of a patient whose arm is disabled, the sleeve should be taken from the affected arm last, and the sleeve of the fresh gown put on first.

LIFTING AND HANDLING THE PATIENT

When lifting a patient it is important to stand firmly; to do this the feet should be placed well apart, bracing one foot against the leg of the bed. Try to bend the back as little as possible, make the knees do the bending. In lifting, endeavor to have the weight come on your shoulders, not on your back. For example, when a patient is to be helped into a sitting position, bend your knees till your shoulder is only



A BACK REST, CANVAS COVERED.

slightly higher than the patient's, then have her put her arm across your shoulders, have your shoulder directly under her armpit, your elbow supporting her head, your hand under her other armpit—your other hand is thus free to arrange the pillows. Now raise the patient. By using this method your shoulder bears the burden, whereas if you attempt to raise the patient by bending your back, or if you have the patient's arm around your neck, the entire weight must be sustained by your back, which will soon become strained.

The Back Rest

A back rest should always be provided when the patient sits up in bed for the first time. Many varieties of these are to be had, and they are inexpensive; some are made entirely of wood, others have a wooden framework with canvas stretched across it. A good substitute for the back rest is a straight back chair turned upside down. The pillows should be placed across the rest in such a way that the head will not be thrown forward and that the small of the back will be well supported.

Foot Brace

When the patient is obliged to sit up all, or nearly all the time, something should be provided for her to brace her feet against. A convenient arrangement for this purpose is a board the same length as the width of the bed and about twelve inches wide, placed between double folds of strong muslin which must be long enough to tie around the head of the bed when the board is supporting the patient's feet. The board may be padded on one side if desired.

Change of Position

When a patient has slipped down in bed and needs to be drawn up, place one arm under the shoulders in the usual crooked position so that your elbow may support her head, and taking a firm grip under the upper part of her arm, put your other arm under the thighs, and move the patient gently upwards. If well enough the patient can flex her knees and help in the movement.

If a patient is so heavy that two persons are required to move her, they should stand on opposite sides of the bed and reaching across the patient's back firmly grasp her under the armpits, their crossed arms thus forming a V-shaped rest for her head while they clasp each other's hands under her thighs.

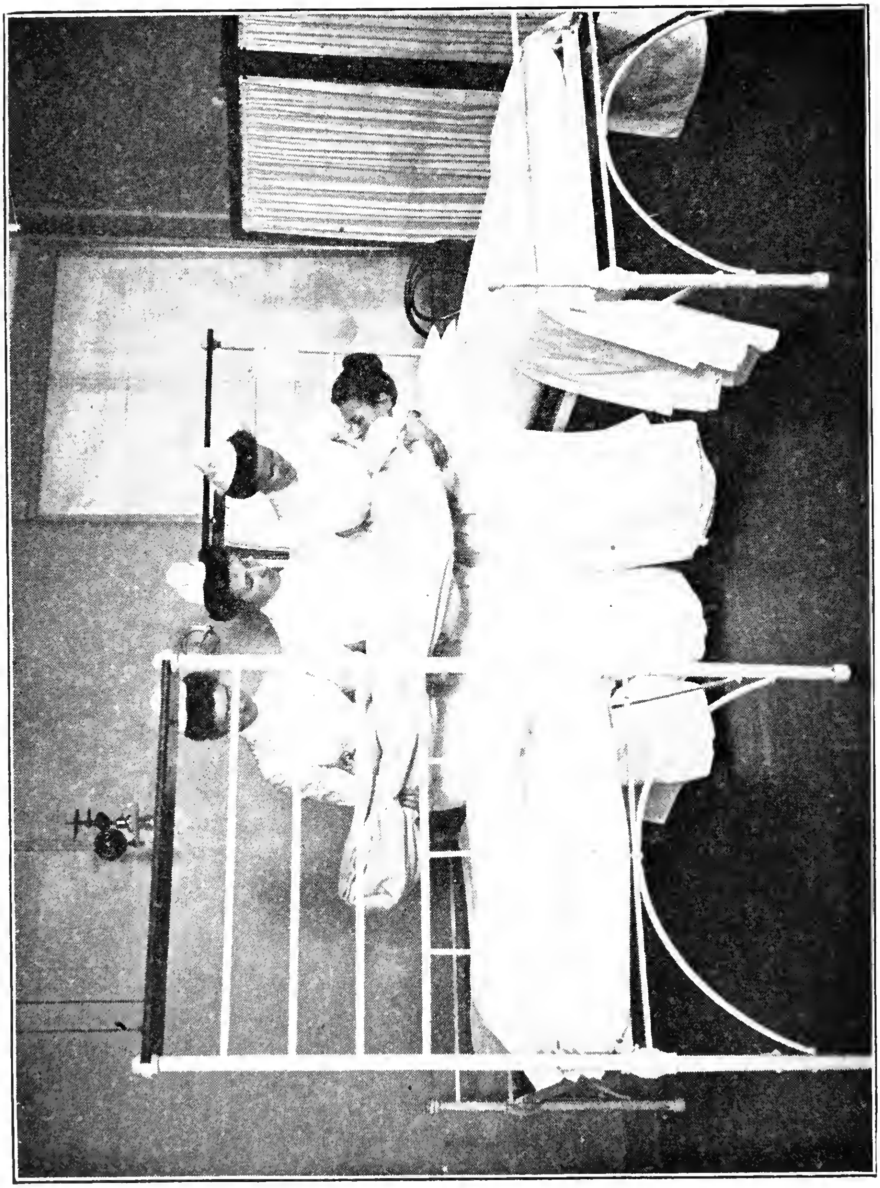
When the patient is well enough to help herself, putting a stout, broad piece of muslin round the foot of the bed with the ends long enough to be grasped, will help her to assume a sitting position; one round the top of the bed will help her to pull herself up higher in bed.

Changing the Patient from One Bed to Another

If necessary to change your charge from one bed to another, place the beds about five feet apart, parallel with each other, with the head of one on a line with the foot of the other. Unless the patient is very light there should be two to lift, both standing on the same side (between the beds). One puts her arms under the shoulders and buttocks, the other under the back and thighs. If possible have the patient hold herself stiff. Lift her gently in unison, turn round and place her on the fresh bed.

If the patient is heavy three may be required to do this well. Under these circumstances the first lifter supports the head and small of the back, the second the shoulders and thighs, the third the buttocks and under the knees.

When the lighting of the room or other considerations render it unadvisable to change the position of



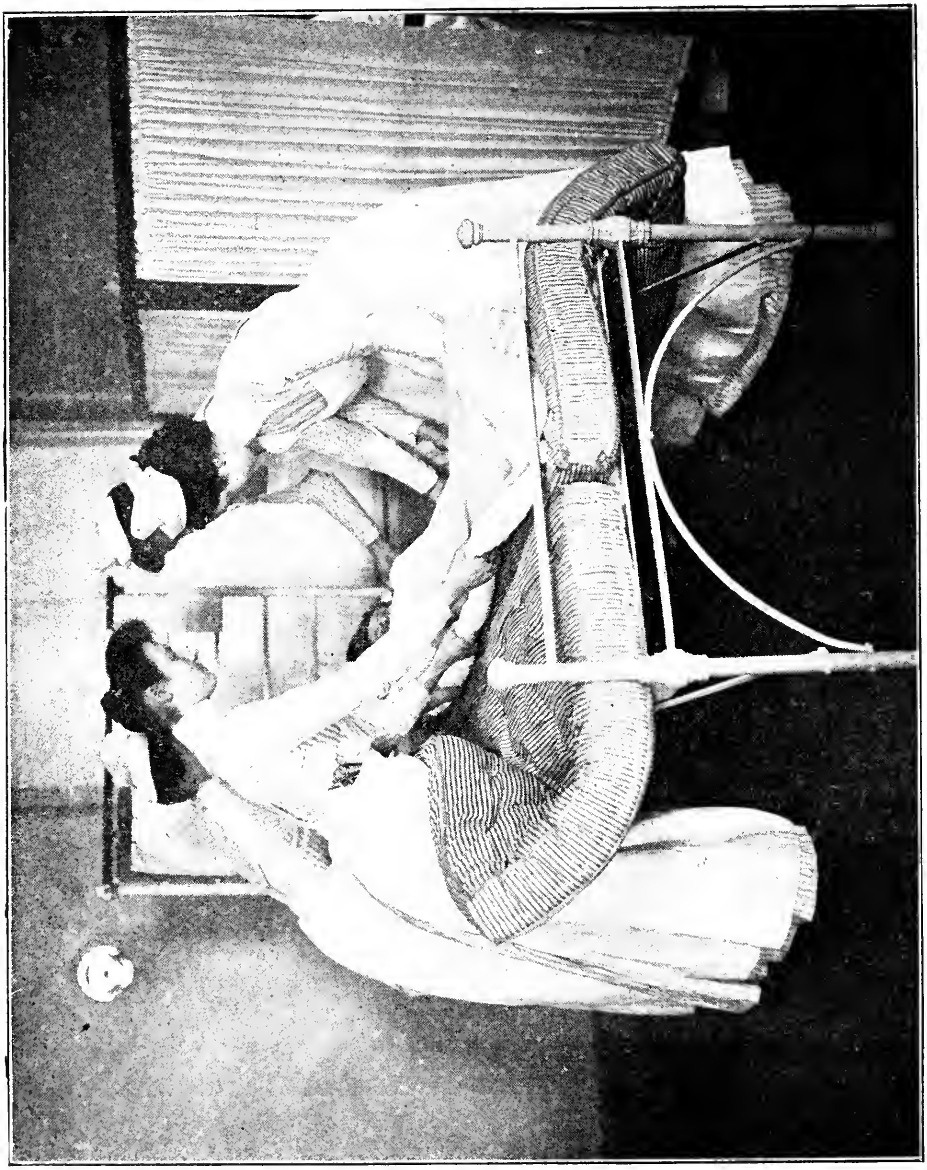
CHANGING A PATIENT FROM ONE BED TO ANOTHER the head of the bed, they are placed near together with the heads on a line. The patient is lifted from the far side of the first bed, carried around between the two, and laid down in the second bed. This entails a longer carry, but if all work in unison it is not difficult.

TO CHANGE THE MATTRESS WITH THE PATIENT IN BED

To the uninitiated this seems an almost impossible feat. In reality, if done according to rule, it is not much harder than changing the under sheets. If the patient is heavy four people will be required to accomplish this deftly, two on either side of the bed. The sheets are loosened on all sides; the top sheets and the blankets treated in the same manner as when the bed clothes were changed; the under sheets are rolled tightly up to the patient's side (the roll being undermost). Using these rolls for support, the patient is moved to one side of the mattress; this side is then pulled to the centre of the bed, curving the mattress upwards; the fresh mattress is placed alongside, the patient lifted by the bed-clothes on to it, the discarded mattress removed, the fresh one drawn into place, and the patient lifted to the centre; the sheets are again unrolled and tucked in place.

THE PREVENTION AND CURE OF BED SORES

A bed sore is gangrene, or death of the tissue of the affected parts. The bony prominences such as the lower part of the spine, the shoulder blades, elbows,



CHANGING THE MATTRESS WITH THE PATIENT IN BED and heels are the parts most likely to be affected. Moisture, wrinkles, crumbs, and a too long continuance in one position are the pre-disposing causes, therefore these conditions must all be guarded against.

Avoid Moisture

The presence of moisture is generally due to perspiration, or discharge from wound, bowels or bladder. When the two latter are the causes pads made of oakum or jute placed in cheese-cloth or old muslin, put on the patient like a child's diaper, will save the bed linen. These must be changed as often as necessary, and the patient well washed with warm water and soap; dusting with a little talcum, starch, or rice powder will help to keep the skin dry and soft and it will also prevent chapping. Crumbs and wrinkles must also be guarded against. By keeping the draw sheet tightly drawn and tucked far under the mattress the latter will be overcome; the former must be looked for after every meal; brushing them out with the hand is the most efficient way, but a small whisk-broom may be used.

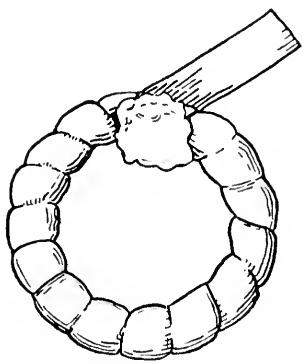
At least twice a day all parts likely to be affected, especially the back, should be washed with warm water and soap, rubbed with 50 per cent alcohol, and dusted with talcum. This not only helps to prevent bed-sores but is unspeakably refreshing to the weary invalid. Avoid using too much powder or it will cake and do more harm than good.

Artificial Skin

A preparation of equal parts collodion and castor oil painted over the surface will often prevent a break-down of the tissue, by forming an artificial skin.

Relieving Pressure

Frequent change of position is another important means in the prevention of bed-sores. Prop the patient over on her side by putting a couple of pillows lengthwise behind her, one under her shoulders, the other under the lower part of her back. Rings made of batting or sheet wadding wound with bandages are excellent mediums for relieving pressure. They should be made with the hole just large enough to permit of the bony prominence fitting into it. When the patient has to lie for some time on her back, often considerable relief is given by flexing the knees. They can be supported either by a pillow doubled and tied to hold it so (the pointed side placed next the body), or a cylindrical pillow made like the old-fashioned bolster, only smaller and stuffed with hair. Small pillows or hot water bags filled with cool water, placed under the small of the back, will help to make a long continuance of the dorsal position bearable.



Wadding Ring, to Relieve Pressure

All pillows should be shaken and turned frequently.

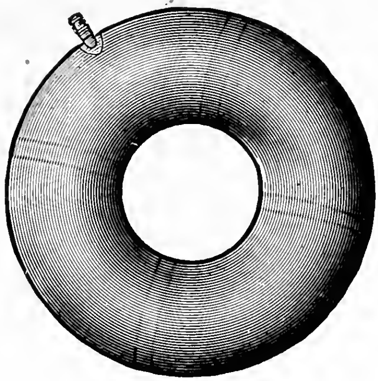
Care of a Sore

If the skin should become broken, the resulting sore should be washed daily with bichloride of mercury 1-2000, and a dressing applied. Gauze soaked in balsam of Peru or an ointment made of castor oil and zinc oxide powder are generally found efficacious.

CONVALESCENCE

The most anxious moments in nursing are certainly when the disease is at its height, but by far the most trying are, as a rule, during the time of convalescence. It is then that the greatest exercise of tact, discernment, self-control and patience on the part of the attendant are necessary.

Relapse, except in the germ diseases, is nearly always due to over-feeding, over-exertion, or nervous excitement.



Rubber Air Cushion

The diet is a very important factor in the treatment of convalescents. Carry out the doctor's orders minutely regarding it. Have, so far as you can, things that you know the patient likes. If she expresses a preference for a certain dish have it if allowable, but as a rule it is not wise to consult her on the subject.

Serving of Meals

Always serve your patient's meals as daintily as possible; have the tray covered with a spotless table napkin or tray cover; use the prettiest china available; even one bright flower with a little green is a great attraction. But above all see that the food is properly cooked and properly served; that all hot things are very hot, and cold ones really cold. More salt and less sugar will generally be wanted than when in

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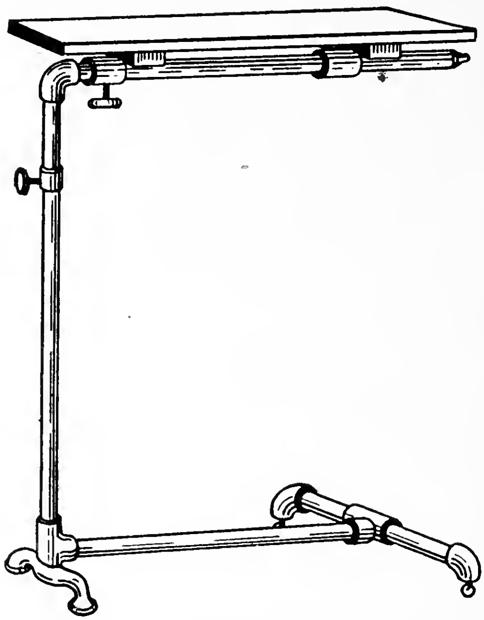
health. Highly seasoned food is not advisable or often desired even by those who like it when well.

It is better to set before the invalid too little than too much, for it is easy to get more, and the sight of too much food on the tray is apt to imbue anyone



A Bedside Table Convenient for Serving Meals

whose appetite is poor with a dislike for it. Besides, as the digestive functions are weakened during and after illness, it is better for a time to serve food in smaller quantities and oftener; for instance, give an egg nog, milk punch, egg lemonade, egg albumen, or other light, easily digested drink between breakfast and the noonday meal, and again at three or four o'clock in the afternoon. A glass of hot milk given at bed-time will often induce sleep.

Amusing the Patient

Keeping the patient amused is another important item in the care of the convalescent. A few visitors (provided they do not stay too long, talk too much, or give any worrying or disagreeable news) will often help to brighten up the patient. Playing cards or games, reading aloud to her, etc., will help to pass away the time and tire her less than talking.

When people have been ill for some time the muscles of the eyes are apt to be weak and will be easily strained, so they ought not to be allowed to read much themselves, especially while they are in the recumbent position.

Sitting Up for the First Time

Those who are strong and well little realize the exertion and excitement caused by the first sitting up, after being confined to the bed for some time.

The period is usually limited to half an hour the first day, gradually increasing the time as the patient can stand it. Do not wait for her to complain of fatigue; on showing the first signs of it she should be put to bed. Of course there are patients who think themselves a great deal worse than they really are, and who have to be encouraged to sit up longer than they think they can. At such times the pulse is a good guide.

Do not really dress the patient until she is well enough to walk around. Warm stockings, bed slippers, a warm wrapper and blankets are all that are necessary.

Lifting into a Chair

If the patient has been seriously ill she should not be allowed to stand or exert herself in the least when sitting up the first few times. If not too heavy she can be lifted by one person. The arms of the patient are locked about the neck of the attendant, who, placing one arm under the thigh, the other under the back, lifts the patient into the chair, the back of which is parallel with the foot of the bed.

When two people are required to do the lifting they should stand at the same side of the bed, placing the hands, one under the shoulders and buttocks, the other under the thighs and ankles, and lifting in unison, turn and seat the patient gently in the chair. The chair should be made comfortable with pillows, and the patient kept warm with blankets. When possible the chair should be carried carefully into an adjoining, well-aired room. The sick-room and bed should be well aired and made ready immediately for the patient's return, as it may be necessary for her to be put back to bed sooner than expected.

CARE OF THE HAIR, MOUTH, TEETH

While caring for the hair protect the pillow-case with a towel. When the hair is tangled always hold it between the tangle and the head to avoid pulling it. Rubbing a little vaseline into the scalp will help to get the snarls out more easily. To avoid tangles the hair should be brushed twice daily and braided in two plaits.

If the scalp is kept clean by rubbing it occasionally with a little alcohol and water (equal parts) the hair always well brushed, and rubbed once in a while between a damp wash-rag, it may not be necessary to wash it for quite a while.

Washing the Hair

When it must be washed, protect the pillow and upper part of the bed with a rubber sheet covered with a bath towel. Pull the pillows down under the back so that the head extends somewhat beyond them and over a basin of water. Have a slop jar at hand in which to empty the water, and plenty of warm water to wash the soap out thoroughly. Support the head with one hand while you wash it. Dry the hair well after washing. A little alcohol or hair tonic containing it, well rubbed into the scalp, will lessen the chance of the patient taking cold.

Care of the Teeth

When the patient is unable to brush her own teeth it is often easier to do it for her with clean gauze wrapped around the index finger or the end of a piece of whalebone, than with a tooth-brush. In illness sordes (tartar) is apt to collect between the teeth unless they are very frequently and carefully cleansed.

Care of the Mouth

Clean not only the teeth but also the gums, the roof of the mouth and the tongue. Whalebone and gauze are far better for this purpose than the brush. When a patient is on milk diet her tongue and mouth should be cleansed after each feeding.

Some good mouth washes are:

(1) Equal parts of listerine, boric acid 4 per cent, lemon juice and water.

(2) Listerine, one ounce; peroxide of hydrogen, three drachms; alboline, one drachm.

(3) Tincture of myrrh, half a drachm; soda bicarbonate, grains twenty; aboline, one drachm.

(4) Listerine and water, equal parts.

BATHS AND BATHING

Perhaps there is nothing that will give greater refreshment to the invalid, obliged to lie in bed day after day, than a bath. Unless contrary to the physician's orders, one should be given every day. If given in a warm room, without exposure, there is absolutely no danger of the patient taking cold. To make matters doubly sure, before taking out of the bath blankets, rub the patient all over with 50 per cent alcohol.

The Cleansing Bath

Never give a bath until an hour after a meal. Before beginning see that the room is not only warm but free from draughts, also that you have everything needed at hand. It is best to have the water in a foot tub; it will keep warm longer than in a shallow basin. Have a pitcher of hot water to keep the bath the required temperature.

A large blanket, face and bath towels, wash cloths, alcohol and powder are the other necessary articles. Slip the blanket under the patient. If it is not wide enough to come well round her and also for the ends to overlap, use two. The blanket may be covered by a sheet if necessary but the wool next the body is desirable.

Take off the night-gown and fold down the upper bed clothes—the face and neck are washed first and well dried, then the arms and hands. Be particular about drying between the fingers, also around and inside the ears. Especially while washing the face have a firm touch. Expose only one portion of the body at a time, and that not longer than necessary. Dry each part well before going on to the next; in order not to fatigue the patient, work as quickly as possible. It should be necessary to turn her only once. The towels should be warmed by wrapping them around a hot water bottle. It is well to give hot broth or milk soon after the bath.

The Foot Bath

To give a foot bath, loosen the bed clothes at the bottom, protect the bed with a blanket, put the foot tub, half full of water lengthwise on the bed, flex the patient's knees, raise her feet with one hand while you draw the tub under them with the other; wrap a blanket round tub and knees.

When mustard is desired, make a paste of the mustard—about two tablespoonsful to a large foot tub. The feet remain in about twenty minutes, the bath being kept at the same temperature by the addition of hot water from time to time. Be careful in adding the hot water not to pour it in near the feet.

When the bath is over wrap the feet in the blanket for a few minutes, then dry.

Baths for Reduction of Temperature

To give a bath for the reduction of temperature a large rubber (covered with a sheet) is necessary to protect the bed, as a considerable amount of water must be used.

There are several different kinds of bed baths given for this purpose. Sometimes the patient is simply sponged off with cold water, at others a hot sponge comes first, followed by the cold which often consists of equal parts of alcohol and water, made colder at times by the addition of ice. The doctor always orders the temperature of the bath, and also the duration, which is generally from ten to twenty minutes.

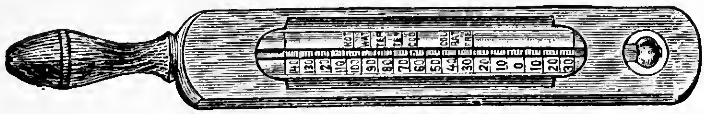
In giving these baths, use slow, long, curving, downward strokes, and plenty of water. Where there is a high temperature there is no danger of catching cold, and as eradiation of heat is the effect sought, the patient should be exposed as much as possible. It is often desirable, when the sponging is over, to rub the patient with alcohol, and fan till dry.

"Brand" Treatment

When possible, the "Brand" treatment is used for the reduction of temperature (especially in typhoid). For this, a portable tub, which can be wheeled to the bedside, is required. It would not be safe to give such a bath without the assistance of a doctor or trained nurse; it is, therefore, not worth while going into details, and, except in cases of long continued fever, the bed bath is generally all that is necessary.

Hot Baths to Induce Perspiration or Quiet the Nerves

When given a hot bath in a tub, fill the tub three-fourths full of water; the exact temperature will be ordered by the doctor, usually it is from 106 degrees F to 110 degrees F. The doctor also states how long he wishes the patient to remain in the bath. When giving a hot bath of any kind, for any purpose, always apply cold cloths or an ice cap to the head. A hot drink given either while the patient is in the tub



BATH THERMOMETER

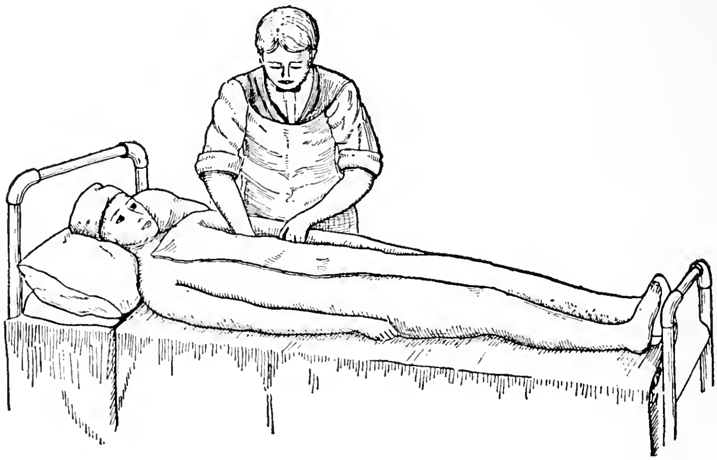
or after the return to bed will further induce perspiration. Mustard is sometimes added to these baths, just as it is to the foot bath.

Precautions

While in the tub the patient's pulse must be noted carefully, as such baths are sometimes very depressing to the heart. After the bath the patient must go to bed immediately, and remain there well covered, and care must be taken to have warm clothing going from the bath to the bed. These baths are also given to children in convulsions.

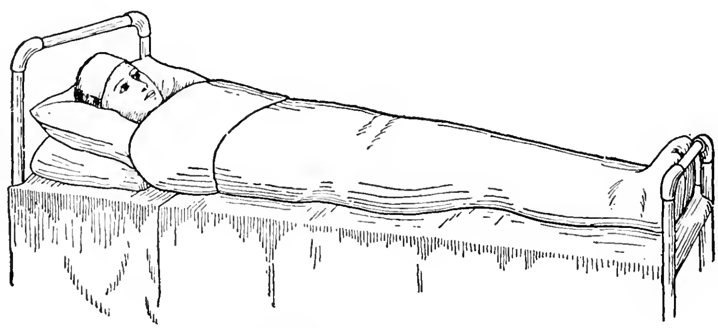
The Hot-pa or Sweat

The hot-pack, or sweat, is generally considered a better medium for inducing perspiration. To give this protect the bed with a rubber sheet or oil cloth, wring out two old blankets in water 130 degrees F, put one under the patient and around one arm and leg, the other over the patient and around the other arm and



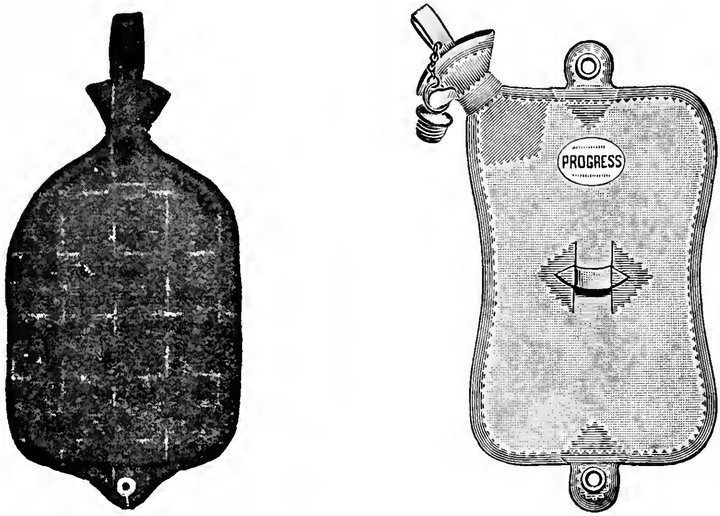
GIVING A HOT-PACK

leg; put an ice cap or cold compress on the head, a hot water bag at the feet, another over the heart,



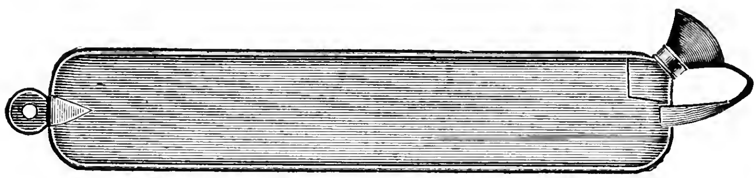
HOT-PACK COMPLETED

others along the side, over all wrap a couple of dry blankets; give a hot drink. The patient generally remains in the pack from twenty minutes to half an hour. The pulse should be taken every five minutes, and as



HOT WATER BOTTLES

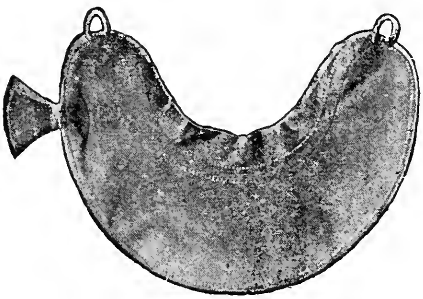
the hands are under the blankets it must be taken at the temporal artery.



HOT WATER BOTTLE FOR THE SPINE

After being taken out of the pack the patient should be rolled in a dry blanket and remain so for an hour.

Except where a light weight is desirable, as over the heart and abdomen, a good substitute for the rubber hot water bag is a stone bottle; even a glass one can be used, and if a wire a couple of inches longer than the bottle is put into it to act as a heat conductor, it can be filled with quite hot water without breaking. When using hot water bags or bottles of any kind, precautions must be taken to avoid burning the patient, which is very easily done, especially with old people, or where from any cause, the circulation of the blood is sluggish or the tissues in poor condition; therefore, see that the bottles are tightly corked, that they are well and securely covered (flannel bags slightly larger than the bottles make the best covering); never put them too near the patient, and remember that when the patient is restless the bags are apt to slip nearer than you intended them to be.



Water Bottle for the Throat

Salt Baths

Salt baths are given for their tonic effects. A bath sufficiently strong to redden the skin and have an exhilarating effect will require ten pounds of ordinary sea salt to a bath tub about half full of water.

The average standard temperature for baths is as follows:

Cold......	33°-65° Fahr.	Tepid.	85°- 92° Fahr.
Cool......	67°-75° Fahr.	Warm	92°- 98° Fahr.
Temperate.	75°-85° Fahr.	Hot..	98°-112° Fahr.

The regular bath thermometer is encased in wood to protect it from hard usage, but the ordinary atmospheric thermometer will answer the purpose just as well. Mix the water well before taking the temperature.

SICK ROOM METHODS

Taking and Recording Temperature, Pulse and Respiration

Observation and Recording of Symptoms

The heat of the blood is ascertained by means of the clinical thermometer. These thermometers are self registering and vary in delicacy, the finest ones registering in one minute, others in from three to five minutes. The more expensive ones magnify the scale, and are therefore easier for the novice to read. Hick's thermometer is probably the best. **Clinical Thermometer**

The temperature is taken either in the mouth, rectum or armpit. Before using the thermometer the mercury must be shaken down to 95°. Be careful not to shake it into the bulb, or the thermometer will be rendered useless and also be careful not to hit it against anything, as it will break very easily. While in constant use it is best kept in a glass containing a little boric acid or listerine, with some soft cotton in the bottom of the glass.

Temperature by Mouth

When taking the temperature by mouth be sure that the patient has not had anything to eat or drink recently. Place the end of the instrument containing the mercury under the tongue, on either side. See that the lips are tightly closed all the time the thermometer is in the mouth, and do not leave it in place longer than necessary.

Clinical Thermometer

Never take the temperature of a delirious patient nor a child by the mouth; they are likely to bite off the bulb and swallow the mercury. If this accident should occur give white of egg immediately and notify the physician. In such cases it is always safer to take the temperature by rectum and it is also expedient to take a rectal temperature when the patient is very ill, for this is the most accurate method.

Before inserting the thermometer, the bulb should be oiled and precautions taken to have the rectum free from faeces. Five minutes should be allowed for registration. The temperature will be one degree higher than when taken by mouth.

The axillary temperature will be from three-tenths to half a degree lower than the mouth. The armpit must be wiped thoroughly before taking; the thermometer is then placed in the hollow, and kept in place by holding the arm close to the side and flexing the elbow so that the hand rests on the opposite shoulder. It will take ten minutes for the thermometer to register.

Normal Temperature

The normal temperature of the human body is from 98° F. to 99° F. The temperature is apt to be highest between 4 p. m. and 8 p. m. and it reaches the lowest ebb about 3 a. m. This fact makes it essential that special care be taken of the sick in the early hours of the morning, the lowering temperature indicating a lower vitality.

High Temperature

Though a rise of temperature is always to be regarded with suspicion it must be remembered that many causes (especially with children) may create a slight deviation from the normal, without anything serious being the matter. Constipation will often cause a rise of temperature, sometimes even a slight cold, attack of indigestion, or undue excitement will do the same, while profuse perspiration or diarrhœa is apt to cause a sub-normal temperature.

Sub-Normal Temperature

A sub-normal temperature is far more dangerous than the same number of degrees above normal. If a patient's temperature drops to 97.5° or 97° she should be rolled in blankets, a hot water bag put at the feet, another over the heart, and a cup of hot coffee or milk given. If the temperature does not soon respond to this treatment the doctor should be notified.

The following table gives the different variations of temperature:

Hyperpyrexia....105° and over, extremely dangerous		
High Fever	103°	105°
Moderate Fever	101°	103°
Sub-febrile	99½°	101°
Normal	98°	99½°
Subnormal	97°	98°
Collapse	95°	97°
Algid Collapse.....Below 95°, extremely dangerous		

Temperature Records

A record of the temperature is of great value, not only in diagnosis, but also in watching the course of the disease; it should therefore be charted every time it is taken. This can be done in figures, but the regular clinical temperature chart conveys a clearer idea of how the temperature is running. The temperature should be taken at the same time each day; when it does not deviate much from the normal twice a day, morning and evening, is sufficient; otherwise it should be taken every three or four hours, according to the nature of the case.

The Pulse

A thorough knowledge of the pulse can only be gained by constant study and practice. It takes many months of careful observation of the numerous cases in the hospital ward, before the medical student or nurse can readily discern between the various characteristics of the different pulses. It is, therefore, impossible to go very deeply into the subject here.

The three principal things to be learned are: (1) How to count it; (2) to discern if it is regular or irregular; (3) if strong or weak.

To count the pulse place the index and middle fingers on the wrist, on the thumb side, where the radial artery can easily be felt. Count it for a full minute, dividing the minute into quarters, as you can then tell if the frequency of the pulse is regular or irregular. For instance, if you count fifteen beats in one quarter and twenty in another, you will know that the frequency of the pulse is irregular.

To Count the Pulse

If some beats are strong and others weak the quality of the pulse is irregular. By careful consideration of the pulse every time you take it, it soon becomes possible to realize where there is a difference in the quality of the pulse; that is, when it is stronger or weaker.

The pulse can be taken at the temporal artery when for any reason it is impossible to take it at the wrist, it also can be felt in the groin.

Pulse by Temporal Artery

The average normal pulse is:

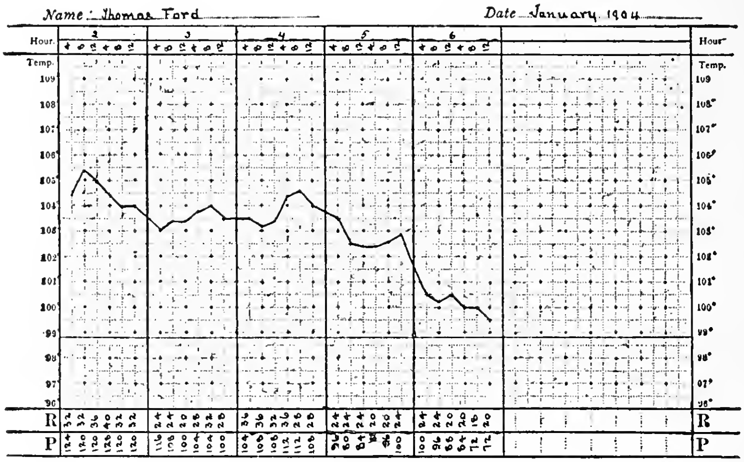
In men from...........60 to 70 beats per minute
In women from.........65 to 80 beats per minute
In children from........90 to 100 beats per minute

Just as the temperature, even in health, is affected by certain conditions, so is the pulse; food, exercise, excitement, will all cause an increase in the pulse rate.

The pulse should always be taken and recorded at the same time as the temperature. The pulse is generally written in figures. When there is any difference in the quality, or if it is irregular this also should be recorded.

The Respiration

A record of the respiration is also often required. The respiration being more or less under the control of the patient it is never wise to let her know that you are taking it; therefore, keep hold of her wrist, as though you were still counting her pulse, and watch the rise and fall of the chest. If you find it hard to



TEMPERATURE, PULSE, AND RESPIRATION CHART

count by simply looking, hold the patient's hand on her chest, then you can feel the motion as well. This is generally the easier method for the beginner. Count it as you do the pulse, for a full minute in quarters. The inspiration and expiration count as one breath.

Keeping Records

Besides the temperature, pulse and respiration, a record must be kept of all medication given, and also of all changes in the patient's condition. If the patient has pain note it, stating where the pain is and if it be continuous or only in paroxysms. When medicine is given to relieve the pain state with what result. When the patient is on liquid diet, the amount of fluids taken during the twenty-four hours should be charted every morning.

Mark every movement of the bowels; observe the

Presbyterian Hospital — Bedside Notes — Name

Date	Hr	Medication	Urine	Dej	Remarks	Day
Jan 2nd	[illegible]	Simple poultice to right side p.r.n.			At 2 a.m. pt complains of severe pain in right side, relieved by poultice. Perspiring profusely at 6 a.m. Defecation at 7.30 a.m. medium dark brown fluid. Coughs frequently with white mucus expectoration. Pulse is rapid good quality. respirations labored. Takes nourishment well.	
	[illegible]	℞ Fl Ext Digitalis m.i q. 4 h.				
		Milk ℥vi q. 2 h.				
		Broth ℥vi q. [illegible]	38	1	Milk ℥16 Broth ℥16 Water ℥20	
Jan 3rd	[illegible]	Turpentine stupes c̄ rectal tube for 10 min			Slept 2 hrs. during night. Sputum is rust color this a.m. Vomited ℥vi of yellow fluid at 9 a.m. a few milk curds with it. Abdomen slightly distended. considerable flatus expelled during stupes. Pt. appears weak and apathetic this p.m. Very little urine voided.	
			12	0	Milk ℥16 Broth ℥20 Water ℥[illegible]	
Jan 4th	[illegible]	Soap suds enema stat			Enema returned brown fluid with some mucus. Tongue very dry. Headache with slight nausea but did not vomit. Pt has slept at intervals during day and is more comfortable this p.m. Dej brown partly formed	
		Stop Fl Ext Digitalis	32	[illegible]	Milk ℥16 Broth ℥24 Water ℥36	
Jan 5th	10 a.m.	℞ Strychnine Sulphate gr 1/60 q. 4 h.			Slept 5 hrs. during night. pt is brighter and without pain this a.m. Continued comfortable during day.	

BEDSIDE NOTES AS MADE IN A HOSPITAL

movements carefully to see if there is anything abnormal in their appearance. If so, not only describe it in your record, but save the movement for the doctor's inspection. The same thing should be done if the patient vomits.

When there is not sufficient urine voided, report it; also if there is anything untoward in its appearance.

Forty ounces is the amount that should normally be voided in twenty-four hours. In fevers there is apt to be less, and what is passed will be highly colored. In nervous diseases, on the contrary, there is likely to be a larger amount of a pale color. Perspiration, a chill or chilly feeling, coughing, expectoration, restlessness, the amount of discharge from wounds, are all items of import of which the doctor must know the details to treat the patient understandingly. He never will fully know them unless they are clearly and concisely written down at the time they happen.

Important Items

The accompanying temperature chart and record is an example of hospital practice.

THE GIVING OF MEDICINE

A few rules to be remembered in giving medicines are:

Rules

1. Always give exactly what the doctor orders, neither more nor less.

2. Always give medicine on time—if a dose is due at twelve, give it at twelve and not at half past.

3. Medicines intended to be taken before meals should be given twenty minutes before meal-time, those to be taken after eating, twenty minutes after the meal is finished.

4. Never give medicine without reading the label on the bottle twice; before and again after pouring it out.

5. When pouring medicine always hold the label on the upper side, to avoid defacing it.

Measuring

6. Do not use spoons for measuring for they are never accurate; small graduated glasses, which are infinitely better, can be bought at any drug store for about ten cents.

7. When pouring hold the mark of the quantity you require on a level with your eye.

8. Always shake the bottle before pouring out the medicine.

9. The bottle should always be recorked immediately after use, for many medicines contain volatile substances and are apt to become either stronger or weaker than intended, if left uncorked.

10. Medicines containing iron should be taken through a glass tube or straw, as they discolor the teeth.

11. Some medicines, notably several that are given for coughs, should be given undiluted, while others on account of their irritating properties should be very well diluted. Never dilute more than necessary, for the addition of a large quantity of water often renders a disagreeable dose still more unpleasant to take.

To take away the Taste

12. Holding a piece of ice in the mouth for a short time before taking medicine will often render a disagreeable flavor less noticeable; a drink of seltzer afterward will help to "take away the taste." Castor oil given with lemon juice, a piece of ice small enough to

swallow, seltzer added just before taking, and a drink of seltzer after, is not at all unpalatable. Holding the nose while taking medicine will also diminish the taste.

Powders and Pills

13. Insoluble powders such as calomel, bismuth and acetanilid should be placed far back on the tongue and washed down with a swallow of water. Those with a disagreeable taste can be given in jam or bread or encased in wafers or capsules which can be bought for the purpose.

14. Pills also can be made easier to swallow by giving in bread or jelly. Unless pills are freshly made, they should be pulverized, as they soon become so dry and hard that they will not readily dissolve in the stomach.

15. Never buy a large quantity of medicine at a time, there are very few kinds that will not deteriorate by keeping; and because a medicine is beneficial in one case, do not imagine that you can give it to everyone whom you may think has the same ailment.

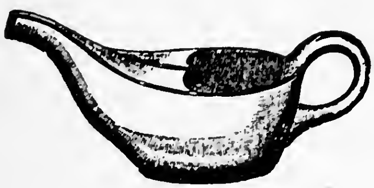
16. Medicines should be kept in a cool, dry place and properly labeled. All poisons should be marked as such and kept under lock and key.

Injections

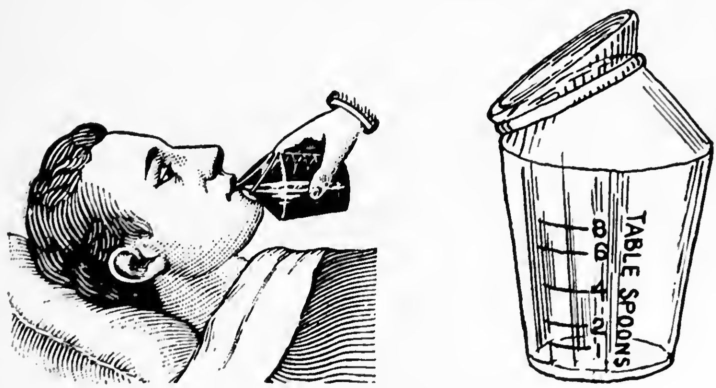
Medicine is occasionally given by rectum, either when a local effect is desired or when the stomach is unable to retain it.

When medicine is given by rectum it is generally ordered well diluted. The water, added for this purpose, should be warm enough to make the injection about

100° F. A rubber rectal tube, or a large size rubber catheter, connected by a glass connecting tube with a piece of rubber tubing about eighteen inches long, into the further end of which has been fitted a small glass funnel, are the best in giving medicinal enemata.


Porcelain Feeding Cup

Let warm water run through the tube to be sure that it is in working order; this will also heat it and thus avoid cooling the medication. Grease the tube well, with oil or vaseline, and before inserting it fill the funnel with the solution, allow half of it to run



GLASS DRINKING CUP

through, back into the pitcher, pinch the rubber to prevent the rest running through. This is done to avoid getting air into the intestine.

For sedative enemata (these generally consist of bromide or chloral) the tube is only inserted about six inches, but for stimulating enemata (brandy or whisky and salt solution) and nutritive enemata, the tube is inserted about fourteen inches, and a small pillow placed beneath the hips to help the upward flow. When giving these enemas have the patient lie on her back. Holding a folded towel to the anus, after the removal of the tube, will help the patient to retain the injection.

Nutritive Enemata

Nutritive enemata generally consist of peptonized milk, white of egg, salt and one of the beef preparations made especially for that purpose; but every doctor has his own formula and will specify how he wishes it prepared. When patients are having nutritive enemata constantly they must have a cleansing enema daily, and this must be given at least an hour before the next nutritive one is due, and not till two or three hours after the last one has been given.

Starch and other emollient enemata are sometimes given in diarrhoeas and dysentery. To prepare the starch mix a teaspoonful of laundry starch in cold water, add a teacupful of hot water, let it come to the boil. A few drops of laudanum are sometimes added to this; when it is ordered, be very accurate in counting the drops.

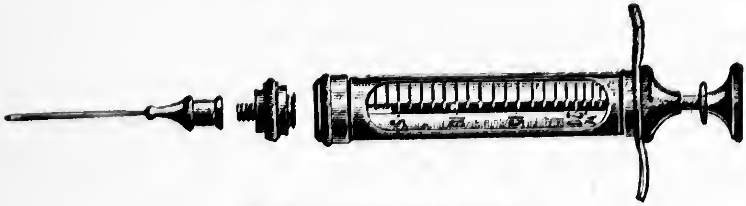
Suppositories

The suppository is another method of giving rectal medication. This is a conical shaped preparation of cocoa butter in which the required drug is incorporated. It is oiled and gently inserted, pointed end foremost, the patient lying on the left side.

Medication for the throat is often given by means of the atomizer. When using this see that the patient's tongue is held down sufficiently to allow the spray to reach the affected parts, and be careful not to let the end of the atomizer touch the back of the patient's throat, as this tends to induce vomiting.

Inhalations

The inhalation of vapor is another method of conveying medication to the throat and also to the bronchial tubes and lungs. Mix the medicine with boiling



HYPODERMIC SYRINGE

water and put in a small kettle over an alcohol lamp. With stiff brown paper, make a cone, one end to fit over the mouth and nose, the other over the spout of the kettle.

Hypodermic Injections

When rapid absorption is necessary medicine is sometimes given hypodermically. The hypodermic is a graduated syringe to which a hollow needle is attached. As hypodermic injections are attended with great danger unless properly given, no one should attempt to administer medicine this way without being personally instructed by a physician or nurse. In giving medication hypodermically, the greatest cleanliness should be observed; the flesh, where the injection is to be made, must be well washed with alcohol, the needles should be attached to the syringe and alcohol drawn into the syringe and expelled several times before the medicine is drawn in. When the syringe is filled with the required amount, expel the air by pointing the needle upward and gently pressing the piston till a drop appears at the point of the needle. Be careful not to let the needle touch anything after it has been cleaned—if it should, hold it in the alcohol again for a minute before inserting. The injection may be given in the outer side of the arms, thighs or abdomen. Hold the flesh between the thumb and first finger of the left hand, plunge the needle in with one quick downward movement, inject the fluid slowly by gently pressing the piston. Draw the needle out quickly. Rub the spot where the injection was made for a few seconds to hasten absorption.

Clean the instrument with alcohol before putting it away.

PURGATIVE, ENEMATA, DOUCHES AND CATHETERIZATION

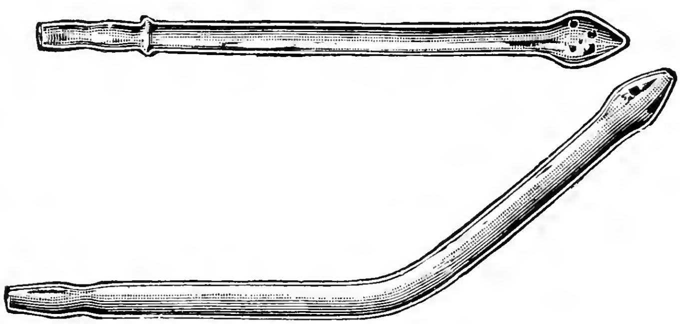
Cleansing Enema

The purgative, or as it is also called, cleansing enema, is given as its name indicates for the purpose of washing out the intestines. It is generally resorted to when cathartic medicine fails to act, when immediate catharsis is necessary, or when for any reason the patient is unable to take a cathartic by mouth.

The long rubber rectal tube is the best appliance for the giving of such enemata; the water is injected higher into the bowel and there is a steadier flow than when any of the bulb syringes are used. This can be attached by means of a connecting tube to the tube of the ordinary fountain syringe bag. See that the stop cock is on the tube.

Soap Enema

The cleansing enema generally consists of a soap



GLASS DOUCHE NOZZLES

suds made with "ivory" or castile soap; the froth of which should be removed as it contains too much air; the temperature should be about 98°F. Make the soap suds in a pitcher, pour it into the bag, let some run through the tube to warm it and expel the air, shut the stop cock, grease the rectal tube. Hang or hold the bag not more than three feet higher than the patient.

The bed should always be protected with a rubber sheet and large towel, the patient lies on her left side with the knees well flexed. The tube should be inserted very gently, never use force, let the water run in slowly. If much pain is given shut the water off occasionally, for a minute or two. When a sufficient quantity has been given (two to three pints for an adult, one for a child) remove the tube quickly, but gently, and press a folded towel to the anus. The fluid to do much good should be retained from fifteen to twenty minutes.

After use the tube must be carefully cleansed, wash it in warm soap suds and water, afterward let a quantity of hot water run through it, hang it up lengthwise to drip till perfectly dry.

When used for more than one person the tube should always be boiled for five minutes after use.

Vaginal Douches

Douches are given, as a rule, either for cleanliness or to relieve inflammation. When used for the former purpose the solution should be of a temperature ranging from 100° F. to 110° F. When given to relieve inflammation it is generally required very hot even 118° or 120° F., and great care must then be taken not to burn the patient by having it any hotter; mix the water well before you test it. Some disinfectant is often added, carbolic or bichloride being the ones most frequently used; they should, however, never be used without a doctor's order. In giving, the patient lies on her back, have the douche pan placed under her properly so that the return flow of the water will run into it. Put a pillow under the small of the back. Before inserting the nozzle let the water flow through the tube, to expel the air. Insert gently and move it around while in.

The douche nozzle should always be boiled or washed in boric acid, or other disinfectant, after use. Glass douche nozzles are preferable to any other. They can be attached to the ordinary fountain syringe.

Catheterizatio

Catheterization improperly performed is fraught with so much danger to the patient that it must not be

GLASS CATHETER

attempted till further instruction than can be given in writing is obtained.

Catheterization is necessary when the patient is unable to void urine naturally, but there are many simple devices which should all be tried before this is resorted to; for instance, put hot water in the bed pan, allow water to run from a faucet within hearing (if this is impossible pour water from one vessel to another), squeeze a sponge dipped in warm water over the lower part of the abdomen, or hot stupes can be applied, and, this failing, the stupes can be alternated with ice.

In preparing to catheterize it is necessary to exercise not only the greatest cleanliness but asepsis. The catheter (glass ones are preferable for women) should be boiled for five minutes. Have at hand some small sterile swabs (see chapter on asepsis) in a solution of boric acid. Put the patient on the bed pan (leaving it further in front than for ordinary use), have the patient's knees flexed and separated, drape a sheet around her legs, leaving the vulva exposed. Then wash the hands well with soap and hot water, soaking them afterwards in a solution of bichloride of mercury, 1-1000. With the left hand separate the labia, and carefully wash all around the meatus (the opening to the urethra, the tube leading to the bladder); into this opening the catheter is then carefully introduced, it must not be forced forward if any obstruction is met with, but withdrawn slightly and the course changed.

Care to be Taken

When the bladder is very much distended it should not be emptied entirely at one time; when a pint or a pint and a half has been withdrawn remove the catheter and insert it again four or five hours later.

Before removing the catheter, the index finger is placed over the end; this prevents drops of urine falling upon the bed.

POULTICES AND FOMENTATIONS

Poultices and fomentations are applied for the relief of localized pain, when caused by inflammation. The heat, by dilating the superficial blood vessels, draws the blood from the congested area.

Linseed Poultice

The linseed poultice is the one most generally used. To make it, stir the meal slowly and evenly into water while it is boiling. When it is thick enough not to run, boil it a minute more; remove from the fire and beat it briskly. When properly made it is perfectly smooth, and just stiff enough to drop away from the spoon. Spread it on a piece of muslin the required size and shape, leaving an inch margin all round to turn over. The side which is to go next to the patient is best covered with cheesecloth or gauze. This is cut slightly larger than the muslin, so as to turn back over it to keep the contents of the poultice in place.

Applying

Few poultices should be more than half an inch thick. They should always be applied as hot as the patient can possibly stand them. To keep the poultice warm while taking it to the bedside it can be placed between two hot plates or rolled in a piece of hot flannel. The flannel can be left over it when applied if there is no oil muslin or oil paper to be obtained; these latter are preferable, however, as they are very light and keep in the heat and moisture better.

The poultice is kept in place by a bandage. A muslin binder is the best means for keeping a chest poultice in place. Poultices should always be shaped to fit the affected part. They should be changed at least every two hours.

Starch Poultice

Starch poultices are used in certain skin diseases. The starch is mixed with a little cold water, then enough boiling water added to make a thick paste. It is boiled, spread and applied in the same manner as the flaxseed.

The cotton jacket or "dry poultice" is made by tacking a layer of non-absorbent cotton or wadding between two pieces of cheesecloth, shaped for the chest, and is excellent to keep on for a few days after other poultices have been discontinued.

Sinapisms

Sinapisms relieve pain through the agency of the mustard which, by irritating the sensory nerves, causes the dilatation of the superficial blood vessels—under the point of application—and the consequent lessening of the congestion in the inflamed tissue. Sinapisms are made of flour, mustard, and tepid water, in varying proportions. Those for a man are generally made one part mustard to four of flour; for a woman one part mustard to six of flour; for a child one part mustard to ten of flour. The water used should always be tepid; cold water feels uncomfortable to the patient, while hot destroys the virtue of the mustard. The flour and mustard are first mixed well together, care being taken to crush all lumps of mustard; enough water is then slowly added to make a thick paste, which is spread on muslin and covered with gauze. The sinapism is generally left on from fifteen to twenty minutes, but it must be watched carefully, and removed as soon as the surface of the skin is well reddened, as otherwise it will blister. After the removal of the sinapism the skin must be washed, and if a little vaseline be rubbed on, this will allay the irritation.

The usual method of applying fomentations is to have two pieces of flannel in use, applying them alternately and changing every three minutes for twenty minutes. The easiest way is to have the water boiling over an alcohol or gas lamp near the bedside. **Fomentations**

Put two layers of coarse, soft flannel (an old blanket is good) in the center of a towel; dip this into BOILING water, wring it out by twisting the ends of the towel, give the flannel a quick shake, and apply the flannel; cover with oiled muslin or oiled paper.

As hot applications promote suppuration there are conditions when their use is contra-indicated and cold applications are ordered.

The most effectual way of applying continuous cold is by means of the ice cap. The pieces of ice put into the cap should be about the size of a walnut; it should never be more than half filled, and the air should be expelled before putting on the cover. Salt is sometimes mixed with the ice to intensify the cold. The cap should be tied in an old handkerchief or piece of gauze to prevent the rubber from coming next the skin, as the extreme cold is very irritating, and may even produce frost bites. **Cold Applications**

Ice Caps When ice caps are being used all the ice must not be allowed to melt before the cap is refilled, as the reaction caused by the resulting change of temperature is very injurious, especially if there is any inflammation.

ICE CAPS

Compresses For the application of cold to the head, old handkerchiefs or pieces of soft gauze can be used, folded so that they will come down well over the temples, but not touch the pillow. They must not be wide enough to wet the hair, or come far down over the eyes. Compresses should not be made too wet. The best scheme is to have a piece of ice in a basin, and two compresses, then while one is on the forehead the other can remain rolled round the ice.

Compresses for the eye should be small and very light. If both eyes need the compresses two separate ones should be used. If only one eye is affected be careful that the compress on it does not touch the other, lest it should become infected. If gauze is used for compresses always turn the ends in, that the ravellings may not annoy the patient.

HOME CARE OF THE SICK.

PART I.

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. *Do not copy answers from the lesson paper.* Use your own words, so that your instructor may know that you understand the subject. *Carry out the directions given in the text, if possible, before answering the questions.*

---

1. What is expected of the nurse?
2. Give the period of incubation, first symptoms, and time required for isolation for: (a) Mumps, (b) Measles, (c) Smallpox, (d) Scarlet fever, (e) Diphtheria.
3. What are the causes of cholera infantum? Symptoms? What are the symptoms of intestinal obstruction?
4. What are the most common causes of convulsions in children? What should be done?
5. What are the primary symptoms of typhoid fever? Of pneumonia? Of meningitis?
6. What is the difference between false croup and true croup in symptoms, danger, and treatment?
7. Describe the ideal sick room.
8. How should the sweeping and dusting be done? How prepare for the night?
9. Why is ventilation in the sick room important? Describe different methods.
10. Make the bed as explained in the lesson and then describe the process.

11. Endeavor to change the bedclothes with a person in bed and report your success.
12. The points suggested in the section on the "Care of the Patient" are all essential. What ones might you neglect if you had no experience?
13. What must be guarded against in lifting and moving a helpless patient?
14. How would you change a patient from one bed to another?
15. What are bed sores and how can they be guarded against?
16. How would you wash the hair?
17. Describe the process of giving a bath in bed.
18. How can the heat of the blood be found? Why is it important?
19. How would you count the pulse?
20. Mention some of the points in a patient's condition that should be noted and recorded?
21. What rules should be observed in giving medicines?
22. What are the different kinds of enemata? How given?
23. What devices can be tried before catheterization is attempted?
24. How is a linseed poultice made and applied?
25. What is a sinapism? A fomentation?
26. How is cold applied to relieve pain?
27. Do you understand everything in this lesson? What questions occur to you?

NOTE.—After completing the test sign your full name.

HOME CARE OF THE SICK

PART II

CONTAGION; DISINFECTION—NURSING IN CONTAGIOUS DISEASES

We have learned in our study of Household Bacteriology that nearly all diseases, especially those coming under the head of infectious and contagious, are caused by certain species of bacteria.

If we would be immune from these diseases, then we must do everything in our power to exclude these germs. Cleanliness, plenty of sunlight and fresh air, are the first requisites for their exclusion; and, wher disease has entered, proper isolation and disinfection to prevent their spread.

Disinfection

By disinfection we mean destruction of the bacteria by use of certain chemicals or heat. Heat, when it can be used, is always the surest and quickest method. The rules for disinfection, or sterilizing by heat, will be given under the head of "Surgical Operations at Home."

The disinfectants most commonly used in illness are bichloride of mercury, 1-1000, for the hands and utensils, and carbolic acid, 1-20, for the clothes, instruments, etc. Bichloride is the stronger disinfectant, but as it discolors clothes and instruments it should not be used for them.

MAKING DISINFECTANT SOLUTIONS

Bichloride of Mercury

A bottle of blue bichloride tablets can be bought at any chemist's; this is the safest form to use it in the home, as the tablets make a blue solution. The bichloride is perfectly odorless, and if the clear, uncolored solution were used it might be mistaken for water. As this is a very strong poison the tablets should be kept always under lock and key, and out of the reach of children. It is well to have a bottle of tablets in the house at all times, to use in case of cuts, etc. They contain salt, which is always required in making bichloride solution.

To make bichloride solution dissolve one tablet in a quart of hot water.

Carbolic Acid

When a large quantity of carbolic acid solution will be required continually, it is cheaper to buy the 95 per cent solution, which can be reduced as needed to the required strength. To make five pints of 1-20, mix four ounces of the 95 per cent carbolic with five pints of boiling water and shake the bottle well.

As 95 per cent carbolic is not only a strong poison, but also very corrosive to the skin, so be careful not to spill even a drop on your hands, but if you should, wash the spot immediately with alcohol or warm water and soap.

Infection and Contagion

An infectious disease is not always a contagious one; that is, it cannot be contracted by being in the same room with the patient, but it is transmittable by some intermediate means of communication.

Tuberculosis is not contracted by coming in contact with a patient suffering from that disease, but by inhaling dust containing the germs derived from the dried sputa of some consumptive person.

The germs of typhoid fever are disseminated when the stools and other excreta of the patient are not properly disinfected by those in charge.

Disinfection Without Isolation

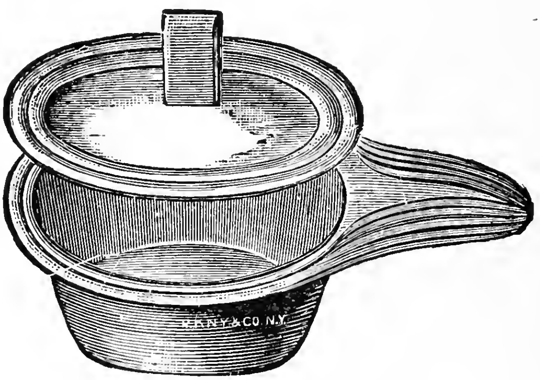
It is not necessary to isolate patients suffering from diseases of this kind, but it *is* necessary to disinfect, according to the nature of the infection; thus, knowing that the germ of typhoid fever is in the stools, and to some extent in the urine, the stools and urine must always be disinfected by covering with bichloride, 1-1000, and letting stand half an hour before emptying. The bed pan must be well washed and disinfected afterward. It is also a wise precaution to disinfect the bed-clothes by soaking in carbolic, 1-20, for twelve hours, and then boiling; also to keep utensils and dishes used for the patient separate, boiling them before they are again mixed with the household supply.

Consumption

Consumption, or tuberculosis of the lungs, is perhaps the most dreaded disease of the present day. There are more deaths from it than from any other, except in times of epidemic. The sputum of patients suffering from this disease contains many millions of the bacilli. If this is deposited in places where it is allowed to dry and become pulverized, it is a source of danger to others. The sputum must, therefore, be disinfected.

Patients suffering from this disease should be provided with sanitary cups. The best for this purpose are made of prepared paper and are very cheap. These should be burnt after being in use for twelve hours at most. If these cannot be obtained, porcelain ones with covers may be used, but bichloride or carbolic must always remain in the cup, and it should be emptied and scalded frequently. The patient should not use ordinary handkerchiefs, but gauze or Japanese paper, which should be burnt. All clothing

Sanitary Cup.



Paper Sanitary Cup.

and bedding soiled by the sputa should be disinfected in the usual manner, and the sufferer should wash and disinfect the hands frequently.

Perfect cleanliness, plenty of sunlight and fresh air, and nourishing food are the most important points in the modern treatment of consumption. Special care should be taken by consumptives to smother every cough when close to other people.

CONTAGIOUS DISEASES

Measles, scarlet fever, smallpox and diphtheria are not only infectious but also contagious, and can be taken by touching the person or anything that has come in contact with the patient.

The Spreading of Germs

Anyone who has been in the room with a patient suffering from any one of these diseases can scatter the germs far and wide; this must be remembered, especially by those who do the nursing. It is an absolute necessity for them to go out every day, but before doing so they should change all their clothes, and wash face and hands with bichloride, 1-1000. As it would be impossible to wash the hair every time, it should be covered by a cap, while on duty. Even when all these precautions have been taken, shops, theaters, and street cars should be avoided.

The rules of isolation are these:

Rules of Isolation

(1) The patient should be removed to a room as remote as possible from the rest of the house.

(2) No one should be allowed to enter the room except the physicians and attendants.

(3) Long-sleeved aprons and caps which will cover the hair should be worn by physicians and attendants while in the room. (These can be made of cheap muslin.)

(4) A solution of bichloride, 1-1000, should be kept by the wash basin for the disinfection of hands, and they should be disinfected every time after touching or doing anything for the patient. For proper isolation there should be two rooms,—the wash stand, gowns, disinfectants, etc., being kept in the outer room.

Disinfection of Clothes

(5) A foot tub or other receptacle containing carbolic, 1-20, should be placed near the bedside when the clothes are about to be changed, and they should be put immediately into this, remaining there well covered for twenty-four hours. They should, even then, be boiled before being washed.

(6) The advice given earlier as to the furnishing and care of the sick-room is especially applicable in cases of contagious diseases. When dusting, the duster should be dampened in 1-40 carbolic. As bare floors are apt to be noisy, a small rug or two may be retained, but they should be old ones, as they ought to be burned at the termination of the disease. They must not be shaken, as at other times, but kept well dusted with the damp duster.

(7) It is well to keep sheets, wrung out in carbolic, 1-20, both between the two rooms set apart for the nursing and at the entrance of the outer room. The door of the latter must be kept closed.

Dishes and Utensils

(8) The dishes and utensils used by the patient and attendants must not be removed from the room; they must be washed there, the patient's always being

washed and kept separate. When food is brought it should be left at the door of the outer room. The attendant, first taking off her cap and apron and disinfecting her hands, should remove the food from those dishes to the ones she has in the room; the others should be removed immediately.

Separate Bath Room

(9) Whenever it can be managed the isolated rooms should be in close connection with a bath-room; which should be set apart for the use of the inmates of the sick-room. When this is impossible the attendant must, when it is necessary to go there, first remove her cap and apron and disinfect her hands. When her object is to empty the slop jar or bed pan they should be completely covered with a large towel wrung out in carbolic.

(10) The bed pan should always have bichloride, 1-1000, in the bottom, and after use more of the same solution should be added. It should stand thus for half an hour before being emptied. When there is no separate bath-room a tightly covered box nailed on the outside window sill of the outer room will be found convenient to hold the bed pan, while its contents are being disinfected.

Special Rules

Besides the general rules for disinfection there are in some contagious diseases special rules, incidental to the nature of the disease.

In scarlet fever the greatest danger of infection lies in the dissemination of the skin, while it is peeling. To prevent this the patient should be rubbed all over, night and morning, with carbolized vaseline or boric ointment.

In diphtheria the most virulent contagion is in the expectoration, especially when the membrane loosens. Soft gauze should be used instead of handkerchiefs, and if there is no grate in the room a pan must be at hand, in which these can be burnt immediately after use.

DISINFECTION AT THE TERMINATION OF THE DISEASE

Time of Quarantine

Even after the fever has abated it is necessary to keep the patient isolated, or "in quarantine," as it is called, for some days. A rough estimate of the time required for quarantine in the different diseases is given in the table in the first section, but the doctor should always be the one to decide when it may be raised, as circumstances or complications may arise which might make it allowable to shorten or necessary to lengthen the time.

Disinfecting the Patient

When the doctor does allow the patient to be moved, a warm cleansing bath (including the washing of the hair) must be given. This is followed by a bichloride bath, 1-1000, and an alcohol rub. The patient is then wrapped in a clean sheet and taken to a different room, where fresh clothes which have not been in the sick-room are put on. Those who have done the nursing must go through the same procedure.

THE DISINFECTION OF THE ROOM AND ITS CONTENTS

Disinfecting with Formaldehyde

The use of sulphur fumes as a disinfectant has been proved to be practically useless, and formaldehyde has almost entirely replaced it. The easiest form of using this is the "Pure Formaldehyde Gas" put up by Seabury & Johnson. It can be procured at most druggists. In appearance it looks like a stone, cone shaped. There are two sizes; the smaller, 2 inches square, will disinfect a room 500 cubic feet, and the larger one, 1000 to 1500 cubic feet. Close the windows, pasting paper over all the cracks; pull down the blinds; open cupboards, drawers, bundles, etc., that everything may be exposed to the fumes of the gas; place the fumigator on the top of an inverted pail—it must not be too near the floor, or it may scorch it—set fire to the top of it, and leave the room; lock the door and paste up the cracks and key hole.

Leave the room thus for five or six hours, then open all the windows, if possible allowing them to remain open for twelve hours.

Books and toys used in the sick-room should be burned, as they are hard to disinfect.

The Mattress

Unless the mattress can be baked it should be opened, so that the formaldehyde can penetrate through to its center. In all large cities there are bake houses where such things may be sent for disinfection at comparatively small cost. They should be carefully wrapped up.

PERSONAL PRECAUTIONS TO BE TAKEN BY THOSE NURSING CONTAGIOUS DISEASES

(1) Take sufficient sleep and rest; never in the patient's room. It is when the muscles are relaxed, as they are when resting, that the greatest danger of infection comes.

(2) A daily walk in the fresh air is necessary.

(3) A daily bath; change of all clothing at least three times a week. The clothing must be disinfected.

(4) When working over the patient never stoop so that you inhale her breath. Never kiss your patient.

Personal Disinfection

(5) Never put your hands to your face, especially your mouth or eyes, without first disinfecting them.

(6) Disinfect your hands frequently in bichloride of mercury, 1-1000. Keep the nails short and scrupulously clean. When washing the hands wash the soap off before putting them into bichloride, or they will soon become sore.

(7) Before meals wash and disinfect your hands well, rinse your mouth with boric acid solution or listerine. Never eat in the patient's room.

(8) When irrigating a diphtheria patient's throat tie a handkerchief over your mouth, and wear glasses to protect the eyes.

The nursing in infectious and contagious diseases is the same as in all other cases of fever. While the temperature is high the patient should be kept in the recumbent position to avoid strain upon the heart.

In typhoid this position is particularly necessary, as hemorrhage from the intestines is liable to occur if it is not strictly adhered to.

Nourishment and medication must be given exactly as ordered. When the doctor orders fluids give nothing solid; many a life, especially after typhoid, has been lost by so doing. **Nourishment**

Except when the patient is nauseated, unless contrary to orders, give plenty of water, every two hours at least. See that the patient drinks it slowly.

Remember the rules already given about the care of the mouth, especially with typhoid patients. Vaseline applied to parched lips gives relief.

In measles and scarlet fever the eyes are apt to be affected, so the room should be kept darker than in other cases, and the eyes should be washed with boric acid, always bathing from the inner angle outward. **Care of the Eyes**

In all diseases where the skin is not working properly, as in measles, scarlet and other eruptive fevers, be especially observant of the urine as various kidney complications are liable to ensue.

There is little danger of the patient catching cold while the temperature is high, but when it begins to lower be doubly careful.

SURGICAL OPERATIONS AT HOME *

For twenty-four hours previous to operation the patient should be given broths every two hours, but neither milk nor solid food. A cathartic is given, if possible, thirty hours prior to operation, and repeated

*This section is optional.

in six hours; a soap suds enema is given three hours after the first cathartic, and repeated twelve hours before operation. A bath is also given the afternoon before, and after the bath the field of operation is shaved, then thoroughly cleansed with green soap, and a compress wet with green soap solution, 25 per cent to 50 per cent, applied (the liquid green soap which is used for this purpose can be obtained at any druggist's); this is covered with a protector—oil muslin or oil paper—and left on from three to six hours, as the skin will bear. When removed, the surface is washed in the following order, with green soap, ether, alcohol, and solution bichloride of mercury, 1-1000; a compress wet in the latter is applied covered with a protector, and left on till an hour before operation, when the process is repeated and the fresh bichloride compress is left on till the doctor removes it on the operating table, after the patient is under the influence of the anaesthetic; then he re-scrubs it, and the ether, alcohol, and bichloride must be ready for him to use. All these precautions are taken to kill or remove *every* bacterium or spore.

Preparation for an Operation

For a vaginal operation the rules for diet, catharsis, enemata and bathing are the same as for any other. In addition a green soap douche is given on the preceding day, followed by one of bichloride of mercury, 1-5000. The vulva is then covered with a pad wet in solution of bichloride of mercury, 1-1000, until two hours before operation, when another bichloride douche is given, the parts cleansed and a fresh bichloride pad applied.

Just before the anaesthetic is given, the patient should void urine. If she has false teeth they should be removed.

The Room

The Room. In the choice of the room the light is one of the first considerations, a good light being a positive necessity. If possible the operation should take place in a different room from the one the patient is occupying beforehand. Remove rugs, carpets, all unnecessary furniture, curtains and draperies. A piece of cheesecloth tacked across the lower sash of the windows will keep the light from being too glaring and obstruct the view from outside.

The day before the operation the walls should be dusted, especially the cornices and mouldings; the floor should be scrubbed if possible, or at least wiped with a damp cloth and it should be washed over again the morning of operation after the furniture is in place.

If the patient is to remain in the room after the operation, have the bed as nearly in the position it is to occupy later as possible, but out of the way.

Protect the floor under and around the operating table with several thicknesses of paper, covered with a sheet tacked down at the corners.

Operating Table

A kitchen table covered with a couple of old blankets protected by a rubber pinned or tacked under the table will answer for the operating table. Three small tables should be at hand, protected with papers, covered with large sterile towels. On one table, convenient to his right hand, the surgeon will need his instruments. On the second table have three bowls which have been well washed first with soap and hot water, then bichloride, 1-1000. The inside of the bowls should not be dried. One bowl is intended to hold the solution for the disinfection of the surgeon's and his assistant's hands, the other two for washing the sponges. The third table is required for the dressings and sterile towels. The former, the doctor will provide or tell you where to get them. Very reliable sterile dressings are now put up by Ellwood Lee, and can be procured at any drug store. They are really better than anything that can be prepared without a sterilizer. If it is impossible to obtain these, the dressings should be prepared in the same manner as the towels, namely, rolled in bundles not more than 9 inches square (or the heat will not penetrate) and steamed in the clothes boiler for at least one hour. If there is no tray to keep them out of the water a hammock of gauze will answer the purpose. They are then dried in the oven, which must not be hot enough to scorch them.

Sterile Dressings

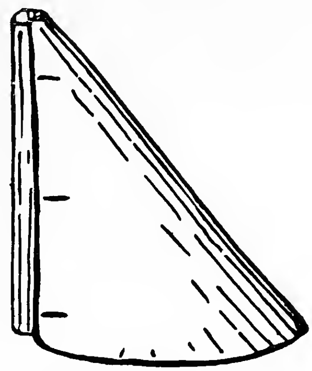
At least a dozen and a half towels will be required. The surgeon will bring the instruments and anaesthetic. If chloroform is administered, some vaseline will be required to grease the patient's face.

An ether cone can be made out of paper, covered with a towel.

An irrigator or douche bag must be at hand for the irrigation. This should be sterilized by boiling for five minutes, as are also the surgical instruments.

Sterilized Water

There must be plenty of sterilized water prepared, six gallons at least, two gallons of which must be boiled long enough beforehand to be cold. This must be kept tightly covered after it is boiled, or it will not remain sterile. Water must boil at least thirty minutes to be properly sterilized.



Ether Cone, made from stiff paper, covered with a towel.

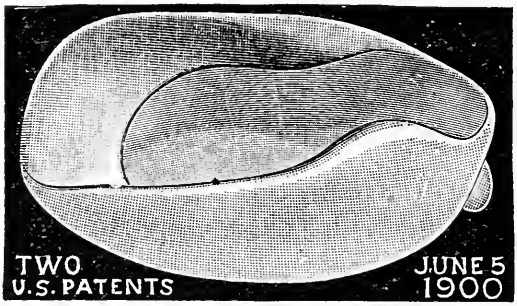
Bichloride, carbolic and salt solutions may be needed and must be at hand, as well as two sterile pitchers, a pus basin, a chair, a blanket or two to cover the patient, two rubbers to protect the blanket, a slop jar, hypodermic syringe, and stimulants—the doctor will give definite instructions regarding the last.

The Bed

The bed is made according to the directions already given for bedmaking, with the exception that no pillow will be required as the patient's head must be kept low. Instead, a small rubber covered by a towel is desirable to protect the bed if the patient is nauseated. A blanket is put over the patient, before the upper sheet; hot water bottles should be in the bed all the time she is on the table; a couple of towels and pus basin should be on a table near the bed in case of nausea, also small pieces of gauze to wipe the mucus out of the mouth, and a wedge-shaped piece of wood to put between the teeth if they become clenched.

Sterilizing the Hands

If necessary to assist the surgeon during the operation, scrub the hands for ten minutes with hot water and soap, using a new stiff nail brush which has been



PORCELAIN BED PAN

soaked in carbolic, 1-20. Be particularly careful of the finger nails, which should be cut very short. After scrubbing, the hands should be soaked in bichloride, 1-1000.

Nobody, whose hands have not been so treated, must touch the dressings or instruments, and after washing nothing but the sterile things must be touched.

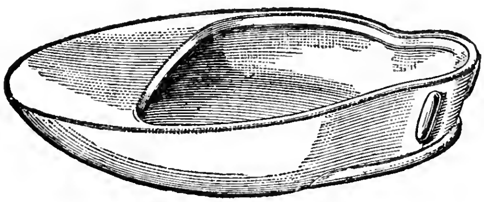
After the Operation

When the operation is over, if the patient's nightgown is wet it must be changed. She is then covered with a warmed blanket, and put into bed. She should lie on her back without pillows and be kept very quiet.

If she vomits, hold her head on one side to prevent strangulation.

Washing the mouth out, as previously directed, will help to relieve the thirst which is generally intense after an anaesthetic.

After a few hours either crushed ice or very hot water, in teaspoon doses, may be given.



Bed Pan, "Eureka" Pattern

The Pulse

The pulse must be watched carefully, and if its rate increases should be reported to the doctor, as this, together with pallor, restlessness, longing for fresh air, sighing respiration, and fall of temperature is a sign of hemorrhage. As the hemorrhage does not always show through the dressing these signs must be watched for.

Perfect Cleanliness

For treatment of hemorrhage see the section on "Emergencies." As the after treatment depends altogether on the nature of the operation, and subsequent condition of the patient, no rules for it can be given here further than to emphasize the fact that the first requisite for success in surgical work is perfect cleanliness. The gauze used for dressing the wound after the operation, the instruments and the hands of those touching these things, must always be as carefully sterilized for the dressing as for the operation.

The diet, like the treatment, will depend upon circumstances. For the first day or two the patient is generally on fluid diet, and care must be taken that it is given slowly and in small quantities, but as soon as possible plenty of nourishing food should be given to build up the system.

OBSTETRICS

The average duration of pregnancy is 280 days. The most accurate way of calculating the probable date of confinement is by counting back three months from the date of the cessation of the last menses and adding seven days.

Preliminary Care

The expectant mother should place herself under the doctor's care in the early stages of pregnancy, as not only her own but the infant's after health depends largely on the care the mother takes of herself at this time. The principal rules of hygiene to be followed are:

1. Daily exercise in the open air.
2. At least eight hours' sleep out of twenty-four.
3. A daily bath, a sponge bath if the tub bath is too exhausting. A brisk rub after the bath will cause a good reaction.
4. The bowels should be moved daily, with mild cathartics if necessary.

5. The urine must be carefully watched and any abnormality reported to the doctor. Frequent specimens should also be sent him, as there may be danger of serious kidney troubles.

6. Freedom from excitement, worry, hurry, and too heavy manual labor.

7. The clothing should be worn loose enough to allow of free circulation.

8. A nourishing, but not too stimulating diet should be adhered to.

9. The nipples require attention, especially during the last two months, and should be washed twice daily with boric acid solution and treated with fresh cocoa butter or albolene.

What to provide:

For the Mother

1. Two large rubber sheets.

2. If possible, a Kelly Pad, if not, make an obstetrical pad, consisting of four thicknesses of cotton wadding, covered with a layer of absorbent cotton, the whole encased in absorbent gauze and tacked to keep the cotton in place. This pad should be three-quarters of a yard square.

3. Two dozen pads for dressings, half a yard long, ten inches wide and two inches thick, made of the same materials.

4. Two dozen smaller pads.

5. Five boxes of sterile gauze (each containing one yard of gauze), to be used both for the mother's dressing and to cover the baby's cord.

6. One roll of adhesive plaster.

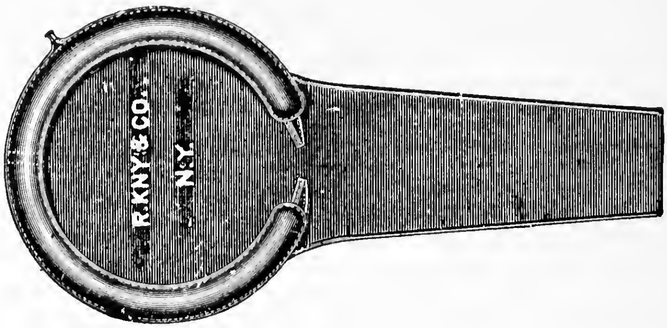
7. Six abdominal binders of unbleached muslin.

8. Six breast binders of unbleached muslin.

9. One pair long stockings made of flannel or an old blanket.

10. Two dozen paper bags in which soiled dressings can be put and burnt.

11. At least two hot water bottles.



KELLEY PAD.

12. Bed pan—"Perfection" is the best.

13. Douche pan.

14. Douche can or new fountain syringe bag.

15. Two glass douche nozzles.

16. Two glass catheters.

17. One agate basin to boil nozzles and catheters in.

18. Two large agate pitchers in which water can be sterilized, solutions made, etc.

19. Clinical, room, and bath thermometers.

20. One bottle carbolic, 4 per cent.

21. One bottle Lysol.

22. One bottle bichloride tablets.

23. New nail brush and fresh cake of soap for the doctor's use.

For the baby: **For the Baby**

1. A tube of sterile tape.

2. A rubber sheet, or, preferably, a nursery cloth to protect the crib mattress.

3. Talcum powder.

4. Sweet oil or sterile vaseline.

5. Pure castile soap (never use perfumed soap of any kind).

6. Bath tub—good rubber ones are the best.

7. Old table linen makes excellent towels and wash cloths for the baby.

8. A large square of soft, thick flannel to roll baby in after it is greased.

9. Basket containing sewing materials and safety pins.

10. Crib and bedding.

11. Scales to weigh the baby in are very desirable.

12. A rubber or padded lap protector for the attendant to use while bathing the baby.

13. A large flannel apron for the same purpose. The latter is especially desirable as the baby can be rolled in it, when taken from the bath.

14. Baby's clothing: Six flannel bands, not hemmed, 6 inches wide, three-quarters of a yard long. Four knitted or woven shirts. Six flannel petticoats. Six white petticoats; these should all be made without **Clothing for Baby**

bands, and the fastening on the shoulders, running a draw tape through the hem of the flannel petticoat, will keep the baby's feet warm without confining them. Six slips for night wear. Six dresses. Diapers, two sizes, eighteen and twenty-two inches square.

As in other cases of sickness, the room should be as large, light, and airy as possible, scrupulously clean, and have no superfluous furniture.

The Bed

In this instance the foot of the bed should be towards the light. It should be made as shown in the section on bed-making, with the addition of a second rubber covered with a clean sheet, and either a rubber Kelly pad or an obstetrical pad (made as already described).

The furniture and floor should be protected in the same manner as they are for operations.

Besides the bed a table for the doctor, wash stand, nurse's table, extra table or bureau and chair will be required. See that there is a hook on which to hang the douche bag.

On the wash stand have hot and cold water, soap, nail brush, scissors, and nail cleaner, towels, and bowl of bichloride, 1-1000.

Doctor's Table

On the doctor's table, bowl of bichloride, 1-3000, with towels and sponges in it; bowl of lysol, sterile towels, sterile douche tip, also rubber and glass catheter.

Nurse's Table

On the nurse's table have (for baby) sterile scissors and tape wipes in boric acid (these consist of small squares of gauze), two large squares of gauze to put over the baby's mouth if necessary to blow into it, soft flannel square to wrap baby in, dressing for cord as ordered by the doctor.

For the mother—chloroform, mask, pus basin, sterile dressing and pads. Under the table the douche pan (which has been washed in bichloride and kept covered with towel, wrung out in same), slop pail and basin, paper bags for soiled dressings and placenta, foot tub, hot and cold water.

On the bureau—room, bath and clinical thermometers; salt, vinegar, alcohol, whisky, hypodermic syringe, binders, pins, hot water bag, tray and alcohol lamp.

The signs of beginning labor are pains in the lower part of the abdomen and back, occurring at regular intervals, about once every half hour, and a discharge of mucus tinged with blood from the vagina. **First Signs**

True pains can be distinguished from false by placing the hand over the lower part of the abdomen; in true pains the contractions of the uterus are to be readily felt through the abdominal wall. As the labor advances the pains grow more severe and the intervals shorter. The first stage of labor consists in the dilation of the uterus, and ends when the membranes have ruptured and the uterus is completely dilated.

The second stage or stage of expulsion ends when the child is born.

The third stage ends when the placenta is expressed and the uterus contracted to the size of a closed hand.

At the beginning of the first stage, the patient should have a bath, and her hair braided in two braids. Her bowels are emptied by the giving of a soap suds enema. After this the external parts are washed with bichloride solution, 1-5000, and a pad wet with bichloride solution, 1-10000, or boric acid applied. She is as a rule allowed to walk around the room during the first stage, which may last from ten to twelve hours, and even longer.

She is best clad at this time in a night gown, warm wrapper, and long stockings made of flannel or an old blanket, coming well up over the thigh.

Milk and broths should be given every two hours; alcohol and other stimulants must be withheld.

The patient must be instructed not to bear down during the pains of this stage, and to sit or lie down when a pain occurs.

The Second Stage

During the second stage the patient must be kept strictly in bed. The wrapper is removed and a short dressing sack put on in its place, the night gown is tied up under the arms, and with it a sheet, the end of which comes down over the legs covering the blanket stockings, which are left on; it can be folded up in the center when necessary.

The patient usually lies on her back. A strong band of muslin around the foot of the bed, with the ends so that she can hold them to pull on, will help the patient during pains.

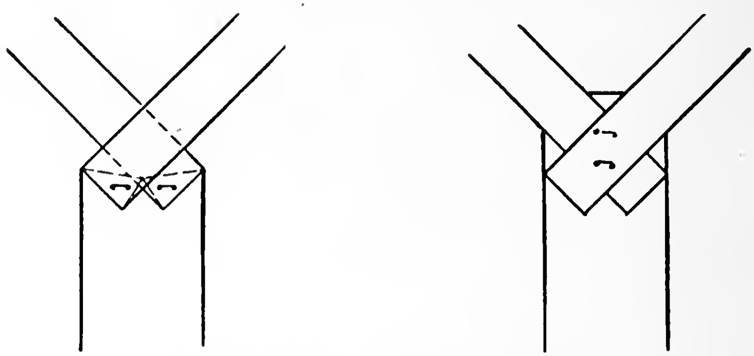
The attendant's hands must be well scrubbed and disinfected with bichloride, 1-1000, that she may be ready to help the doctor.

If the doctor does not arrive in time, the attendant, taking all antiseptic precautions, must place her hand against the head as soon as it appears and hold it back during the pains, thus preventing too rapid descent. When the head is delivered insert the finger into the passage to see if the cord be around the neck, if so, pull it carefully over the head. The right hand supports the child as it comes, and the other is placed on the abdomen and pressed firmly but gently downward till the child is expelled. One hand must be held over the uterus from this time until at least half an hour after the placenta is expelled.

Care of the Child

Place the child on its right side between the mother's thighs, wipe out its eyes and mouth with swabs wet in boric acid; place gauze over the mouth and blow into it; if it does not cry, slap it on the back and chest; if the color does not improve the cord will have to be tied and cut immediately (it is generally better to wait five minutes before doing this) and the child plunged into a hot bath. It is rarely necessary to do this, however. The cord should be tied tightly with the sterile tape about an inch and a half from the navel, and again an inch further on; it is then cut (with sterile scissors) between the two knots. The baby is rubbed with vaseline or olive oil, rolled in the flannel square, and a warmed blanket, then put in its crib with at least one hot water bottle until the mother is attended to.

The Third Stage The placenta is generally expressed about fifteen or twenty minutes after the birth of the child; but even if it take longer, the cord should not be pulled upon—it is better to gently manipulate the abdomen above the uterus, and continue doing this very gently with one hand as the placenta comes out, while with the other hand twist slowly to aid its coming. Even after

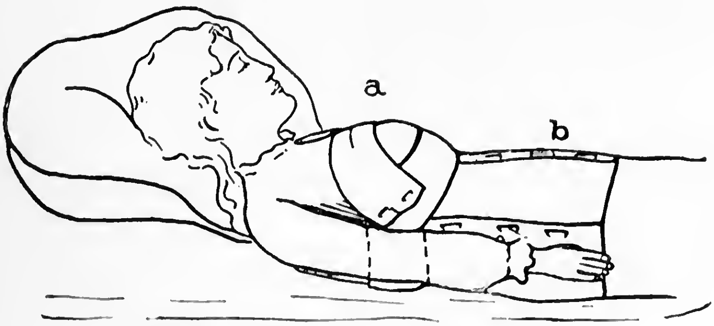


ENDS OF THE Y BREAST BINDER

the placenta is expressed, the hand must remain pressed downward over the uterus until it feels hard and firm. An assistant can in the meantime be washing the patient with bichloride, 1-2000, and removing the soiled linen. When the uterus is firm and hard a binder should be applied, a dressing of sterile gauze and a pad being first placed over the vulva; this is afterward pinned on to the binder to keep it in place.

The Binder The binder is best made of unbleached muslin. One for a medium size woman should be a yard and a quarter long and half a yard wide. It should, when pinned in place, extend from the border of the ribs to below the prominence of the hips, and should be made to fit the contour of the body by taking in darts over the hips on the upper and lower edges.

A binder is also used to make compression upon the breasts. There are a variety of these, but the Y breast binder originally used in the Boston Lying-in Hospital is perhaps the easiest one to manage, and has the advantage of leaving the nipples exposed. A bandage shaped like a T is made by folding muslin lengthwise and pinning it at right angles to another strip folded in the same way. The T is then made into a Y by making a diagonal fold in the middle of the cross piece and fastening the middle of the plait with safety pins. **Y Breast Binder**



Y BREAST BINDER (*a*) AND ABDOMINAL BINDER (*b*) IN PLACE

To apply, dust the surface of breasts with powder, draw base of Y beneath the patient's back until apex of the fork is external to the outer edge of breast. Lift breasts upward and toward each other. Draw lower arm of fork snugly across chest beneath breasts, the inferior border of this arm extending at least one inch below margin of breasts; the end of arm is pinned to end of strap, which has been passed beneath back; the lower border is pinned in the center to abdominal binder. The upper arm of fork is then drawn across chest above the breasts and pinned like the lower to the main strap.

Hemorrhage

Watch for the signs of hemorrhage already described. Should hemorrhage occur send for the doctor immediately; induce contractions of the uterus by grasping the fundus and employing a firm but gentle kneading (no doctor would leave the case in your charge without showing you exactly how to do this). Elevate the foot of the bed, and give a hot douche of sterile water, 120° F. Sometimes astringents such as vinegar are added to the douche, but unless the case is very urgent it is best not to use it without the doctor's order.

The patient must be kept quiet and on her back for the first six or seven hours, afterward she can turn on her side but should not sit up for at least five days. She is generally allowed to sit up on fourteenth day, if all discharge has ceased. In no case should the usual routine of life be resumed under four weeks.

The diet is usually liquid for the first twenty-four hours, after which all symptoms being normal, the patient is allowed almost any easily digested food.

The dressing and pad should be changed every two hours until the discharge diminishes, later every three to five, as the case demands. After the third day it is usually necessary to change it only after it has been removed for the requirements of the patient. These dressings must all be sterile and the hands disinfected before applying them. If douches are ordered, boil the douche nozzle for five minutes before and after use.

The breasts must be washed with boric acid solution before and after nursing.

THE CARE OF THE CHILD

After its birth the child's eyes and mouth are cleansed with 2 per cent boric acid solution and its whole body greased with sweet oil or sterilized vaseline. It is then wrapped in warm flannel, put in a crib or basket, heated with hot water bags if necessary, and covered with a warmed blanket. It can then be left until the mother is cared for. Watch the cord carefully as there is danger of hemorrhage.

First Bath

The first bath is often given at once, although some doctors prefer to have the baby rubbed with oil only for the first few days. Before beginning have everything necessary together—a foot tub containing water, 100° F., bath thermometer, warm, soft towels, wash cloth, castile soap, dusting powder, a dressing for the cord, boric acid solution, small squares of gauze, a rubber lap protector, two diapers, flannel band, shirt, flannel petticoat, and a simple, soft white dress.

The head is first washed, using very little soap, rinsed and thoroughly dried; then wash behind the ears, the crevices of the neck, axilla, joints, and between the buttocks and thighs carefully. Only the part being bathed should be exposed. The baby is now put down into the tub and rinsed, supporting the head and back firmly with the left hand and arm. Cover the lap protector with flannel apron or warm towel and when you lift the baby out, roll this around it. Dry by patting; use very little powder and only when it is necessary to prevent chafing. Some doctors consider it better not to put the baby in the tub until after the cord is off.

Navel Dressing

The navel is now dressed by cutting a hole with sterile scissors in a piece of sterile gauze, which is slipped over the cord and folded about it. The cord is laid toward the left side and a pad of sterile absorbent cotton put over it. A soft flannel binder holds the pad in place and must be put on firmly and smoothly, but not too tightly. It is best sewn on with a few large stitches. After the bath the baby should be rolled in warm flannel and laid on its right side in its crib.

Nursing

The Feeding. The first six weeks the baby should nurse every two hours during the day and every three hours at night; afterward this may be changed to every three hours during the day and twice at night. These hours should be rigidly adhered to. If the baby seems thirsty between meals a little plain water may be given.

The baby's mouth should be washed with 2 per cent boric acid solution before and after feeding and also the mother's nipples.

When for any reason it is impossible for the mother to nurse the child, great care must be exercised in the preparation of its food. First the bottle and nipples must be thoroughly cleansed immediately after each feeding by rinsing in cold water, then washing in hot water and soap suds and rinsing in hot water. The bottle is kept turned upside down and the nipples in a 2 per cent solution of boric acid. Both bottle and nipples should be boiled for five minutes twice a day.

Every doctor has his own formula for prepared milk, but whatever the preparation used it is best pasteurized if not above suspicion.

FOOD FOR THE SICK

In many diseases, especially those accompanied by fever, the powers of digestion are much impaired. For this, as well as other reasons, it is necessary that all food given should be in a liquid form. Milk, except **Milk** under certain conditions, is at such times considered the best food, as it contains in a dilute form all the constituents of the solids, namely: albumen, fat, sugar, the inorganic salts of lime and potash, and water.

If curds appear in the stools, or vomiting ensues, it shows that the milk is not being properly digested. This difficulty may often be overcome by diluting it with seltzer or other effervescent water, by the addition of lime water or bicarbonate of soda (ten grains to a pint), or by peptonizing the milk. (The recipe for the latter will be found at the end of the section.)

A good substitute for milk is white of egg, beaten to a froth, diluted with an equal quantity of water, and flavored with lemon juice.

Beef tea and broths contain very little nourishment, and should, therefore, be given only occasionally, for a change.

Amount and Frequency

Patients on fluid diet should, as a rule, be given six ounces every two hours, or half the quantity every hour. Of course there are times—as after operation, or when the patient is nauseated—when less must be given.

When a patient is on liquid diet it is especially imperative to give her nourishment at stated times and regular intervals. In giving see that it is taken very slowly.

Feeding Cups

As a rule, when a patient is sick enough to be on fluid diet it is necessary for her to maintain the recumbent position, even while drinking, and there are several devices to facilitate this. There is the old-fashioned feeder with the spout, but the drinking tube or "ideal glass" are preferable. When raising the head slip the arm under the pillow; take care not to throw the head forward, and by so doing make it difficult to swallow. Never bring a glass to the patient in your hand, but on a small tray or plate, and with it a napkin to fold under the patient's chin and prevent drops soiling the sheet.

When a patient is on milk diet her mouth should be washed out after every feeding, with listerine or boric acid, otherwise it will soon become coated and sore. Directions for doing this were given in the section on the care of the teeth.

Solid Food

A convalescent patient should be given solid food only by degrees, beginning with the so-called soft diet, which includes broths, strained vegetable soups, soft cooked eggs, milk toast, junkets, custard, jellies, and raw beef sandwiches. Then comes "light diet," which means the addition to the "soft diet" of underdone steak, chops, chicken, baked potatoes, and farinaceous puddings.

Pastry and all rich or highly seasoned food should be avoided until the patient has, in every respect, resumed her usual routine of life.

Special Diet

In diseases such as rheumatism, Bright's disease, diabetes, dyspepsia, etc., where fever is not the most important symptom, but where the effect of certain foods must be taken into account, a special diet is prescribed. As the patient's general condition must be considered in the prescribing of such, I think it wise to make only a few general remarks on the subject, as a great deal of harm is frequently done by following set rules for medication and food, by those who are unable to recognize symptoms contra-indicating their use.

In many forms of febrile disease, as for instance tuberculosis, light diet can be given even while there is fever, nourishing food being a most important item in the treatment.

In diabetes, sugar and starchy foods, most fruits, and alcoholic drinks must be avoided. Gluten bread should be used, and that not too fresh; saccharine should be used instead of sugar for sweetening not only tea and coffee, etc., but also in cooking. Fresh milk should not be taken, but buttermilk and koumyss are allowed.

In rheumatism and gout, as in diabetes, all sweetening should be done with saccharine, and sweets of all kinds are prohibited, also pastry, puddings, jellies, pork, veal, and all fried meats. Fruit except strawberries and bananas, is allowed.

TRAY WITH FEET

Dainty Serving

Too great stress cannot be laid on the necessity for a dainty serving of the patient's meals. They should be either very hot or perfectly cold, as the case requires. Have clean napkins, spotless china, and shining silver and glass. Be careful in carrying the tray not to spill any of the fluids, and, as has been said before, do not have too much on the tray at a time.

Furthermore, that the patient may thoroughly enjoy the meal, it is necessary that she should be perfectly comfortable. Therefore, before bringing in the tray, wash her face and hands, shake up the pillows, and decide where it is best to set the tray. If there is no bedside table or tray with feet, it is a good plan to have two blocks of wood to put on each side of the patient. They should be about the width of the tray, and high enough to hold it off the patient's chest. Magazines will answer the purpose if the blocks cannot be obtained. Always protect the night-gown and bed clothes with a towel or table napkin.

RECIPES

Milk

In warming milk for drinking never allow it to boil, and always keep it covered. It is the coagulation of the casein by boiling, and the evaporation of certain gases, that renders it indigestible. **Never Boil**

Brandy Milk with Egg

Beat one egg with one tablespoonful of sugar; add two tablespoonfuls of brandy and a cup of cold milk.

Koumyss

1 qt. perfectly fresh milk.
1-5th of a 2-cent cake of Fleischmann's yeast.
1 tablespoonful of sugar.

Dissolve the yeast in a little water; mix it with the sugar and milk. Put the mixture into strong bottles; cork them with tightly fitting stoppers; tie down securely with stout twine. Shake the bottles for a full **Five Days Required** minute; place them on end in a refrigerator; at the end of three days lay them on their sides; turn them occasionally. Five days will be required to perfect fermentation. Kept in the refrigerator and well corked koumyss will keep indefinitely.

Milk Lemonade

1 tablespoonful sugar.
1 cup boiling water.
¼ cup lemon juice.
¼ cup sherry.
1¼ cups cold milk.

Pour the boiling water over the sugar; add the lemon juice and sherry. Stir it until the sugar dissolves; add the cold milk; stir again until the milk curdles; strain through muslin.

Milk Punch

Sweeten 1 cup of milk with 1 teaspoonful of sugar; stir in 2 tablespoonfuls of brandy; beat with egg-beater; pour into glass and grate nutmeg over the top.

Milk Rennet

Use Dainty China

Stir 1 teaspoonful of rennet and 2 teaspoonfuls of sherry together with 1 teaspoonful of sugar. Heat 1 pint of milk until it is exactly 100° F.; pour into bowl containing rennet and wine; stir quickly and only enough to mix ingredients; grate nutmeg over the top, and set on ice till solid.

Peptonized Milk

Mix 5 grains of pancreatic extract and 15 of soda bicarbonate with cold milk; warm a pint of milk and add; stir well and put on ice to cool.

Barley Gruel

Mix 1 tablespoonful of Robinson's barley-flour with half a teaspoonful of sugar; pour over this a cup of boiling water; boil ten minutes; add a cup of milk; bring to boiling point; serve very hot. **Gruels**

Arrowroot Gruel

Mix half a tablespoonful of arrowroot with 1 saltspoonful of salt, half a teaspoonful of sugar, wet with 2 tablespoonfuls of cold water; pour on a cup of boiling water, stirring constantly. Boil for twenty minutes; add the milk, and bring to boiling point; strain; serve immediately. A little port wine is often added.

Oatmeal Gruel

Mix 2 tablespoonfuls of oatmeal, half a teaspoonful of sugar and a saltspoonful of salt. Pour this slowly into boiling water; cook in a saucepan for thirty minutes, or, preferably, in a double boiler for two hours; strain; add the milk, and bring to boiling point.

Cracker Gruel

Mix 2 tablespoonfuls of cracker crumbs with half a saltspoonful of salt and half a teaspoonful of sugar. Pour over this a cup of boiling water, add one cup of milk and simmer for two minutes.

Beef Tea

Cut two pounds of round steak into half-inch squares; put into double boiler and add one quart of water; let stand one hour, then place over fire and let simmer two hours; flavor to taste.

Chicken Broth

Broths

Cut up a fowl (which has been properly cleaned) into small pieces; add a quart or a quart and a half of cold water, according to size of fowl. Let stand for one hour and simmer for two hours, then boil slightly for one. Strain it, remove fat, and flavor to taste.

Mutton Broth

Cut one pound of loin or neck of mutton into small pieces; put with one teaspoonful of chopped onion into one quart of water. Let stand one hour, and simmer three; strain; let cool; then remove the fat which rises to the top. Heat when ready to serve; season with salt and white pepper.

Flaxseed Tea

Drinks

Boil one tablespoonful of flaxseed in a pint of water for one hour; strain; add one tablespoonful of lemon juice and one tablespoonful of sugar; serve either hot or cold. The loss by evaporation should be made good from time to time, so that at the end of the cooking there shall be one pint of tea.

Coffee

For every cup of water use a heaped tablespoonful of coffee. Soak the coffee for several hours in cold water; bring to boiling point and let simmer for a few minutes; let stand on the back of the stove for a minute to settle before serving.

Caudle

To a cupful of thin oatmeal gruel add a tablespoonful of sherry, one egg well beaten, sugar to taste; it can be served either hot or cold.

Toast Water

Toast till dry three slices of bread an inch thick; break into small pieces; add a pint of cold water; soak for an hour; strain, and squeeze the water out of the toast with the back of a spoon. Serve cold; if desired a little cream and sugar may be added.

Barley Water

Boil one tablespoonful of barley flour, a teaspoonful of sugar, a saltspoonful of salt and a quart of water together for fifteen minutes; strain; it can be flavored either with lemon juice or port or sherry wine.

Rice Water

This is made in the same manner as barley water, except that two tablespoonfuls of rice will be required to a quart of water.

Oyster Soup

Heat a cup of milk; add two tablespoonfuls of cracker crumbs, a saltspoonful of salt, a sprinkle of pepper, a fourth of a teaspoonful of butter; when this is warm through add a cup of fresh oysters and juice;

allow to simmer for about two minutes, or till the gills of the oysters curl.

Milk Toast

Toast three slices of bread a delicate brown; butter them and put them into a covered dish. Cover them with milk which has been brought almost to boiling point.

Soft Custard

Beat together the yolks of two eggs, a saltspoonful of salt, and two tablespoonfuls of sugar; add this slowly to a pint of milk which has been brought to boiling point; boil three minutes. Flavor with vanilla or sherry wine; serve cold.

Egg-nog

Egg Dishes

Break one egg into a bowl; add one saltspoonful of salt and two teaspoonfuls of sugar; beat until light; add one cup of milk, one or two tablespoonfuls of good brandy or whisky; serve immediately.

Sherry and Egg

Break an egg into a bowl; add a teaspoonful of sugar; beat the two together until well mixed; add two tablespoonfuls of sherry wine and a fourth of a cup of cold water; mix thoroughly; strain, and serve immediately.

Scrambled Eggs

Beat two eggs, a saltspoonful of salt, a sprinkle of white pepper, with a Dover egg-beater, until quite light; add four tablespoonfuls of sweet cream or milk;

turn the mixture into a double boiler; cook, stirring constantly until the albumen is coagulated.

Foamy Omelet

Separate the yolks from the whites of two eggs. To the yolks add a saltspoonful of salt and one-fourth of a saltspoonful of pepper. Beat with a Dover egg-beater until light; add two tablespoonfuls of milk. Beat the whites until fairly stiff, and fold them into the yolk; pour the mixture into a hot buttered omelet pan; cook for about two minutes; put into the oven for one minute to cook the upper surface.

Egg Cream

Separate the yolks of two eggs from the whites; add two tablespoonfuls of sugar to the yolks; beat until well mixed; add the juice and grated rind of half a lemon; place the bowl in a dish of boiling water on the fire; stir slowly until the mixture begins to thicken; add the beaten whites of eggs, and stir for two minutes. Serve cold.

Poached Eggs

Pour some boiling water into a small saucepan; salt it and add half a teaspoonful of vinegar; break a fresh egg gently into this. As soon as the white is firm lift out the egg with a skimmer, and put on crustless buttered toast.

Soft Cooked Eggs

Never boil eggs for the sick. Boil enough water to cover the eggs; put them in; remove the saucepan to the back of the stove where the water will not lose its warmth too soon, and let them stand ten minutes.

Jellies

Jellies

The order for making nearly all jellies is as follows: The gelatine is hydrated, or softened, by soaking in the cold water for half an hour. The boiling water, sugar and flavoring are then added, in the given order. Strain and cool.

Lemon Jelly

¼ box of gelatine.
¼ cup of cold water.
1¼ cups of boiling water.
½ cup of sugar.
¼ cup of lemon juice.
1 tablespoonful of brandy.

Orange Jelly

¼ box of gelatine.
¼ cup of cold water.
½ cup of boiling water.
½ cup of sugar.
1 cup of orange juice.
Juice of half a lemon.

As soon as the latter begins to stiffen it can be whipped till stiff, making orange sponge, which, served with custard, makes a very dainty dish.

Velvet Cream

Soak ¼ box of gelatine in ¼ cup of cold water for half an hour; then pour in ¼ cup of sherry wine; set the bowl in a dish of boiling water over the fire. When the gelatine is dissolved add a teaspoonful of lemon juice and ½ a cup of sugar; strain; set the bowl in a dish of ice and water to cool. As soon as it begins to thicken turn in the cream. Stir this until it also thickens; mould and put on ice. Serve with cream.

Wine Jelly

¼ box of gelatine.
¼ cup of cold water.
1¼ cups of boiling water.
½ cup of sugar.
½ a square inch cinnamon.
1 clove.
½ cup of sherry wine.

Coffee Jelly

¼ box gelatine.
¼ cup of cold water.
1 cup of boiling water.
½ cup of strong coffee.
½ a teaspoonful of vanilla.
½ a cup of sugar.

EMERGENCIES. FIRST AID TO THE INJURED

In all emergencies one of the chief requisites is coolness. Do not get excited, or you will be perfectly useless. When the doctor's services are necessary send him a *written* statement of the case, that he may come prepared with the proper appliances. Severe injury of any kind is apt to be followed by that complete prostration of the vital powers known as "shock." Therefore, after such, the patient should be put into a warm bed, and hot water bags applied to the feet and over the heart.

Exclude the Air

Scalds and Burns. In the treatment of scalds and burns the first object is to allay the pain by excluding the air. This is done best by the application of clean, soft, white linen or cotton cloths wrung out in a solution made by dissolving a tablespoonful of bicarbonate of soda (baking soda) in a pint of boiled water. This treatment can be continued for the first few days; afterwards boric acid ointment spread on lint or soft sterile cotton will be found healing. Do not try to treat a burn of any extent without a doctor's advice, as many complications are likely to ensue. In fact, in such cases, it is always best to send for the doctor immediately, as many people have died from shock after comparatively small burns.

Frost Bites. Rub with snow, or cloths wrung out in ice-water. The rubbing must be very light at first, and the patient kept away from the heat.

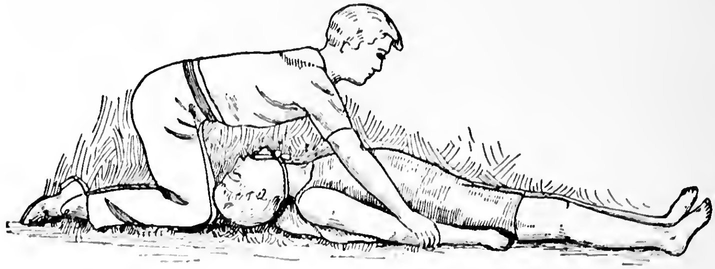
Syncope or Fainting. Place the head lower than the feet if possible; give plenty of fresh air. Ammonia may be given by inhalation, but it should not be very strong, as it is irritating to the bronchial tubes. If these measures are not successful treat as in case of shock.

Shock. Put the patient into a warm bed; undress and roll in blankets; apply heat to the extremities and over the heart; raise the foot of the bed, so that the patient's head will be considerably lower than the feet. If possible avoid giving stimulation till the doctor arrives; if, however, he cannot be found, and the case is urgent, give a rectal injection of whisky 1 oz., water 5 ozs. (105° F.), salt 5 grains. Coffee may be used instead of water and salt.

Epilepsy. Loosen all clothing; put something between the teeth to prevent the tongue being bitten; have the head on a level with the feet; give plenty of fresh air but no stimulants.

Drowning. In cases of drowning where a person is apparently lifeless, efforts to restore life should be commenced at once by loosening all tight clothing around neck, chest, and waist. Turn the patient over quickly on his face, raising the body slightly at the waist to allow any water in the throat or air passages to run out. Wrap a handkerchief or a towel around the forefinger and gently cleanse the mouth. All this should take only a minute or two. Place the person upon his back with a folded coat or a firm pad of any kind under his shoulders to raise them a little. Be careful that the tongue does not slip back and shut off the air from the trachea. If it shows any tendency to do so, have some one hold it out, or tie a handkerchief around it and then around the neck.

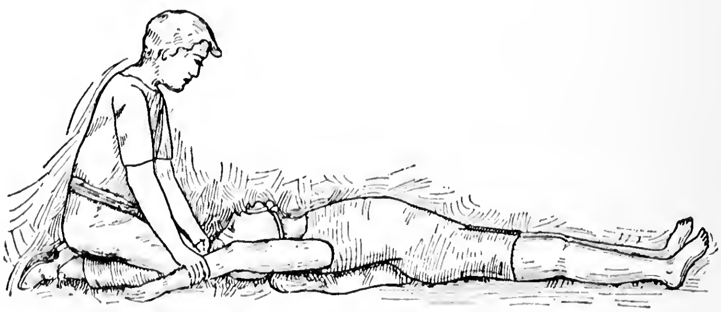
Now artificial respiration should be produced until the natural breathing is restored. To do this kneel



ARTIFICIAL RESPIRATION (First Movement)

Artificial Respiration

behind the patient and grasping his arms just below the elbows, draw them slowly upward above his head until they nearly touch. Give a firm pull for a moment. This movement tends to fill the lungs with air by raising the ribs and increasing the chest cavity.



ARTIFICIAL RESPIRATION (Second Movement)

Then carry the arms slowly back to the sides of the body and press them against the ribs. This movement forces out the air which was drawn into the lungs and makes artificially a complete respiration. These two movements should be repeated slowly and steadily about sixteen times in a minute, until respiration takes place naturally. This may require an hour or more.

Asphyxiation, Caused by Gas, Smoke, etc. Remove the patient into the fresh air, loosen the clothing, throw cold water in the face, neck, and chest; apply heat to the feet and over the heart. If respiration is

EXPELLING THE AIR (Third Movement)

shallow, artificial respiration should be performed, and, if necessary, treat as for shock.

Contusions, or Bruises, are best treated by rest and cold applications.

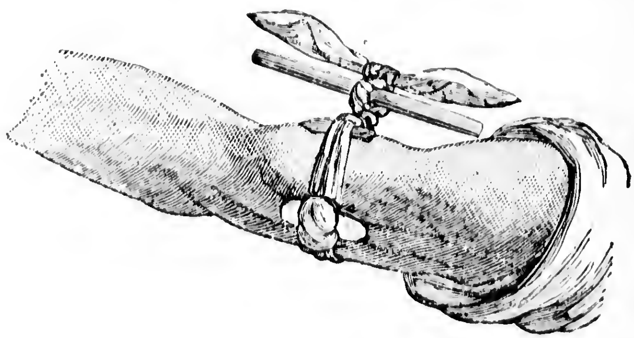
Guarding Against Blood Poisoning

Wounds. When there is a cut, the first procedure, provided there is no hemorrhage, is to wash out the wound well with bichloride, 1-5000, and bind it up with sterile gauze. A wound will heal without the formation of pus if all bacteria are killed or kept out. When the cut is long, or the ends of the wound do not come together well, the doctor should be summoned, as putting in a few stitches may prevent an unsightly

Tourniquet

scar. (Having bichloride and sterile gauze always in the house would save many a case of blood poison, infected fingers, etc.) Collodion is useful in keeping bacteria out of small cuts and in applying absorbent cotton over wounds in places where bandages cannot be used.

Hemorrhage. Elevate the affected part; make compression over the wound by applying clean compresses and bandaging tightly. If this does not check it, and you do not know the course of the arteries well enough



Manner of compressing an artery with a handkerchief and stick.

to make compression upon the required one, tie on a bandage very tightly above the wound. A pencil or a piece of wood stuck under this, and turned around, will act as a tourniquet. When possible, in addition to this it is always better to place a hard pad over the course of the artery. A doctor's aid must be sought immediately, for if the blood is shut off in this manner longer than an hour gangrene is likely to set in.

Epistaxis (bleeding from the nose). Make the patient stand or sit erect; throw the head back and elevate the arms, while you apply ice or ice-cold compresses to the forehead and back of neck. If the bleeding still continues the nostrils should be syringed with salt and water, ice cold. Avoid blowing the nose, and so disturbing the formation of clots. **Cold Applications**

Hemorrhage from the Lungs. Keep the patient quiet, give crushed ice, and put ice-cap on chest. Salt solution made by dissolving a teaspoonful of salt in a small cup of water may also be given.

Sprains occur most frequently at the wrist and ankle joint. Soak the affected part in hot water, or apply hot compresses. The joint should then be supported by strapping, and given moderate use. A surgeon should do the strapping, for if it is not properly done serious trouble may result. **Strapping**

Fractures. It is a mistaken impression that a fracture must be set immediately. It will do less harm for it to be left a day or two without splints than for them to be applied awkwardly. Handle the injured limb as little as possible, and keep the patient quiet until a competent surgeon can be obtained. Temporary splints made of pasteboard, shingles, etc., may be bound on to prevent the spasmodic twitching of the muscles; cold or hot compresses applied will keep down the swelling and relieve the pain. **Fractures Need Not Be Set At Once**

Dislocations should be reduced as soon as possible, but only a surgeon can do this properly.

FOREIGN BODIES IN THE EYE, EAR, NOSE, THROAT

The Eye. If anything gets under the lower lid, draw the lid down by the lashes, direct the patient to turn the eyeball toward the nose, and the offending body can then be wiped out with a soft handkerchief. If it is under the upper lid, this can be turned up over a thin pencil or knitting needle, and treated in the same way, except that the patient is directed to look down. Always wipe the eye towards the nose. If the particle is imbedded in the surface of the eyeball a surgeon must be notified immediately; do not make any effort to get it out.

Use Nothing But Water

Foreign Body in the Ear. Unless the object is something that will swell with moisture, syringe gently with warm water, taking care not to close the opening with the nozzle of the syringe. If this method fails go to a doctor; any unskilled effort to poke or probe the object out is likely to result in permanent injury to the ear.

The Nose. When a foreign body is in the nostril make the patient take a full breath, then close the mouth and the other nostril firmly—the air will probably expel the obstruction. If this fails, and the object is in sight, compress the nostrils above and hook it out with a hairpin or piece of bent wire.

A Foreign Body in the Throat may be hooked out in the same way; if not, a piece of bread should be swallowed; this may carry down the obstruction. Do not give purgative medicine, as is often done, but rather plenty of solid food, especially potatoes and bread.

A Foreign Body in the Windpipe will usually be dislodged by the coughing which its presence excites; if not, a blow on the back, or, in the case of a child, holding it up by the feet and administering a succession of blows between the shoulders will generally produce the desired effect.

POISONS AND ANTIDOTES

The treatment has three objects in view: to remove the poisonous substance, neutralize its further action, and remedy the ill effects already produced. An emetic is the first consideration. A tablespoonful of salt or mustard stirred into a glass of lukewarm water will usually prove effective. This dose should be repeated three or four times. An enema should also be given, the patient kept warm, and, as soon as vomiting ceases, the chemical antidote given.

Give an Emetic At Once

The following table of the chemical antidotes and further treatment of the most common poisons should be learned and remembered.

Carbolic Acid. Lime water and milk, equal parts, a pint to a pint and a half. Atropine and heart stimulants, such as whisky and strychnine, may be required, given hypodermically.

Nitric or Oxalic Acid. Chalk or whiting, the plaster from walls, milk and lime water. Give whichever can be obtained quickest.

Ammonia. Vinegar or lemon juice, followed by castor or olive oil.

Arsenic. The best antidote is tincture of iron, diluted with water, and either baking or washing soda. Lacking this, or till it can be obtained, give milk and white of egg, or flour and water.

Aconite or Belladonna. Strong, hot coffee. Give artificial respiration if necessary.

Bichloride of Mercury (corrosive sublimate). White of egg—white of two eggs to a pint of water.

Calomel. The same as bichloride of mercury.

Opium. Strong, hot coffee. Keep the patient awake, using artificial respiration when necessary; permanganate of potash and tannic acid are the best chemical antidotes, but they can rarely be obtained in a hurry.

BANDAGES AND BANDAGING.

Materials

The materials most commonly used for making bandages are either unbleached muslin or gauze. Muslin bandages are best when necessary to keep a splint in place, or make firm pressure. Gauzes are infinitely preferable when the object is only to keep a surgical dressing in position; they adapt themselves more neatly to the part, and are much cooler.

Bandages should be six to eight yards long; they vary in width from one inch to four; one inch for finger bandages, two for hands and feet, two and a half to three for head and arms, three to four for legs, spicas, etc.

The three fundamental forms of bandaging are: the spiral, reverse, and figure eight.

Figure Eight Bandage

The figure eight principle is the one most used, and is the easiest method to learn. It is made by turning the bandage round the limb in the form of the figure 8, each figure being higher than the preceding one, but overlapping it one-third of its width. A bandage must lie smoothly without wrinkles, making an even but not too severe pressure. It must not be loose enough to slip, yet not tight enough to be painful or impede the circulation.

Finishing

When finishing a bandage always put the pin on the outer side of a limb, and in all cases where it will least interfere with the patient's comfort. Safety pins should always be used.

In bandaging a limb begin at the extremity, and work upwards from left to right. Hold the bandage with the roll side upward.

Foot Bandage

To bandage a foot start the free end of the bandage at the instep, make a turn around the base of the toes, carry the bandage diagonally over the foot, across the point of the heel, and back from the other side till it coincides with the first turn. Cover this, and carry a second turn around the heel, half an inch higher than the first. Continue making alternate turns under the sole and behind the heel, crossing over the instep, until the foot is covered. Finish with a couple of circular turns around the ankle, or, if desired, continue up the leg.

Leg Bandage

The beginning of the leg bandage is placed obliquely across the leg above the ankle; a circular turn keeps it in place; then the bandage is inclined up the leg, and a turn taken around it. It is then brought downward, and another turn taken around the ankle. Suc-

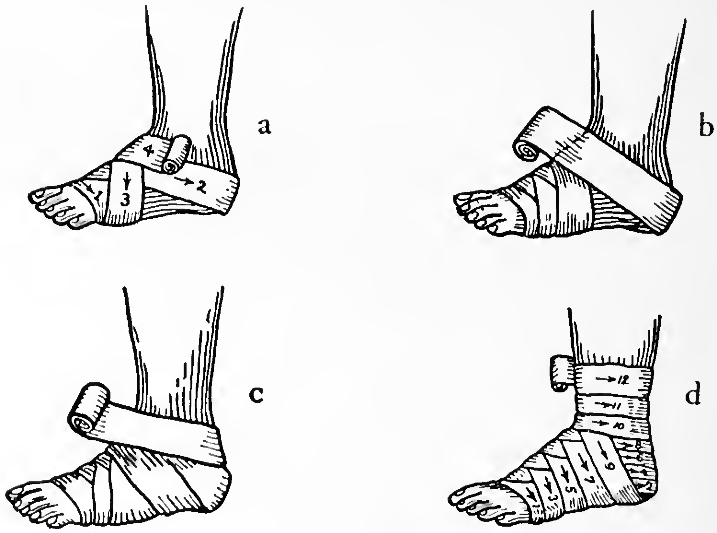


FIGURE 8 OF THE FOOT.

cessive turns are to be made, each one higher than the preceding, till the entire limb is covered.

To bandage a hand begin at the top of the first finger and cover it by a succession of oblique circular turns, or figures of eight, to its base. Then make a turn around the wrist to keep these from slipping, and return to the root of the second finger. Lead the bandage by one or two spirals to the top of this, then proceed down it, as upon the first finger, concluding with another turn upon the wrist. Cover each finger successively in the same way; then take a wider bandage, start at the back of the hand and wind it around the base of the fingers, carry it obliquely across the back of the hand around the wrist, back to the further side, and again around the palm. Continue these turns alternately till the hand is covered. The arm is bandaged in the same manner as the leg.

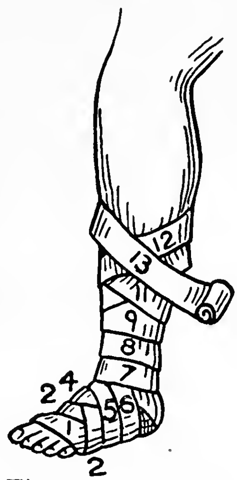


Figure 8 of the Leg

Forehead or Back of Head

When it is only necessary to cover the forehead or back of the head the figure-of-eight is all that is required. Start the bandage over the ear, carry it across the eyebrows and around the back of the head as high as possible. Continue to wind it round thus, making

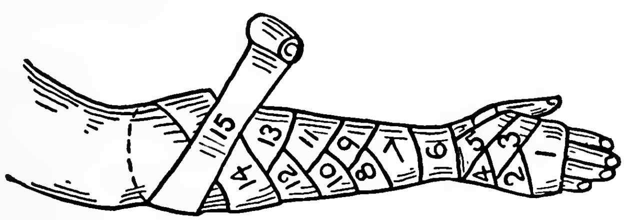
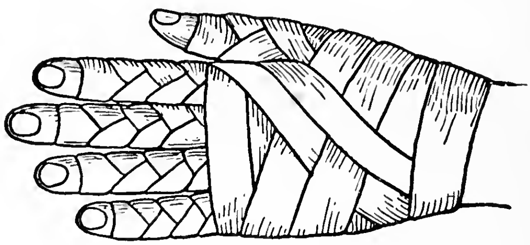


FIGURE 8 OF THE ARM.

each turn a little higher in the front, and lower in the back, until you have covered as much surface as required. When the whole head needs covering the capeline is better. This is put on by a

The Capeline

double roller (join two bandages by rolling). Stand behind the patient, and, taking one roll in each hand, begin low on the forehead and carry them round the head, far down on the nape of the neck; then transfer the bandage in the left hand to the one in the right, and continue it round, while the other is folded over at right angles with it, and brought across the top of the head to the front. Here it meets the other and crosses it again, running backward and overlapping the former folds. These turns are continued until the



Bandage of the Hand

whole head is covered, one bandage going round and round it, and the other going back and forth across it; all the folds leading from the front of the head to the back should be on the left of the middle, while those leading toward the front should be on the right. Finish with a circular turn around the head; fasten with a safety pin in front.

The tailed bandages are often found very convenient, especially for keeping poultices and the like in position.

Four Tailed Bandages

The four tailed bandage of the head is made from a piece of muslin eight inches wide and long enough to go over the scalp and tie under the chin. It is torn from each extremity to within three or four inches of the middle. The body of the bandage is placed on

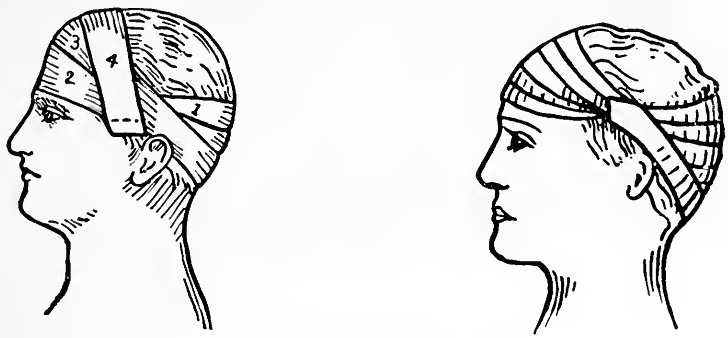
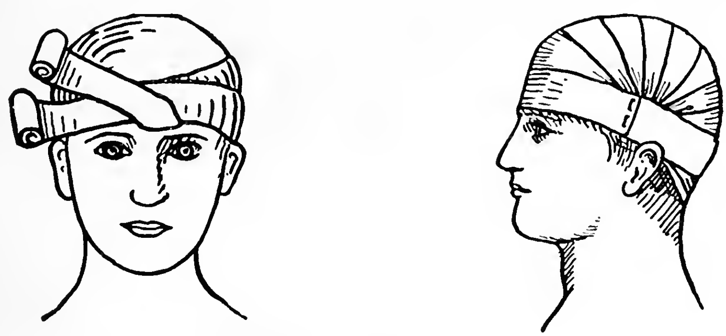


FIGURE 8 OF THE HEAD

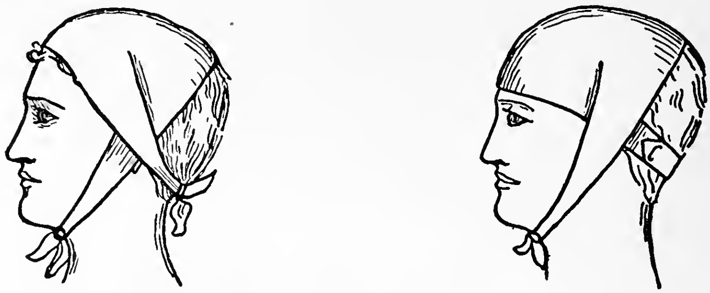
the top of the head, the two posterior tails tied under the chin, and the two anterior ones around the back of



THE CAPELINE

the neck. If it is desired to cover the front of the head the body of the bandage is placed at this point, the two anterior tails are fastened at the back of the head, and the two posterior ones down under the jaw.

A four tailed bandage for the knee is made by splitting a strip of muslin at each end, to within two or three inches of the center. Place the body of the

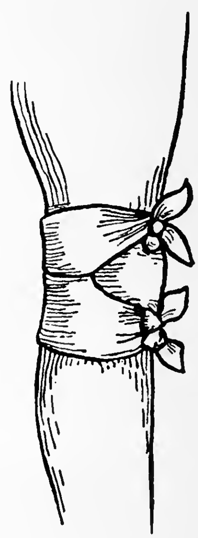


FOUR-TAILED BANDAGE OF THE HEAD

bandage over the knee, carry the tails under the knee, cross them so that the lower ones will come above the joint, and the upper ones below; bring them around, and tie in front.

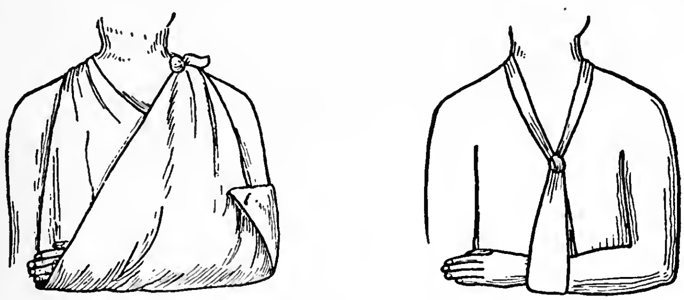
Scultetus

A scultetus, or many tailed, is used on the abdomen, to obtain pressure, to keep a surgical dressing or poultice in place, etc. To make it take four or five strips three inches wide and a yard and a quarter to a yard and a half long, sew them together in the center for a quarter of a yard, each one overlapping the other by two-thirds of its width. To apply, pass the bandage under the patient, so that the sewed part is under her back; fold the strips alternately over the abdomen, from below upward.



Four Tailed Bandage of the Knee

To make a sling take a square yard of muslin and cut it across diagonally; this makes two slings. When the fore-arm is injured its whole extent should be supported equally. Put it in the center of the sling; carry its outer end around the neck on the side of the injured arm, and the end between the arm and the **Slings**



SLINGS FOR LOWER AND UPPER ARMS

chest around the other side, tying them at the back. The third end is brought around the elbow and fastened in front.

If the injury is of the upper arm the sling should support the wrist only, making no pressure on the elbow. Turn the hand palm inward, fold the apex of the bandage in place, the arm just above the wrist in the center of the sling, cross the ends and tie them around the neck. **Sling for Upper Arm**

The student should practice the various bandages and slings described on some member of the family or a friend. Some little experience is required before they can be applied securely and neatly. The illustrations will help to make the matter clear.

HOME CARE OF THE SICK

PART II

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. *Do not copy answers from the lesson paper.* Use your own words, so that your instructor may know that you understand the subject. *Carry out the directions given in the text, if possible, before answering the questions.*

---

1. How are infectious and contagious diseases alike? How do they differ? Name some of each.
2. What precautionary measures should be taken with typhoid fever? With consumption?
3. What are the rules when isolation is necessary?
4. What precautionary measures should be taken by the attendant while nursing in a contagious disease?
5. How disinfect (a) the patient, (b) the room, (c) the furnishings at the termination of a contagious disease?
6. Why are the many precautions taken in surgical operations and in childbirth?
7. What can you say of diet for the sick? Why should special care be taken in serving?
8. What should the medicine closet contain in preparation for emergencies and accidents?
9. How would you treat a scald or burn? Frost bite? A wound?
10. What is shock and how should this condition be treated?

11. Why should written directions be sent to the doctor in accidents?
12. What would you do for a sprain? Fractures? In case of hemorrhage from an arm or leg?
13. What should be done at once for one who has fainted? One apparently drowned? Asphyxiated?
14. Give the rules of hygiene in pregnancy.
15. Name some of the things to be provided for childbirth. How should the room be prepared?
16. Describe the stages of labor.
17. What should be done if the doctor does not arrive in time?
18. How should the child be cared for directly after birth?
19. How would you remove a foreign body from the eye? Ear? Nose? Throat?
20. In case of poisoning, what objects has the treatment in view?
21. What would you do for carbolic acid poisoning? Bichloride of mercury? Arsenic? Opium?
22. Of what material are bandages made? How should they be applied and fastened?
23. Bandage a foot as shown in the illustration and then describe the process.
24. Try some of the other bandages described and report.
25. Make and adjust a sling for the forearm. When should it be used?
26. What questions would you like to ask in connection with these lessons? Tell of any experience that you may have had in nursing and of methods that were helpful.

NOTE.—After completing the test sign your full name.

SUPPLEMENTAL PROGRAM ARRANGED FOR CLASS STUDY ON

HOME CARE FOR THE SICK

MEETING I

(Study pages 1–13)

Symptoms of Disease

See *Care of Children*, pages 153–159, for children's diseases. (Vol. XI of the Library of Home Economics.)

The Sick-Room.

See *Household Hygiene*, Ventilation and Heating, Home Nursing, Harrison, pages 1–13. ($1.00, postage 10c.)

MEETING II

(Study pages 13–34)

Care of the Patient

Make bed with draw-sheet, as described in the text.
Change the bed as described.
Lift patient to sitting position.
Make back rest and foot brace.
Change patient from one bed to another, two methods.
Change mattress with patient in bed.
Make a wadding ring to relieve pressure.
If possible, get a trained nurse to show how these things are done.

Convalescence

Lift patient into a chair.
Topic—Amusing the convalescent and sick children.

MEETING III

(Study pages 34–62.)

Baths and Bathing

Make up pitcher of water, cool, tepid, warm, etc., of the various degrees of temperature given on page 41.

Test with a bath or other thermometer and with the hand. Note how unreliable the hand may be; after the hand has been in the cold water, the tepid water feels warm, and after having been in the hot water, the tepid water feels cold.

Home Nursing, Harrison, pages 63–73. ($1.00, postage 10c.

Practical Points in Nursing, Emily Stoney, pages 83-93 ($1.75, postage 20c.)

Temperature, Pulse, Giving Medicine, etc.

Obtain a clinical thermometer and take temperature a number of times, having all read the thermometer to 1-10 of a degree, and write the reading on slips of paper. Compare results. If there is any difficulty in shaking down the mercury, get a physician or nurse to show how it is done. A clinical thermometer may be purchased through the School for $1.25, or will be loaned for 10c.

Count the pulse in quarters for a second, as described, and compare results as in the taking of temperature.

Count the respiration, as directed.

Have an exhibit of medicine glasses, feeding cups, syringes, ice-caps.

Make poultices, sinapisms, flannel for fomentations, compresses.

(Select answers to the Test Questions on Part I and send to the School. Report on Meetings I, II, and III.)

MEETING IV

(Study pages 63–73)

Contagious Diseases: Disinfection

See article in the supplement, also send for and read some of the following Bulletins issued by State Boards of Health:

Lansing, Michigan, "Dangerous Communicable Diseases."

Concord, New Hampshire, "Consumption."

Springfield, Illinois, "Consumption" also "Practical Disinfection."

Augusta, Maine, "Contagious Diseases."

Trenton, New Jersey, "Restriction of the Spread of Infectious Diseases."

These Bulletins are sent free, or for a 2c stamp. Send to your own State Board of Health, if not included in the above; to your capital city, for any Bulletins.

MEETING V

(Study pages 73–105)

Surgical Work: Obstetrics

Practical Points in Nursing, Stoney, ($1.75, postage 20c.)

Food for the Sick

Food and Cookery for the Sick and Convalescent. ($1.50, postage 18c.)

Food for the Sick, French, ($1.00, postage 10c.)

Hand Book of Invalid Cookery, Boland, ($2.00, postage 16c.

Collect appropriate recipes in addition to those given in the text.

Show dainty and suitable serving for the sick.

MEETING VI

(Study pages 105–121)

Emergencies

Practice artificial respiration, as described.

Make a tourniquet.

Bandaging and Bandages

Practice all the bandages described. If possible, get a trained nurse to show methods.

(Select answers to the Test Questions on Part II and report on Meetings IV, V, and VI.)

BIBLIOGRAPHY

Food and Cookery for the Sick and Convalescent ($1.50) Fannie M. Farmer.
Food for the Sick ($1.00). Edward C. French.
Home Nursing ($1.00). Eveleen Harrison.
Nursing ($2.00). Isabel A. Hampton.
Practical Normal Histology ($1.25). T. Mitchell Prudden.
Practical Points in Nursing ($1.75). Emily A. N. Stoney.
Text Book of Nursing ($1.75). Clara Week Shaw.

MAGAZINES

The American Journal of Nursing.
The Trained Nurse.

Note.—For the convenience of students the School will purchase and forward any of the above books on receipt of the price given.

ANNOUNCEMENT

"LESSONS IN COOKING, THROUGH THE PREPARATION OF MEALS."

THIS new correspondence course in cookery has been prepared to meet the needs of home-makers who have had little or no systematic training in modern methods of cooking but who desire to provide for their families simple, yet appetizing and wholesome meals, with the last expenditure of time, effort and money.

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The problem of home cooking is not only how to cook various separate dishes but how to prepare *whole meals.* The plan of "Lessons in Cooking" is unique and original in that a systematic course in cooking is taught through a series of menus, with detailed directions, not only for cooking the separate dishes, but also for preparing and serving *each meal as a whole.* The course is divided into twelve parts, in each of which is given the recipes for a week's menu, typical of one month of the year—over 250 meals in all. In the first lessons, simple operations of cooking are described and gradually the more difficult and complicated recipes are introduced, leading to advanced work in the later lessons. Throughout the course the question of wholesome food combinations and balanced meals is carefully considered and special emphasis is given to economy of time and money.

All available authorities have been consulted and the assistance of a number of prominent teachers of cookery has been obtained in the preparation of this course, which presents the best modern methods and the latest scientific discoveries relating to the "Fine Art of Cooking."

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INDEX TO

THE PROFESSION OF HOME MAKING

HOME-STUDY COURSE

As this Course or book is made up of four different books, the pages are re-numbered at the *foot* of the pages to provide a complete index. In using this index *refer only to the numbers at the bottom of the pages.*

Emergencies, accidents, poisons and antidotes, etc., are printed in black-faced type as an aid to "quick reference."

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Note.—For page numbers, see foot of pages.

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(5) **Food and Dietetics**
Parts I, II, III, IV.

(7) **Household Management**
Parts I, II, III, IV.

HEALTH SUBJECTS

(2) **Household Bacteriology**
Parts I, II, III.

(4) **Household Hygiene**
Parts I, II, III.

(6) **Personal Hygiene**
Parts I, II, III, IV.

(8) **Home Care of the Sick**
Parts I, II, III.

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(9) **The House—Its Plan, Decoration and Care,** I, II, III.

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