A Course In Household Arts

A COURSE IN HOUSEHOLD ARTS

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PART I

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PREFACE

A Course in Household Arts was prepared in 1902 for the Boston Public Schools of Cookery, and its use in that city was continued up to the time a revised edition of the book was contemplated.

The lessons were planned with reference to the requirements of the different grades, no less than with due regard for the wide variation in the number and length of periods devoted to the work. At the same time the material was so arranged that the essentials of the course could be covered in two years—the minimum of time recommended by the Board of Supervisors.

This purpose was accomplished by dividing the course into two parts, Series A and B, each containing material for one lesson a week for a year, and each card including a sufficient number of recipes illustrating the principles involved to admit variation to suit differing circumstances and conditions. Allowance was made for needful drill in preliminary work and for the care and storage of materials and utensils customary at the close of the year.

Designed primarily for beginners, these lessons have, through a teaching experience of several years, proved satisfactory in grammar, secondary, and higher classes. The theoretical portion was condensed, expanded, simplified, or omitted, and the order of lessons changed according to special needs.

It has seemed advisable to include in the present course only simple experiments which can be performed with utensils to be found in an ordinary school kitchen, since excellent laboratory manuals are published for students of domestic science, and opportunity for experimental work varies in different schools. Aside from these considerations, the time required for working out results by the laboratory method precludes the extensive use of this method by the average student, who, though not intending to teach the subject herself, may nevertheless desire to understand the principles underlying the methods employed in cookery and other household arts. While it is hoped, therefore, that others may find this work helpful, it is for students of this class primarily that the present work is intended. With such knowledge, it is believed that there will come an intelligent interest and a keen pleasure in the performance, raising even the homeliest task above the plane of drudgery pure and simple.

With this aim in view, and with the idea of eliminating at least a portion of the reading, and especially of the burdensome note-taking that consumes so much of the time and energy of the student, a considerable amount of material has been collated from various sources.

"In dealing with certain questions," it has been said, "authority is wont to carry more weight than pure reasoning, and quotations are frequently used when the same ideas might have been expressed with greater facility or brevity in the writer's own language." To a certain extent this opinion is concurred in, and this enlarged Course of Household Arts is sent forth, not as something wholly new and original, but "only the shifting into place of the innumerable materials made available and experimented on by others—another modification of them, like the combinations of the kaleidoscope."

The intention was to include in one volume lessons formerly given in Cards A and B, but the abundance of added material made this impracticable. It was decided, therefore, to hold to the original plan, following the fundamental work of the first year with lessons in the second year which, in A Course in Household Arts, Part II, establish new principles and also enlarge and extend the application of those already learned.

Grateful acknowledgment is here made to Miss Susannah Usher, who in the midst of a busy life kindly read the manuscript and offered valuable suggestions; to officials of the United States Department of Agriculture, for prompt and courteous attention to requests for information, particularly to Professor Louis D. Hall, specialist in "Marketing Live Stock

and Meat" (formerly assistant professor of "Animal Husbandry" at the University of Illinois), who, in conjunction with *Good Housekeeping,* permitted the reproduction of drawings of retail cuts of meat and the use of other material which appeared in that magazine; to Cornell University; to the Agricultural Experiment Stations of the University of Illinois and of the University of Minnesota, for the use of illustrations of meat cuts; and to all others who in any way aided in the preparation of this work.

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The arrangement of subject-matter in the present revised Course necessitated at times grouping two or more lessons into one chapter, as well as changing the relative position of certain lessons. The plan adopted may be adhered to or changed as desired by the individual teacher.

The preliminary lessons remain as in the original Course, it being understood that instruction or practice in household processes, such as dish-washing and the like, may be combined with the lessons in cooking as local conditions make convenient or desirable.

In connection with the study of Water, the principles underlying the use of freezing mixtures are applied to the preparation of frozen creams. This topic, however, as is customary in many schools, may be deferred to the closing lesson of the year.

The material given in Chapter V—Food and the Human Body—is intended for use as required, not necessarily to be given in consecutive lessons. Here, as elsewhere, the time and method of treating a topic must of necessity vary with the age, experience, and previous knowledge of the students. In general, however, it would seem that certain relations of food to the body will be more readily understood when some knowledge of combustion has been gained through study of Fire and Fuels; also that the study of Milk as a representative or typical food will help to a clearer understanding of foodstuffs, or "food principles," as formerly termed. To this end, experiments to separate cream, curd, and whey from milk will show in a simple way the presence of the three foodstuffs—fat, protein, and water. (The remaining experiments with milk are better deferred until after the study of albumin in eggs.) Common salt will serve as an example of mineral matter, and ordinary starch and sugar of the carbohydrates.

Chapter VIII treats of Fruits, fresh and dried. Those of the former class, which are abundant in the early autumn, may be used at that season, and the dried fruits in lessons given during the winter or spring.

The same rule holds with Vegetables, using in the lessons of the fall or early winter those which are then at their best, and the commoner vegetables and dried legumes at any convenient time.

Vegetable soups may follow the regular vegetable lesson or be given later as a review of vegetable cookery and white sauce. Salads also may, if preferred, follow vegetables, or fats and oils.

Since the cookery of eggs may serve to show some of the prominent characteristics and properties of a typical protein food, the egg lessons are given precedence on this subject. It is not supposed, however, that all the experiments in this connection, or indeed of any subject, are necessarily to be given at one time. One or more may be taken up to illustrate the principle involved in any given lesson.

The theoretical portion is very full and will supply material for reading or recitation, which may be supplemented by Bulletins of the United States Department of Agriculture, or other reference material.

I would not have any one believe that the truths it is my life work to preach are doctrines likely to lead away the mind from higher thoughts. On the contrary, if I am right, they are the most necessary to clear thinking and right action. I have tried to model my daily life on the teachings of the Scripture. I nowhere find food spoken of in the Holy Book with disrespect, and the greatest miracles and most beautiful mysteries are linked with the daily necessities of food and drink. And what I have sought to impress upon you all is that dining means not only stoking the human body, but so stoking it that it shall manufacture the maximum of steam and the minimum of black smoke. And in the cookery and preparing of food there are at every time opportunities for courtesy and unselfishness to others, and the charm of exercising technical skill in the practice of a great art.

—"John Honorius," by Judge Parry, in *Cornhill.*

CHAPTER I

Sweeping and Dusting

The purpose of sweeping is the removal of loose dirt.

Dirt is composed of particles of sand or earthy matter, bits of worn-out clothing, refuse of animal or plant life, etc.; in fact, dirt may contain particles of anything, clean or the reverse, and it may be wet or dry.

Dust, on the contrary, is always dry. Dust is composed of the same substances as dirt, only dried and ground exceedingly fine. So fine and so light in weight are these particles that more or less dust is always floating in the air. The lightest footfall or the gentlest breeze will cause it to rise. Dust contains also tiny "seeds" capable of growth.

Dirt and dust may be filthy; they are always repulsive because they mean disorder and carelessness. When, moreover, it is realized that among the tiny "seeds" usually present in dust may be some which, as they grow, cause consumption, diphtheria, lockjaw, and other dangerous diseases, it is evident that dirt and dust should be disposed of in such a way as to kill these "seeds."

Because these "seeds" are so extremely abundant in dust, they are sometimes called "dust plants." They are also called "germs" and "microbes." "Germ" means that from which something grows; "microbe" means simply a "little living thing." Scientifically, these dust plants are grouped under three heads—**molds, yeasts,** and **bacteria.**

Molds are the most commonly known of these plants because they can be seen with the naked eye. They grow and multiply rapidly in warm, moist places, destroying food and clothing. Mildew is one form of mold.

Yeasts are widely distributed over the surface of the earth, in the soil, the air, and the water. Yeast plants blowing round in the air are called *wild yeasts* to distinguish them from the cultivated yeasts used in bread-making. The fermentation or "working" of preserves and fruit juices or other sweet liquids is caused by wild yeasts.

Bacteria (singular, **bacterium**), "little rods," are so named from their appearance when they are seen under a microscope. They cannot be seen with the naked eye. They are the smallest and simplest of known living things. Each bacterium is a simple cell,—that is, an exceedingly small mass of living substance inclosed in a thin cell-wall to give it shape. This living substance, or *protoplasm*, is soft, jelly-like, colorless, and nearly transparent.

Bacteria are the plants usually meant when germs or microbes are spoken of, because some members of this group cause certain diseases, while others cause the decay or spoiling of animal and vegetable substances. Most bacteria, however, are harmless, many are useful, some are even necessary.

The home of many bacteria is in the upper layers of the earth, but being so small they are carried by the wind and rain and snow almost everywhere. They are found in the air, in the water, on food and clothing, in the mouth and nose, under the nails, and in other parts of the body.

Like other living things, bacteria require food and moisture. Many require warmth, though some can grow at freezing temperature. Some need air; others do not. All multiply with marvelous rapidity under favorable conditions, one dividing into two, two into four, four into eight, and so on. As they grow, some bacteria produce poisonous substances which frequently cause more harm than the mere presence of the bacteria themselves. Some species can divide and become full grown in half an hour or even in less time. If this rapid multiplication should continue without interruption, each bacterium, it has been computed, would produce 16,000,000 offspring in twenty-four hours. Such an extremely rapid increase as this could not occur, however, because lack of food or the accumulation of their own life wastes would soon check the growth of the bacteria or kill them. Nevertheless, their power of multiplication under even ordinary circumstances is so great that in spite of their exceedingly minute size, they accomplish marvelous results in a very short time.

Bacteria can live a long time even when deprived of food and moisture. Under these unfavorable conditions the living substance sometimes shrinks or shrivels into little hard balls, called *spores*. Spores are difficult to kill. Some which had been boiled in water for several hours afterwards grew when placed in favorable conditions; others were found alive after having been dried for ten years. Not all bacteria, however, can form spores. Fortunately, none of the common disease germs do so. These, therefore, can be killed by boiling in water about half an hour.

In this connection it should be clearly understood that though bacteria are abundant in the water, in the soil, and in the air, nevertheless, the world is not filled with disease germs lying in wait to attack us; for of the many hundreds of kinds of bacteria known to scientists, only a few kinds cause disease.

"It is a mistake to think that every breath of air is dangerous or that all food and water contain disease germs. . . . In the bodies of persons ill with germ diseases, in the houses where they live, and *wherever the wastes from the bodies of* *the sick go,* there, and in most cases there only, are disease germs to be found." (*Primer of Sanitation,* Ritchie.)

Note.—The germs of the disease contained in the matter coughed up by consumptives, drying on sidewalks and other places, may be carried with the dust to well persons, who may thus contract the disease. This possibility emphasizes the need for burning all dirt and dust and for washing the hands before touching food, especially after handling any object that has been in contact with dirt or dust.

In general, dark, damp, dirty places are most favorable for the growth of all germs. Fresh air and sunlight are nature's great disinfectants. Nevertheless, it may also be said with Miss Talbot, in *House Sanitation,* that sunlight acts as a disinfectant "only when it is direct; and there are very few places in a room on which the sun shines directly, even for a few minutes. The light is chiefly diffused, and even then is still further dimmed by the shadows from furniture, curtains, and other large, dark objects. In consequence, for practical purposes of disinfection, the admission of sunlight is not to be trusted. It is not a substitute for cleanliness."

Implements for Sweeping. In getting rid of dirt, as little dust as possible should be raised; implements best suited to this purpose should be chosen. For sweeping smooth, hard floors, whether painted, polished, or covered with oilcloth or linoleum, a long-handled bristle brush is best. For carpets, a corn broom or a carpet sweeper may be used. In either case, a small broom will be needed for cleaning corners and other places which cannot be reached with a large broom or with a carpet sweeper. A carpet sweeper raises less dust than a broom and does not wear out the carpet so quickly. A sweeper should be chosen which has some protection at the ends to prevent the furniture from being scratched. A sweeper with a removable brush is also preferable, because it can be cleaned readily. If a corn broom is used, it may be dampened slightly, or damp newspapers may be scattered over the carpet before sweeping to prevent the dust from rising. Best of all implements, however, is the vacuum cleaner, which removes the dirt without stirring up the dust.

Preparation of Room for Sweeping. Dust and put away small articles. Dust pictures and furniture too large to be removed, and cover with cloths kept for this purpose. Dampen shavings or torn newspapers and scatter them over the carpet. Close the doors. The windows may be opened or closed during sweeping, according to conditions. If the windows are open when a strong wind is blowing, the dust may be blown back; if the windows on opposite sides of the room are open, a whirlwind of dust may be raised.

NOTE.—Never sweep or dust a room while food is being prepared or served, since the dust, as it "settles," will be deposited on the food, and the food, usually warm and moist, will furnish favorable conditions for the growth of bacteria.

Method of Sweeping. Always sweep away from the walls and toward the center of the room unless there is some good reason for doing otherwise.

In brushing a *smooth, hard floor,* begin at one corner. Brush the dirt from the corner and along the side of the room, close to the wall and parallel with the grain of the wood; then, standing on the swept portion, push the brush before you, keeping it close to the floor to prevent dust from rising, until the middle of the room is reached. Hold the brush upright a moment before lifting it, then raise it gently from the line of dirt to avoid scattering the dirt in the air. Brush the space beside the one just cleaned, and push the dirt gently into small piles. If the dirt is collected into small piles rather than into a single large pile, less dust will be raised. When one-half the room is swept, begin at the opposite end and proceed as before until the sweeping is completed. If the room is unusually long, less than one-half the length may be brushed at a time.

If a corn broom is used, clean corners first with a small broom or brush; then begin near one corner of the room and, standing on the cleaned portion, draw the broom from a point just behind you, and sweep with a rather quick, light stroke. When the end of the stroke is reached, allow the broom to stop short with a "motion between a short, backward stroke and a sudden stop," keeping the broom in a vertical position over the dirt for an instant to prevent dust from rising. Sweep the place beside the one just cleaned, and collect the dirt in the manner described in the foregoing paragraph.

After brushing, smooth floors may be freed from dust by wiping them with canton flannel or other soft material made into a bag, with which the brush or broom is covered; or an old broom may be used to push over the floor a piece of woolen cloth or cheesecloth folded several times. When the under side of the cloth becomes dusty, it may be folded in and a fresh surface exposed. This "folding in" process may be repeated until the cloth is filled with dust. The cloth should then be shaken out of doors.

For *carpeted floors* use a *heavy* stroke in sweeping across the grain—since the stronger threads run in that direction—and a lighter one in sweeping lengthwise. Carpets and rugs which have a "nap" should always be swept *with* the nap, because if swept "against the grain" they may retain particles of dirt or sand, and thus quickly wear out. *New* carpets or those which are not much used will wear well if, instead of being swept, they are "wiped off" with a damp cloth.

Rugs are more easily cleaned than carpets. When it is possible, the rug should be cleaned out of doors. It should be rolled, carried out, placed right side down on the grass or on some other flat surface, beaten well with a rattan or carpet beater, then turned over and swept on the right side. After this sweeping the rug should be hung on a line till the dust passes off. If a flat surface is not convenient, the rug may be hung over a line and beaten. The rug should never be held by one end and shaken, however, since its weight will loosen the threads and cause the end to ravel. Rugs too large to be easily carried out should be swept first and then wiped off with a damp cloth. Begin at one side or end, wipe a portion of the surface, and fold or roll the cleaned part in. Wipe the under side of this portion and the floor beneath. Continue thus until one-half of the rug has been cleaned; then unfold and put in place. Repeat the process for the other side.

Concerning rugs, Miss Marion Talbot says in *House Sanitation:*

On the whole, the rug or carpet which nearly covers the floor and is not nailed down is most desirable, and with the help of the vacuum cleaner is much more easily kept clean than hardwood floors and small rugs, which formerly received the stamp of approval of the sanitarians. The care of these small rugs, etc., involves much hard work and heavy lifting, and where there are old people or children, they are not very safe because of the danger of slipping.

Sweeping Stairs. Begin at the top stair and sweep away from the sides toward the middle. Brush the dust from each stair separately into a dustpan covered with damp paper. Be careful to clean the corners. Never brush the dirt from one step over the others, because the dust would be raised only to settle later on those previously cleaned as well as on those below. Dust may be wiped from hardwood stairs with a soft cloth slightly dampened.

Collection and Disposal of Dirt. To prevent the dust from rising, cover the dustpan with a piece of damp newspaper, standing the paper a little higher than the pan at the back, as "damp surfaces catch and hold the dust." The paper with the dust folded in should afterwards be burned.

Care of Sweeping Implements. Brooms and brushes will wear a long time if they are carefully used, cleaned, and kept. The broom during sweeping should be used on alternate sides as well as on opposite corners. When not in use, it should not be allowed to rest on the broom or brush end, but should be hung up. If it is washed occasionally in hot, soapy water, it will be kept soft, flexible, and durable. Hang the broom to dry in such a way that the water will not run into the metal parts. Tacks and wires if wet will rust and break. Brushes should be washed in cold water on account of the glue with which the bristles are fastened. Lint, dust, and hairs should be removed from all sweeping implements each time they have been used. The brush of the carpet sweeper should be cleaned, and the inside of the dust receiver, when it has been emptied, should be wiped out with a damp cloth.

Dusting. Dusting should mean the removal of dust. It is a waste of labor, therefore, to dust immediately after sweeping, since experiments have shown that at least two hours are required for the dust in a still room to settle.

A thin, soft cloth, not over three-quarters of a yard square, is best for dusting. Cheesecloth is inexpensive and is easily washed and dried. Old cloth does not ravel so readily as new. New cloth should be hemmed or overcast, since ravelings might catch and break small articles. Have several dusters if possible. Feather dusters should never be used, since they merely scatter the dust, which will settle again as soon as the place is quiet.

"Damp surfaces hold the dust"; therefore, slightly dampened or slightly oiled dust cloths or "dustless dusters" may be used.

When the dust has settled after sweeping, wipe woodwork and windows. Wipe the walls gently with a clean, dry cloth. Carefully remove cloths from the furniture, and fold the dusty side in.

Begin at one place and dust everything in turn until the point of beginning is reached. Dust collects chiefly on flat surfaces. Dust high places first, then lower ones, so that any dust that falls may be collected.

Use and Care of the Dusting Cloth. With a corner of the cloth wipe the dust from the surface to be cleaned, and fold the dust in; wipe the next article with a clean part of the dusting cloth, and fold in the dust as before. Continue this process until all the clean portions of the cloth have been used; then take a fresh duster. When the dusting is completed, wash the dusters. Scald them occasionally. Always dry them out of doors, and if possible, in the sunshine.

NOTE.—Dust and the bacteria with it may cause much irritation to eyes, nose, and throat, the effects being similar to those of a severe cold. To avoid this, while sweeping and dusting, cover the nose and mouth with a slightly dampened cloth.

CHAPTER II

Washing Dishes and Kitchen-Ware

Preparation for Washing Dishes. As soon as a meal is ended, put into a wide-mouthed jar any milk that is left; *cover* and place in the ice box or in some other *cold* place at once, and fill empty pitcher with *cold* water. (See chapter on Milk.)

Remove platters and dishes containing food, then plates, cups, and saucers, etc. Put unused food into small dishes or bowls, *cover*, and—after cooling any food that is warm—place in ice box or pantry. Scrape all waste portions of food from dishes. For this purpose small rubber scrapers may be purchased, though a piece of waste bread crust or soft paper will do the work quietly, quickly, and thoroughly. Put refuse into a pail or jar kept for the purpose, and empty and wash this receptacle after washing the dishes.

Empty and rinse cups if necessary. Pile plates by themselves—the largest at the bottom—cups by themselves, silver articles together, and steel knives and forks by themselves, to avoid scratching the silver. Place nearest the dishpan the dishes to be washed first.

Soaking Dishes. Saucepans, pudding dishes, etc., that need soaking should be filled with water immediately after using. Dishes which have been used for milk, eggs, or for mixing cake, bread, or other starchy substances, should be soaked in *cold* water; those that have been used for candy and other sugary substances, and for sticky, gummy substances like gelatin, should be soaked in *hot* water.

Washing Dishes. Have two pans, one two-thirds filled with hot, soapy water for washing, the other with clear, hot water for rinsing. Dishes may also be rinsed by pouring hot water over them on the draining shelf. An empty pan or a tray may take the place of a draining shelf.

A simple and convenient *soap shaker,* for holding small pieces of soap, may be made by perforating the bottom and sides of a tin baking powder or cocoa box, and fitting a loop of wire over the top for a handle.

Dishcloths for glasses, silver, and fine china should be thin and soft; those for ordinary dishes may be of thicker, firmer material, and those for saucepans, etc., of even coarser cloth. Since every part, outside and inside, of every dish should be washed, use a small *mop* for dishes not large enough to admit the hand.

Towels also should be adapted to the work they are to do. Soft, thin toweling, therefore, is best for glasses, silver, and delicate china, and firmer, heavier toweling for other dishes. For drying saucepans, use a coarse, soft crash.

Order in Dishwashing. The usual order is to wash glasses first, then silver, and next china, leaving cooking utensils till the last. For reversing this order by washing cooking utensils first, the following reasons are given: (1) cooking utensils are emptied first, and food hardens on them if allowed to stand; (2) the hardest thing should be done first; (3) the dirty water is not likely to be used for china or glasses; (4) delicate articles may be broken if washed in a crowded sink; (5) the hands are left in better condition after the work is finished.

Method of Washing Dishes. Use *hot, soapy* water for washing ordinary china, silver, and glassware. Rinse all dishes except silver and glassware. Change the dishwater often enough to keep it hot and soapy. To prevent cracking, dip glasses edgewise into hot water, so that both outside and inside are heated together.

Fine China, to be kept in good condition, needs careful treatment. In washing, place a towel on the bottom of the dishpan and wash only one piece at a time, since the delicate edges are easily nicked, especially when they are warm. Use *mild* soap and but little of it for gilded or painted china. Strong soap and washing powders are likely to injure decoration.

While china is warm, do not place one piece over another, for the glaze is likely to be cracked. Even when cool, fine china plates should never be piled without soft paper between, because the lower edge of plates is often rough and may, therefore, injure decoration.

In putting dishes away, hang up what can be hung, and place other dishes upside down to keep out the dust.

Cut Glass should be handled with great care. Only moderately hot water should be used in washing it. If the cutting is deep, use a soft brush, but do not use anything which will scratch the surface, since cut glass breaks easily at any part that has been scratched. A grain of sand in the bottom of the dishpan may scratch glass. Place a towel in the pan, therefore, when washing cut glass, and cover the draining board with a towel or soft cloth. Since contact with a hard, cold surface is likely to crack cut glass, the place on which it is to rest should be covered with a cloth or doily.

It is difficult to *dry* deeply cut glass with a towel, and because, if not dried well, the glass becomes cloudy, place such pieces, after wiping with a soft cloth, in a box, cover with sawdust from a non-resinous wood, and let them stand for half an hour or more. Take them then from the sawdust, brush with a soft brush, and polish with a soft cloth or clean chamois. Spread the sawdust out to dry for future use.

Tinware should be washed in hot, soapy water, special care being taken to remove grease and food waste from all seams. For this purpose use wooden toothpicks, skewers, or a stiff brush. Tinware discolored by the burning on of food should be boiled out occasionally in water containing washing soda.

Agate and Ironware may also be cleansed with a washing soda solution. Rub with *pumice stone* agateware which has been roughened by the burning on of food. Remove ordinary stains with sapolio. After washing and wiping ironware, let it dry thoroughly either in the sun or on the back of the stove. If ironware is not to be used for some time, rub it over with unsalted fat to prevent rusting.

Aluminum utensils require special care. Washing powders and strong soaps are injurious to aluminum because of the alkaline substances present in them, and therefore they should never be used. Cooking acid fruit in the utensils or washing them with a weak acid, like vinegar, will remove discoloration.

Scouring Knives. Scour the blades of steel knives with pulverized sapolio, Bristol brick, or tripoli. To scour, place knives flat in order to avoid loosening the handles. Dampen a cork, or a piece of woolen cloth or cotton waste, and dip into polishing material. Rub the blades briskly, first on one side, then on the other, until stains are removed. Dip quickly into clean, soapy water, and dry at once. If cotton waste and tripoli are used, the knives need not be washed, only dried thoroughly. The handles of knives and forks will be loosened or split if often put into water. Clean them, therefore, by wiping first with a damp cloth, then with a dry one.

Care of Silverware. Silverware in constant use should require little extra care if washed in hot, soapy water and *dried* thoroughly each time after using. To *dry* silver, which is a soft metal, and therefore easily scratched, use clean, soft towels.

Tarnish of silver is usually a compound of *sulphur*. Silver may become tarnished through careless washing and drying, through contact with the hands—since perspiration contains sulphur—through contact with rubber articles, such as elastic bands or fruit jar rings—since rubber contains sulphur—and through contact with the compound of sulphur found in eggs. Sulphurous gases from fires or lights in the air of a badly ventilated room will also tarnish silver.

Storing Silver. Before storing wrap each piece of silver separately to prevent scratches. Never wrap silver in white paper or cloth, because they are usually bleached with sulphur. Wrap the silver in *red* canton flannel or in pink paper, which has had no sulphur used in its preparation. An especially prepared "jeweler's paper" may be purchased.

Polishing Silver. To remove tarnish from silver, rubbing with a polishing powder is generally necessary. Use only a very fine powder, since coarse grains will scratch the metal. Frequent polishing and unnecessary rubbing should be avoided. The thin layer of pure silver on plated ware is easily rubbed off.

The basis of many *silver polishes* is precipitated chalk, which is inexpensive when purchased in bulk. Specially prepared whiting, or ordinary whiting sifted through fine muslin to remove coarse particles, may also be used.

Mix the powder to a creamy consistency with ammonia and water. Do not use ammonia without diluting, because this or any strongly alkaline liquid will dissolve silver. Alcohol may be substituted for ammonia, but is more expensive. If water is used—as it may be—instead of ammonia, more rubbing will be required.

Dip a soft cloth into the mixture, rub over the silver, and let it stand to dry; then polish with a dry cloth, chamois, or fine tissue paper. For grooves and chasings use a soft brush. Wash spoons, forks, and other tableware after polishing, and dry thoroughly. With the specially prepared cloth or chamois which may be purchased for polishing, no powder is needed.

A *second method* of cleaning silver is to place in the bottom of a pan a wire rack, put the silver on the rack, and cover with hot water. For every gallon of water add two level tablespoonfuls of salt and two of baking soda. Put a small piece of zinc into the water, and heat to boiling point. Boil fifteen or twenty minutes, then remove silver, which will be clean and bright. Wash and dry as usual.

Care of Dishcloths and Towels. Wash dishcloths and dish towels thoroughly each time after using. Scald them frequently. After washing, shake them well and dry them out of doors if possible. Wash dish mops in hot, soapy water, and rinse in clear, boiling water. Squeeze them as dry as possible, shake out thoroughly, and hang them, with mop end up, to dry. Oven towels usually need soaking. Rub the soiled portions with soap, then roll the towels tightly with soiled portions inside. Cover with water, and let them stand for an hour. Wash them then in this water, next in clean, soapy water, and finally rinse in clear water. Wring as dry as possible, shake out wrinkles, stretch into shape, and hang out of doors or in a current of air.

Care of the Sink. When the dishwashing is finished, wash every part of the sink with hot, soapy water, and scrub if necessary. Wipe carefully all wood or stonework above and around the sink. Use a wooden skewer to clean behind pipes, and carefully collect all scraps of food waste. Leave no wet cloths about. Wash and hang them to dry in a current of air when possible. Moisture and food waste make good soil for molds and bacteria and attract water bugs and roaches.

Flush the sink with boiling water every day, and once a week with a strong solution of washing soda, using one pound of soda to one quart of water. Use a solution of caustic soda or lye after pouring greasy water down the sink pipe, since grease collects and clogs the pipes and drain. Wipe iron sinks dry. If the sink is rusty, rub thoroughly first with paper wet with kerosene, then with dry paper. Burn the papers at once after using. If the sink is to be left some time unused, rub it with fresh beef or mutton fat to keep the metal from rusting.

Scrubbing Boards and Tables. Having removed all crumbs, rub boards and table with a wet cloth; then with a brush, the bristle part of which has been dipped into water and rubbed with sapolio, scrub *with* the grain. Rinse off with clear water. Rinse the cloth, wring it as dry as possible, and wipe the board or table. Shake cloth and hang to dry. If the table has leaves, lower them and wipe round the hinges. Let no dirt collect in the seams. *Grease spots* on unfinished wood may be removed by covering spots with borax wet with a small quantity of cold water. Let it stand a few hours, then scrub well with sand soap and rinse with clear water. Repeat if necessary. Ammonia water may be used instead of borax.

Care of the Refrigerator. All waste and overflow pipes of refrigerators, as well as of sinks, become foul with grease, dust, lint, and other substances if not well cared for, and frequently contaminate the air of the whole house. Put no *hot* food into the refrigerator, nor food with a strong odor, as salt fish, etc. Examine the refrigerator daily, that no food may be left to spoil or cause bad odors. A drop of spilled milk or a small particle of other food thus left will contaminate a refrigerator in a few days. The refrigerator pan should be washed every day or two in boiling water. Once a week, when the ice supply is low, everything should be taken out and every part of the refrigerator washed with a hot solution of washing soda. To avoid injuring the hands with the strong soda solution, use a mop or small broom. Clean the pipe through its entire length with a cloth pushed through by means of a skewer or a piece of wire. Do not neglect the space under the ice rack. Wipe all parts as dry as possible. Place shelves near the fire to dry or, better, in the sunlight and open air. Leave the refrigerator open until it is thoroughly dry; otherwise it will become moldy. It is much easier to prevent bad odors than to cure them.

CHAPTER III

Making and Care of the Fire

Heat is produced in four ways: (1) by the sun's rays; (2) by friction or rubbing; (3) by combustion or burning; (4) by electricity.

Combustion is the uniting of two or more elements to form a new compound. Combustion always produces heat and, when rapid enough, light.

In order to have a fire, three things are necessary:

1. **Fuel,** or something to burn.

2. **Heat,** to make the fuel hot enough to burn or to reach its "kindling point."

3. **Air,** to keep it burning, or "to support combustion."

Pure air is composed of oxygen and nitrogen. *Oxygen* is the part necessary to keep the fire burning.

Fuel is anything used to make a fire. Fuels are composed chiefly of *carbon* and *hydrogen,* with a small amount of *oxygen.* When fuel is heated sufficiently, the carbon of the fuel unites with the oxygen of the air and forms a gas called carbon dioxide, while the hydrogen unites with oxygen, forming watery vapor. *Carbon dioxide* and *watery vapor* are, therefore, known as "products of combustion." *Ash* is what remains after all that is combustible has been burned.

The *kinds* of fuel most commonly used in ranges are *wood, coal,* and *charcoal.* Gas, gasoline, and kerosene are burned in stoves prepared especially for their use. The ideal fuel for cooking purposes is *electricity,* because it is absolutely clean, can be controlled perfectly, and can be used in any place where connection with electric wires can be made. Its high cost at the present time, however, bars it from use in the average home.

Gas is the quickest, cleanest, and most convenient of the fuels in ordinary use for cooking purposes. The application of a match makes the full power available at once; the heat may be regulated as desired and shut off when the work is done. The use of gas involves neither carrying of fuel nor caring for ashes, etc. At ordinary rates and with proper care, the cost of operating a gas stove is less than that of a coal range; even at higher rates, the saving in time, labor, and trouble would seem to counterbalance the expense.

Stoves or **ranges** are iron boxes in which fires are made. The part which holds the fire, called the fire box or fire pot, is in the front or at one end. The sides are lined with fire brick; the bottom is a grate, the openings of which allow the air to go up through the fire, and the ashes to drop into the ash pan below.

Every stove must have *two openings:* one to supply air and the other to allow smoke, gases, and watery vapor to escape through the chimney. The slides controlling these openings are called *dampers* or *regulators.* The slide below the fire box controls the opening through which air is supplied, and is therefore called the *fresh air damper.* It is called also the "creative" damper. The slide which controls the opening into the chimney is called the *chimney damper.* In cooking stoves and ranges there is always a third damper or regulator by means of which the oven is heated. When the *oven damper* is open, the hot gases from the fire pass across the top of the oven directly to the chimney. When the oven damper is closed, the hot gases are forced around the oven before escaping through the chimney, and thus heat the oven. When the fire is burning freely and the blue flame has disappeared from the coal, close the oven damper. If the fire burns too quickly or is hotter than is needed, close the fresh air damper partly or wholly, as required. When it is desired that the fire burn very slowly, close the chimney damper. All three dampers should be open when the fire is first made—the *fresh air* or *creative damper* to give a plentiful supply of air; the *chimney damper* to allow smoke and gases to reach the chimney; the *oven damper* to allow smoke and gases to take the shortest road to the chimney. For convenience in broiling, some stoves have a long, narrow door directly over the fire. In this door is an opening controlled by a slide, called a "check" damper, because when opened, a stream of cold air flows over the fire, and cools or checks it. If the check damper is kept open too long, however, the fire will go out.

To Lay the Fire. Free the fire box from ashes. Remove stove covers, and, if necessary, brush the soot from the under side. In making a fire, paper, or shavings, soft wood, hard wood, and coal are generally used, being placed in the fire box in the order named. Crumple the paper loosely, putting the first piece into the grate so that an end will hang below, making it easier to light. Use enough crumpled paper to cover the bottom of the grate; over the paper place pieces of soft wood, slightly crosswise, to allow air to pass between; arrange hard wood in the same manner, being careful to have sufficient wood at the ends, so that the coal may be kindled there as well as in the middle of the fire box. Open all the dampers, and light the fire from below. Push down the wood and add more if needed; put on a small quantity of coal at a time. Too much put on at once will "smother" the fire, making it burn slowly and smoke or go out. Never fill the fire box so full that the coals are higher than the lining. Add more coal before fire burns too low. Keep the oven damper closed except when necessary to make fire burn more quickly. Fuel may be saved by keeping a fire from day to day. Little or no kindling will then be required, and but slight additional fuel will be needed to quicken the fire.

To keep a fire over night, shake down the ashes, add fresh coal, and when it is kindled enough to have the blue flame disappear, close all the dampers. In the morning rake down the ashes gently to allow the air to reach the red coals; open the dampers and add a little coal. If the fire is very low, first add a little wood, and then, when the wood is kindled, shake down the ashes; add coal gradually as required, and regulate dampers according to heat desired. Do not allow ashes to accumulate in the ash pan, which should be emptied every day, because ashes absorb heat; if they are allowed to accumulate, the heat will warp the grate and cause it to burn out sooner than it otherwise would.

In a range that is used constantly, the flues (as the spaces are called through which the hot gases circulate in their passage from the fire box to the chimney opening) should be cleaned at least every month or two, because the fine ashes carried over with the hot gases that pass around and under the oven accumulate here. If these ashes are not removed frequently, they will interfere with the proper heating of the oven by absorbing heat and preventing a free circulation.

If there is a second grate below the fire box, shake this lower grate after the ashes have been turned down, to separate the cinders from the ashes, which will fall into the ash pan below. Keep the stove doors closed until the dust from the ashes ceases to rise; then remove the cinders and save them for burning again. If there is no lower grate, turn down ashes and cinders together into the ash pan and have them sifted later, being careful to place hot ashes in a fireproof ash receiver. If a fresh fire is to be made, empty the ash pan and replace it before the fire is lighted, thus avoiding all danger of fire from careless storing of hot ashes.

After ashes and cinders have been cared for, wipe the dust from the range with a soft cloth. A few drops of kerosene or unsalted grease of any kind on the cloth will cause the dust to adhere to the cloth and will improve the appearance of the stove, thus making the use of stove blacking rarely necessary.

Wash the top of the stove occasionally with soap and water, and scrape off anything that has burned on.

The best time to blacken the stove is after the fire is laid. To blacken a stove, moisten stove polish with cold water and rub it over the stove with a dauber. To avoid soiling the clothing in reaching over the wet portion, blacken first the part farthest away from you, then the other parts. If a stove has been allowed to burn red, use lard instead of water. Polish with a dry brush and rub quickly but lightly. Begin to polish the stove as soon as the fire is lighted, polishing first the part over the fire box, because it dries first. It is easier to polish a stove when it is warm, because the blacking dries quickly. If too hot, the stove will burn the brush, and cannot be made bright.

Before applying the blacking, scrape off anything that has been burned onto the stove. Time and labor may be saved by wiping the stove *immediately* when anything is spilled. Old newspapers are useful for this purpose, and may afterwards be burned.

A Gas Range should occupy small floor space and have room on top for heating several articles at once. It should also have a large oven, a place for broiling, two or more small burners, one large burner for quick work, and a simmering burner, so that it will not be necessary when simmering to use a large burner partly turned down, and thus allow gas to escape. The range should be easily cleaned; top grates and "working parts" should be removable: it should be plain, with no useless ornamentation. The funnel of a gas range should be connected with the chimney, to allow products of combustion to escape. Ovens *above,* rather than *below* the top of range require less stooping and have better light.

Use of Gas Range. The first thing a beginner should learn is to know the stove and how to use it. Study the construction of the range until you are familiar with the use of every part. Follow each pipe from the handle or lever of the gas cock to the burner to which it belongs, so that you will know where to apply the match.

Notice the position of gas cocks when open and when closed, and keep *all* gas cocks turned off when not in use.

To light top burners, strike a match, turn the gas on *full,* apply the match to the burner, and then turn down the flame as needed.

If a gas flame burns yellow instead of blue, or "lights back" in the burner with a whistling noise, turn off the gas; then turn it on again, to let out surplus air; close the burner, let it remain closed for a moment, and then relight.

When lighting *oven burners,* open oven doors to avoid danger from explosion in case gas has leaked into oven. Turn handle of gas cock which controls the supply of gas to the lighter or "pilot light"; apply lighted match from the outside to pilot light burner inside the oven through opening provided for the purpose; or, if stove has "safety" pilot light, apply lighted match to the slotted tube found inside broiling oven. Next turn on one of the oven burner gas cocks, and the oven burner will light. Turn on the other if it is needed; then turn off gas in the lighter.

One burner may be used or both lighted and turned low. When only one burner is needed, it will usually be found that the front one will give better results. From five to ten minutes will be required to heat the oven when both burners are lighted.

If anything is to be kept warm in the oven, light *only* the oven lighter.

In using a stove for *baking*, it should be remembered that the heat of the gas oven comes from beneath and is greatest at the bottom, whereas in the coal range the heat passes *over* the *top* of the oven first; so that while baking in the oven of a coal range the *top* of the food must be protected, in a gas oven the *bottom* must be shielded from the intense heat. The bottom heat is greater toward the bottom of the oven, and the top heat increases toward the top of the oven. A point may be found where the top and bottom heat are equalized; and as this moderate heat is required in most baking, the rack in the oven should be adjusted at the proper level.

When the top of food baked in the oven does not brown enough, it is probable that the oven was not hot enough at the start.

To Avoid Waste of Gas:

1. Use the smallest burner that will do the work; never use a large burner unless in haste.

2. Before lighting the gas, have the kettle, etc., near by and ready to place over the burner.

3. Do not light gas until ready to use it, and extinguish it the moment you have finished.

4. Turn down gas so as to burn only what is needed, and no more.

5. Use the simmering burner whenever possible. When boiling begins use the simmering burner, as a low heat will continue the boiling after it once begins.

6. "Matches are cheaper than gas"; it is better, therefore,

to extinguish the gas between operations and to relight it than to waste gas by burning it uselessly.

7. Some ranges have an upper or baking oven and a lower or broiling oven, both heated by the same burner. In order that no heat be wasted, plan to use both ovens at the same time, especially as oven work is expensive compared with that of the top burners.

8. A small portable oven placed over a top burner bakes small quantities at much less expense than the large oven; a steam cooker having compartments for several dishes also saves gas.

9. Meat or potatoes may be roasted under the gas flame in the broiling oven with less gas than it takes to cook them in the baking oven.

10. While using the lower oven for roasting or broiling, use the baking oven for anything requiring moderate heat or for boiling. In the latter case, it is best to have the kettle brought to the boiling point before placing it in the oven.

11. In most baking, one oven burner can be turned out, or both may be lowered after the first fifteen minutes.

12. Turn off gas from oven burners several minutes before baking is finished, as sufficient heat will be retained to complete the cooking.

13. When baking is finished, plan to use remaining heat of oven for drying bread for crumbs, etc.

Care of Gas Stove. Keep your stove clean. Dust and dirt will corrode burners and rust the steel parts. A gas range with proper care should last a lifetime.

To clean a gas stove: (1) Heat it; (2) wash it; (3) grease it; (4) light all the burners and turn them low.

Have ready a pan of warm water, a soft woolen cloth, a small stick, and a little pot of grease; any unsalted fat will do, such as lard, beef, or mutton fat.

Wring the cloth out of the warm water; add a little piece of fat about the size of a pea; do not use enough to make the stove greasy anywhere, but only as much as the hot iron will absorb. Wipe off the side shelf and top racks; turn off one of the top burner flames, and wipe off the burner: continue until all have been cleaned. Do this every day if possible. The ovens need the same kind of treatment once or twice a week.

Black lead may be used on the cast iron parts, but grease is best for the rest of the stove.

Rust should be attacked with a bit of grease at once. Here, as in other cases, "an ounce of prevention is worth a pound of cure."

The oven linings are the points at which the stove will give out first, but care will keep them in good condition for a long time.

Remove and wash the sliding sheet under the top burners as often as necessary.

The burners of a gas stove are so constructed as to admit enough air with the gas to produce complete combustion, giving a blue flame with intense heat. If from any cause the air inlets become closed, the flame will be yellow and smoky, will soil utensils, and give less heat.

CHAPTER IV

Laying the Table and Serving

To gather around a table means a certain dignity and order, a certain formality, which means good manners, courtesy toward others, a spirit of helpfulness, comparison of ideas—not greedy selfishness. One meal a day at least should have time enough. Serving in courses promotes good digestion by preventing haste, as well as by allowing pleasant speech. It does mean more work, but is often worth the trouble.—*Mrs. Ellen H. Richards.*

A table should look as neat and attractive as possible. Fresh flowers, however few, a small fern, or a flowering plant form a pleasing decoration.

The Breakfast Table. Cover the table with an undercloth of felting or of canton flannel, or with a clean cotton blanket, to protect the table, to lessen noise, and to improve the appearance of the cloth. Over this undercloth spread the tablecloth smoothly and evenly, the middle fold upward, exactly in the middle and lengthwise with the table. If there is a chandelier or other hanging light, the center of the table should be directly under it. *Doilies* instead of a cloth may be used for breakfast, luncheon, or supper or for an informal family dinner.

The place where the father or the host sits, the "head of the table," may be at the end or at the side, whichever is more convenient for serving. The mother or the hostess sits opposite at the "foot of the table."

It is often convenient or desirable to lay a carving or tray-cloth at the head and another at the foot of the table.

Place the knife or knives at the right of each place, sharp edge toward the plate; the fork or forks at the left, with the tines pointing upward, arranged in the order in which they are to be used, the first one needed being placed farthest from the plate.

An individual "cover," consisting of the plates, glasses, silver, and napkin, to be used by one person, should be at least twenty-five inches in length and fifteen or sixteen inches in depth. Lay spoons, one or more, as needed, beside the knife. Have the handles of all these articles half an inch from the edge of the table, and be careful to lay them straight. Regularity and order should mark the arrangement of the table appointments. If cups and saucers are placed beside the plate at breakfast, spoons may be in front, instead of at the right, of the plate. Place the tumbler, top up, at the end of the knife blade, the butter plate near the end of the fork, and the napkin at the left with the fold at the top, the open edges at the right and toward the edge of the table. The bread and butter plate is placed near the point and slightly at the left of the fork, the butter spreader being laid across the upper right side of the plate. Lay a carving knife and fork at the right of platter or beside the knife and fork of the host, who usually serves the meat. The required number of tablespoons may be placed beside the dishes from which food is to be served. The salt and pepper may be at the corners or, if the table is long and narrow, at each side of the center; individual salt and pepper shakers may be put beside each plate or between every two.

Arrange the *tea or coffee service* in semi-circular form around the place of the hostess. Put the tea or coffee pot, the handle toward the right, on a stand at the right side; next, the cream pitcher, then the hot water pitcher, with the handles toward the right; the sugar bowl, and tray bowl, if used, in front. Arrange the cups and saucers at the left, with the handles all pointing one way.

The *butter dish* should be placed at one side of the table.

near the one who is to serve it, with the butter knife beside it, handle to the right. If the butter is in the form of balls, or in other fancy shapes, serve with a small fork or a butter pick. The *bread plate* should be at the opposite side of the table. When the meal is served without a maid, it is convenient to have a bread board, with a sharp knife beside it, near one member of the family, who will cut the bread only as needed, to save drying.

Fruit should be put on the table at the beginning of the meal, a plate and a knife being laid for each person, to be removed after fruit is eaten. *Finger bowls* are placed before each person, with doily or fruit napkin, and removed after use, the waitress taking one in each hand.

Place the dish containing cereal in front of the person who is to serve it, a tablespoon at the right and the saucers or shallow bowls at the left of the dish.

After the cereal has been eaten and the dishes have been removed, place hot plates and the dish of meat or fish before the host, and hot muffins or rolls or potatoes at the sides.

When the meal is over, remove everything from the table, scrape or brush off the crumbs, take off the cloth carefully, folding it smoothly in the creases in which it was ironed.

The Supper Table. Arrange the supper table like the breakfast table. Use smaller plates if no meat is served. A cake dish often occupies the center. If preserves are served, place the dish in front of one member of the family, with small dishes at the left and a tablespoon or a berry spoon at the right.

Place knives, forks, or spoons for serving food *beside* the dish containing it.

The Dinner Table. The dinner table is usually laid for courses. The plates for the several courses should be kept hot or cold, as the food may require, until serving time.

Flowers or ferns, when used, should be in a rather low dish, placed in the center of the table. Salt, pepper, olives, pickles, etc., can be put at the corners or where most convenient.

If the serving is done by the host and hostess, the hostess should serve the soup, vegetables, salad, dessert, and tea or coffee; and the host the meat or fish. When there is a waitress, the hostess serves the soup, dessert, and coffee, and the host the meat or fish; the waitress passes the plates as food is served, and also serves the vegetables and *entrées*.

A simple dinner may consist of two courses, meat or fish with vegetables, and dessert; or of three courses, with soup first. A more elaborate dinner, as at Thanksgiving or Christmas, may have more, as soup, with rolls or bread, croûtons or baked crackers; meat or fish, with vegetables; salad; dessert; coffee and bonbons. The table should be laid neatly, and the serving should be careful, whether the courses be one or ten. Arrange the cloths, knives, and forks as for the breakfast table. Put at the right of each knife a soup spoon and a teaspoon, or more, if needed, in the order in which they are to be used.

For the first course place a ladle at the right, beside the tureen, which should be before the hostess, and hot soup plates directly in front, almost touching the tureen, to prevent dripping on the cloth. In serving, soup should be dipped away from, not toward, the person. The same rule holds in eating it.

After the first course, remove the soup tureen and the plates, one at a time, on a tray, or by taking one in each hand. Never pile one on the other.

Arrange the meat and plates for the second course as for the breakfast table. When this course is finished, before the dessert is placed on the table, remove all dishes except the dessert spoons, or other necessary silver, and the glasses. Pass to the left of each person and remove crumbs if necessary, using a crumb tray and knife or a napkin and plate.

Place the dessert in front of the hostess, the serving spoon or fork at her right, with plates or saucers in front or at the left.

Waiting on the Table. The hair of the waitress should be neatly arranged; her collar, apron, hands, and nails should be scrupulously clean, and her movements quiet and deft.

The waitress is responsible for the proper temperature of dishes, which should be warmed for hot foods, and cooled for salads and frozen dishes. During the meal the waitress must see that bread, rolls, butter, and water are well supplied.

If the serving is done wholly by the family, take especial care to provide everything necessary when laying the table. Butter plates and tumblers may be filled just before the family are seated.

In putting ice into glasses, put water in first, then the ice, using a spoon for the purpose to prevent the ice from breaking the glass. In filling, draw the tumbler to the edge of the table, and never fill it quite full, leaving at least half an inch of space at the top. In passing it, take the tumbler near the bottom, and not with the hand near or over the top.

It saves time and confusion for some one sitting near the host to serve vegetables or other dishes which are to be put on the same plate with the meat.

After the cover has been removed from the tureen, the waitress should stand at the left of the server, hold the tray with the left hand, and with the right hand place the filled plate on the tray. Take it to the right of each person, and with the right hand set it in front, close to the edge of the table.

The dish containing food served with the course should be placed on the tray, with the handle of the serving spoon or fork toward the person at the table. Pass the dish to the left side of each person, holding it low enough to enable him to help himself with his right hand.

In removing a course, take large dishes or platters first, then plates, knives, and forks. Place carving knife and fork side by side on the platter.

Cover the serving tray with a napkin or doily to prevent noise. A folded napkin on the palm of the left hand is sometimes preferred to a tray for passing dishes, except where two or more articles, such as sugar bowl and cream pitcher, are passed together.

The tray is held in the left hand, because the right hand is strong and firm to take the dish from the tray and place it without spilling the contents. Cups and saucers and glasses are always placed from the right.

When several persons are to be served, with but one person to do the serving, the tray may be dispensed with, and both hands used in placing and removing courses.

Note.—If placing and removing dishes from the left is preferred, because an unguarded motion of the right arm of the person served may overturn the plate, remove with the right hand and place with the left.

When there is but small space for a waitress to pass round a table, it may be necessary to use, in passing or removing plates, the right or left hand, as convenient.

It has been well said that whatever expedites service without offending eye or ear is in good taste. Larger dishes, therefore, should be lifted with both hands; relish dishes, etc., collected upon a small tray; while an individual cover, consisting of a large plate, small plate, and perhaps sauce dish, may be deftly removed by placing both small plates upon the tray held in the left hand, and carrying the large plate in the right.

There are three recognized methods of serving a meal: the *English,* the *Russian,* and the *Compromise.*

English Service. All food belonging to one course or all that is to be served at a simple meal is placed on the table in platters or other suitable dishes before the host, the hostess, or some member of the family. The required number of plates may be placed in a pile before the host or hostess, or taken one by one from a side table by the waitress and set before the one serving. As each plate receives its portion, the waitress carries it either to the person serving another article of food, such as vegetables, or places it directly before the one for whom it is intended.

Russian Service is more formal and requires more attendants than the English method, since everything is served from the serving table or pantry. No food appears on the table, with the possible exception of candy or nuts. Each plate, with a portion of the main dish of the course and perhaps one accessory upon it, may be brought from the pantry, all other dishes being passed on attractively arranged platters, from which each person serves himself. As the waitress removes each plate with one hand, she sets down the plate for the next course with the other, the table never being without plates until it is cleared and crumbed before dessert.

Compromise Service. Some articles or whole courses are served on the table as in the English style of service, while others are passed, as in the Russian. For example, soup may be served from the pantry in individual plates, the meat carved by the host, and vegetables passed by the waitress, who may also pass the salad and serve the dessert.

CHAPTER V

Food and the Human Body

This chapter is a compilation chiefly from the following:
Human Nutrition, Part I, by Flora Rose (Cornell Bulletin No. 6).
Principles of Nutrition and Nutritive Value of Food, by W. O. Atwater, Ph.D. (Farmers' Bulletin 142).
The Computation of Rations for Farm Animals by the Use of Energy Values, by Henry Prentiss Armsby, Ph.D., LL.D. (Farmers' Bulletin 346).
Food and the Principles of Dietetics, by Robert Hutchison, M.D., F. R. C. P.
Chemistry of Food and Nutrition, by Henry C. Sherman, Ph.D.
Food at Fifty Cents a Day, by Graham Lusk, Ph.D., Sc.D.
The Human Mechanism, by Theodore Hough, Ph.D., and William T. Sedgwick, Ph.D., Sc.D.
Primer of Sanitation, by John W. Ritchie.
Quantitative Aspects of Nutrition, by Henry C. Sherman, Ph.D.

Unless we know something about the conditions upon which the welfare of the body depends, we cannot care for it intelligently. Some knowledge of its structure and activities, therefore, and the relation of its various parts to one another and to the whole, will help toward a right understanding of these conditions.

The human body is a mass of matter averaging in weight, when fully grown, about 150 pounds. It is not, however, one solid mass, alike all through as is a block of marble, for example, but is made up of various parts which differ greatly in many ways. These different parts of the body—as eyes, ears, hands, feet, heart, brain, muscles, etc.,—are known as *organs.* The body as a whole is known as the human *organism.*

An *organism* is a living body, animal or vegetable, composed of organs with functions separate but mutually dependent, and essential to life (*Webster's Dictionary*). An *organ* is that by which some action is performed or some end accomplished. Each part, therefore, of a living plant or animal which has a separate work to perform may be regarded as an *organ*.

Cells. In looking at a brick wall from a distance, we are not able to distinguish the individual bricks; nevertheless, we know that every such wall is built up of a great number of individual bricks or units fastened together. The body also is built up of a number of very small parts or units which are called *cells*. A single *cell*, however, is so small that it cannot be distinguished from its neighbors without the aid of a powerful microscope. With the microscope, the cell may be seen as an exceedingly small mass of substance, and a more dense portion may sometimes be distinguished within it, called the *nucleus*.

"A *cell* is a small mass of protoplasm or living substance with its nucleus." Each cell of the body is alive, takes in food, and grows. The cells must have oxygen from the air, must get rid of their poisonous wastes, and must have a constant temperature, neither too hot nor too cold, or they will die. They may be killed in other ways, too, as by being crushed, by electricity, and by poisons.

Every cell of the living body must do part of the work of providing for its various needs. No single cell is left alone to do its work, however, but is assisted by great numbers of its neighbors, formed into groups, according to the kind of work to be done.

As the kinds of work to be done are many and various, many different cell-groups are formed, the members of each being especially adapted to do the kind of work required.

The Tissues. A *group of similar cells all doing the same kind of work* forms what is known as a *tissue*. Thus, cells on the outside of the body are formed into groups, which together constitute its protective covering of *skin-tissue* or *skin*.

The groups of cells which have as their part of the body's work the power to cause movement form *muscular tissue,* or *muscles;* the groups which carry messages form *nerve-tissue,* or *nerves;* other groups may purify the blood, as the kidney cells do; while the work of bone-cells or *bone-tissue* is to deposit around themselves quantities of mineral matter to give the softer tissues a hard, bony framework to support them.

Other groups form the blood vessels, and in the red marrow of the bones are cells whose work is to form red blood corpuscles. These not only give to the blood its red color, but also its power to gather oxygen from the lungs.

Certain of the cells lining the stomach and intestine, and others grouped together into bodies called *glands,* manufacture digestive juices, which are poured out upon the food and help to get it ready for the body to use.

The alimentary canal, or "food tract," which includes mouth, stomach, and intestine, is a kind of factory where food is sorted, and the part that is useful extracted and changed into a form that can pass into the blood vessels and by them be carried to all the cells of the body, the refuse being excreted as waste. After food material has been changed to the right condition, the blood vessels carry it from the alimentary tract to the most remote parts of the body, and the cells of every tissue and organ have an opportunity of selecting the foods needed for their special work. Thus bone-cells choose the mineral matter and other materials needed for their growth and repair; muscle-cells choose the substances needed by them for growth and the power to execute movements; and so on until every cell in the body is provided for.

Though each cell has its food carried to it and its waste products removed by the blood, it must feed itself and do its own repairing and perform its own *function,* as the special work of a cell or group of cells is termed.

By this wonderful division of labor, or *specialization,* among the cells of the various tissues and organs producing muscle and bone, blood and nerve, and so on, the body stands forth as a whole, all its parts working harmoniously, each having its own work to perform for the good of the whole, each depending on the coöperation of the whole for its existence, and all coöperating through the regulating power of the nervous system.

The welfare of the body is in turn dependent upon the healthy condition and right working of these little living units and groups of units, the cells and tissues. To keep our bodies in health, therefore, we must supply our cells with the things that they need and we must keep poisons and other injurious substances away from them, because when the cells are in health the body is in health, and when the cells die the body is dead. Care of the body really means, then, care of its individual members, the cells, for the whole construction of the body is to serve the cell. We must consequently supply each little cell or worker in the body—blood-cell, muscle-cell, nerve-cell, and all the rest—with the materials needed for the special work each has to do, and we must also see to it "that the systems which are concerned with carrying food to the cells and removing waste products are kept flushed, clean, and in good condition."

The Body as a Machine

We may, for purposes of comparison, regard the human body as an engine or machine of a very superior kind. A machine may be defined as "an apparatus either simple or complex, composed of unlike parts by means of which power received in one form is given out or applied in some other form," or, more simply, as an apparatus having the power to do work. One of the simplest of all machines is a stove, an apparatus composed of a few simple parts by means of which the potential energy or power of fuel—wood, coal, gas, or oil—is liberated and applied to the work of heating or cooking. Like other machines, the body requires material (1) to build up its various parts, (2) to repair them as they are worn out, and (3) to serve as fuel to supply energy or the power to do work.

"The steam engine gets its power from fuel; the body does the same. In the one case coal or wood, in the other, food is the fuel. In both cases the energy or power to do work which is latent in the fuel"—potential or inactive energy—is transformed into the active energy of motion and heat.

There is in some respects a very close likeness between the animal body and what are known as internal combustion motors; that is, those engines in which power is developed by burning liquid or gaseous fuel (gas, gasoline, etc.) in the cylinder of the engine itself. Such an engine requires two things for its operation: (1) sufficient repair material to keep its working parts in running order, and (2) a supply of fuel in proportion to the work to be done.

> Just these two things are what the living machine needs: repair material and fuel. In some respects, however, the living machine differs greatly from the artificial machine; for example, it cannot be stopped and started again at will. As long as the body lives the vital machinery is in operation, although less actively at some times than at others. The body might thus be compared to an automobile whose engine must be kept running at low speed in order to have the power available when needed. Consequently the living machine requires to be supplied with repair material and with fuel as long as it lives, and not merely when it is in active use.—*Farmers' Bulletin 346.*

Since food is the source of both its repair material and its fuel, it is plain "that when the body is deprived of food its tissues waste away, while its fat is burned up in the effort to keep the bodily machinery in motion."

Another important difference between the human machine and the steam engine is that the former is self-building, self-repairing, and self-regulating. The steam engine and the body are alike in that both convert the fuel into mechanical power and heat. They differ in that the body uses the same materials for fuel as for building and also consumes its own material for fuel.

But the body is more than a machine. It has not simply organs to build and to keep in repair and to supply with energy: it has a nervous organization; it has sensibilities; and there are the higher intellectual and spiritual faculties. The right exercise of these depends upon the right nutrition of the body.—*Farmers' Bulletin 142.*

Chemical Composition of the Body

The repair material for any machine must be of the same kind as that of which the machine is made; consequently it is important to know of what materials this most wonderful of all machines, the human body, is composed.

Chemistry tells us that the body as a whole contains a great variety of substances. Since the following elements, and very small amounts of a few others, are always present, they are, therefore, probably essential to it:

Carbon	Sulphur	Sodium
Hydrogen	Phosphorus	Potassium
Oxygen	Calcium	Iron
Nitrogen	Magnesium	Chlorine

The chemical elements are not found singly in the body, but are united into compounds containing two or more of them. For convenience these compounds or *combinations of elements* are divided into groups, the most important of which are: proteins, water, mineral matter, fat, and carbohydrates.

The combination of elements in these groups may be shown as follows:

Carbon Hydrogen Oxygen	forming carbohydrates.
Carbon Hydrogen Oxygen	in different proportions forming fats.
Hydrogen Oxygen	forming water.
Carbon Hydrogen Oxygen Nitrogen Sulphur Phosphorus (sometimes) Iron (sometimes)	forming proteins.
Sulphur Phosphorus Chlorine Sodium Potassium Calcium Magnesium Iron	forming ash constituents or mineral matter which exist partly as mineral salts and partly in combination with proteins, carbohydrates, fats, and other organic compounds.

The "Proteins are essential constituents of all living tissues —of the so-called *protoplasm*"—that is, "the substance through which life especially manifests itself." In the body protein is always associated with water and mineral matter.

When protein substances are heated, they gradually decompose with a strong odor of burnt hair or wool. During the burning many gaseous substances are produced and a mass of carbon (charcoal) remains. If the heating is continued the organic matter will be dispersed in the form of volatile substances, leaving only the mineral residue, or ash.

The essential *working parts* or the "machinery" of the body —bones, ligaments, muscles, and tendons; the skin; the internal organs of circulation, respiration, digestion, excretion, etc.; the brain and nerves—in short, for our present purpose, the whole body, may be regarded as being composed essentially of the three groups: proteins, water, and mineral matter.

Besides its essential parts, the body contains *reserve material* in the form of *fat*. This occurs under the skin and in other localities, and in minute particles scattered through the various tissues. While these fat deposits are of use mechanically as cushions between the various organs and as a protecting layer under the skin, fat represents essentially a storage of material derived from food consumed in excess of the body's immediate needs. Though part of the surplus food may be stored temporarily in a form known as *glycogen* or "animal starch," the larger proportion is laid up in the more permanent form of fat. The amount of fat is variable, and may fall very low without interfering with normal life-processes; the amount of carbohydrate is not only extremely variable, but also extremely small.

The proportion of these compounds in the body is approximately as follows: water, about 65%; proteins, about 18%; mineral matter, about 4 to 6%; fat, about 12 to 15%; carbohydrates, less than 1%.—*Elementary Household Chemistry*, Snell.

Chemical Composition of Food

"All the organs of the body are built from the nutritive ingredients of *food*. With every motion of the body, with the exercise of thought and feeling as well, body substance is consumed and must be resupplied by the food." The body must also be kept warm and must be supplied with the materials needed to yield energy for work as well as for the regulation of its physiological processes or functions. Since the substances composing the body must be obtained from the food, it is evident that the food must contain the same elements as those found in the body. If a single one of the elements which compose the body is lacking in the food, the body will, sooner or later, suffer for the lack of something necessary to it.

These elements of the food, like those of the body, are classified into five main groups: water, mineral matter, proteins, fats, and carbohydrates. These groups are termed "the food-stuffs." The functions of the foodstuffs are threefold:

Protein Water Mineral matter	to build and repair body substance or tissues.
Carbohydrates Fats Proteins	to yield energy.
Water Mineral matter	to regulate physiological processes.

It is not to be inferred that any given food substance can be assigned once for all to some one of these three general functions. Thus the protein digestion products may serve both to build tissue and to yield energy; phosphates may serve both to build tissue and to assist in regulating the neutrality of the blood and tissues.

Moreover, it has very recently been established that certain important functions are performed by food constituents hitherto unknown and of which the amounts involved are so small that the chemical nature of the substances has not yet been fully established. Some of these substances appear to be nitrogen compounds and have received the group name *vitamines*. . . . While not yet fully understood, the vitamine content seems likely to prove a factor of some importance in the rôle of fruits and vegetables in the diet.—Sherman, *Food Products*.

Food as Building and Repair Material

Since the body is composed essentially of protein, water, and mineral matter, these same materials must be supplied with the food.

The most important proteins are those found in white of egg, lean of meat, curd of milk, and gluten of wheat; cheese, peas and beans, nuts, and some cereals are foods relatively rich in protein.

Proteins differ from the other compounds found in the body in that the proteins contain sulphur and especially *nitrogen.*

Nitrogen is essential to the building up of all living tissue, because the substance of the cell itself contains nitrogen. The only form of nitrogen which the body can use, however, is that contained in proteins. The *protein* supply, therefore, calls for careful consideration, since, aside from water, the most abundant constituent of the body is protein, and without it there can be no life.

The term "protein" (from a Greek word signifying "I am the first," or "I take the first place") is applied to this class of compounds on account of its pre-eminent importance in relation to life.

Body substance is broken down and worn out or destroyed at a fairly regular rate during the working of the human organism, and since the bodily machinery is running all the time, this loss is continually going on, whether or not any external work is done.

Living cells are made of different proteins, and these, together with water and salts [mineral matter] and fatty substances, are the cogs and wheels of the machine shops of life. The cell machinery, however, is not absolutely stable; a certain small fraction is constantly wearing away. It has been estimated that under the most favorable conditions the quantity of protein worn out daily in the service of the life of a man is one-thousandth part of the total protein present in his body.—Lusk: *Food at Fifty Cents a Day.*

The body differs from other machines in being self-repairing; but it cannot manufacture protein for repair purposes out of the carbohydrates and fats of its food, any more than an automobile can be repaired out of the gasoline which supplies the power. The body is absolutely dependent for its protein upon its food. This protein is needed for two purposes: First—It is required for repair purposes in the strict sense; that is, for making good the wear and tear of the bodily machinery. The amount needed for this purpose is comparatively small and is no greater, under normal conditions, when the body is doing work than when it is at rest. Like a good machine the body makes relatively small demands for repair material, and requires chiefly fuel.

Second—Protein as well as mineral matter is needed in the young *growing* animal to furnish the material for enlarging the working machinery of the body itself. The amount of protein required for this purpose is just so much in addition to that needed for repair purposes simply; hence to secure proper nutrition the food of the young should contain a liberal supply of this ingredient.—*Farmers' Bulletin 346.*

Hutchison, in *Food and the Principles of Dietetics,* says in this connection that insufficient supply of protein leads to imperfect tissue repair, more especially, perhaps, of the muscles and blood, and a lowering of the power of resistance to unfavorable influences, including disease. A deficiency of protein in the diet of growing children, however, is especially disastrous, for children have not merely to keep their tissues in repair, but have to go on adding to them, and this necessitates a relatively abundant supply of building material, especially for muscle and bone. A lack of protein in the diet of children, therefore, may result in impaired growth and development, the consequences of which may last through life.

An *excess* of protein, on the other hand, is not without danger, as it is believed that in the effort to get rid of the surplus as quickly as possible the liver and kidneys will be overworked; for the body is unable to store up any surplus of protein, as it does of carbohydrate and fat.

From the investigations carried on in the Office of Experiment Stations, the conclusion has been drawn that the total amount of protein needed every day, which is usually estimated to be 100 grams or $3\frac{1}{2}$ ounces (one ounce equals about 28 grams), one-half or 50 grams is taken in the form of animal food, which of course includes milk, eggs, poultry, fish, etc., as well as meat. The remainder is taken in the form of bread and other cereal foods, and in beans and other vegetables. The portion of cooked meat which may be referred to as an ordinary "helping"—3 to 5 ounces (equivalent to 3½ to 5½ ounces raw meat)—may be considered to contain from 19 to 29 grams of protein, or approximately half the amount which is ordinarily secured from animal food. An egg or a glass of milk contains about 8 grams more, so the housekeeper who gives each adult member of her family a helping of meat each day, and eggs, milk, or cheese, together with the puddings or other dishes which contain eggs and milk, can feel sure that she is supplying sufficient protein, for the remainder will be supplied by bread, cereals, and other vegetable food.—*Farmers' Bulletin 391.*

Water constitutes about two-thirds by weight of the human body, being a necessary part of all its tissues.

The only part of the body which does not depend upon a surrounding of liquid to keep it alive is the outside skin. All the other cells, except those of this protective membrane, the skin, will perish if they become dry. The body deprived of food would die, but would not perish so quickly as if deprived altogether of water.—*Human Nutrition, Part I, Cornell Bulletin No. 6.*

Since so large a portion of the human body is composed of water, and all material for its growth and repair comes from food, it follows that sufficient water should be taken to carry on the work of the body and to replace that lost through the action of the lungs, kidneys, and skin, which amounts to about four and one-half pints daily.

If the body receives too little water, the blood stream becomes sluggish, the cells are not flushed as they should be, the waste products accumulate, and as these are poisonous, the body suffers with weariness, headache, and various other ills. Water is, then, a very important part of our food. Many persons at the present time are constantly taking patent medicines for ills that are but too evidently the result of insufficient water in the daily diet.—*Human Nutrition, Part I, Cornell Bulletin No. 6.*

More or less water is contained in all food substances, no matter how dry they may appear. Many fruits and vegetables contain a large proportion of water, with only enough solid material to give them form. The drier our food and the more exercise we take, the more water we need to drink. Physiologists tell us that about five tumblerfuls should be taken daily in addition to that contained in the food.

Mineral matter is just as essential as the proteins and water, though not required in such large amounts.

The principal mineral substances in the body are compounds of calcium, phosphorus, sulphur, magnesium, sodium, potassium, iron, and chlorine. So necessary are these, that if the supply were entirely cut off, death would occur in about a month, it is said, even though all the other constituents of food were supplied as usual. About five-sixths of the total amount of mineral matter in the body is contained in the bones, the mineral basis of which is calcium phosphate, or phosphate of lime. Mineral matter is present in the teeth, in the hair, and the nails; it is also necessary in the blood; it aids digestion and other important processes, many of which are not known. The fact that we know of no animal tissue or fluid which is free from mineral matter is a proof of its importance.

Mineral matter occurs in small quantities in all ordinary articles of food—in the juices of fresh meats and fish; in milk and eggs, and especially in the yolks. Fruits and vegetables as a whole are rich in mineral matter; the diet should, therefore, contain them in abundance. Common salt, a kind of mineral matter familiar to all, is the only one added in pure form to food.

It is commonly believed that a diet which supplies protein, fats, and carbohydrates in sufficient quantity will also furnish an adequate supply of all the mineral substances required by the body, except ordinary salt. Recent investigations seem to indicate, however, that at least three of these, calcium, phosphorus, and iron, cannot thus be safely left to chance, and especially in the case of children.

Calcium is necessary to the growth of the bones and serves many other important uses in the body. If not present in sufficient quantity, bones and teeth will not develop properly. Milk, the best source of calcium, should form an important part of the diet of children all through the growing years. Other sources of calcium are dried peas and beans, oranges, cabbages, turnips, spinach, and whole grains.

Phosphorus, like nitrogen, is essential to the development of every cell and is one of the chief elements of the bones. If the food of a child is deficient in phosphorus-containing compounds, proper growth cannot take place. Milk and cream, whole eggs or yolks of eggs, meat, whole wheat, oatmeal, dried beans and peas are foods which will supply phosphorus in the diet.

Iron is an essential part in the red coloring matter of the blood and gives to the red blood corpuscles their power of holding oxygen and carrying it to the cells. If there is an insufficiency of iron in the diet the whole body will suffer in consequence, because not enough oxygen will be carried to the cells. Among foods rich in iron are eggs—especially the yolks—meat, spinach, peas and beans, whole wheat, oatmeal, prunes and many other fruits.

There appears to be ample evidence that iron as it occurs in foods is of greater benefit to the body than that taken in medicine or mineral waters, and also that iron in medicine is more beneficial to the body in proportion as the "food-iron" is more abundant.

NOTE.—The necessity of a generous supply of vegetables and fruits must be particularly emphasized. They are of the greatest importance for the normal development of the body and all its functions. . . . If we limit the important sources of iron—the vegetables and the fruits—we cause a certain sluggishness of blood formation and an entire lack of reserve iron, such as is normally found in the liver, spleen, and bone marrow of healthy, well-nourished individuals.—*Von Noorden.*

Food as Fuel

"Since the animal machinery is running continually," writes Dr. Armsby in *Farmers' Bulletin 346,* "it requires a continual supply of fuel material, the amount which is necessary depending upon the amount of work done. This fuel material consists chiefly of the carbohydrates and fats of the food, although if more protein be fed than is required for repair and construction purposes, it, too, may be used as fuel, while the worn-out portions of the protein tissues are also utilized—that is, the bodily engine can burn up its own waste products as fuel. The unnecessary use of protein as fuel material, however, is wasteful, because protein is ordinarily more expensive to buy or to produce on the farm than are carbohydrates and fats.

"If the fuel materials supplied in the food are just adequate to the work to be done, they are virtually burned up as a source of power. If more are supplied than are immediately needed, the body is able to store away the surplus for future use, much as we may fill up the gasoline tank of an engine. To a small extent the body stores up carbohydrates (in the form of glycogen), but most of its surplus fuel it converts into fat. The fat of the body, therefore, is its reserve of fuel."

If, however, the food furnishes an insufficient supply of fuel to the body, its reserve surplus will be drawn upon—the body substance itself will be "burned" as fuel, the body meanwhile becoming lean; while if food be entirely lacking, the "fires of life" will "go out." The activities of the body will cease when its resources are exhausted, because energy must have some source; it cannot be created out of nothing.

The source of energy of the body—its capacity to do work—is, as already mentioned, the potential, or inactive energy latent in food. As a result of the complex changes which food undergoes in the body, its latent energy is set free, and its activity may be manifested as *heat* which warms the body or as *work* in the form of the muscular and nervous energy required for its various activities, internal and external.

Physiologists believe at the present time that, under ordinary circumstances, muscular activity is first provided for, heat being a secondary or "by-product"; that the amount of heat thus produced is amply sufficient to maintain normal body temperature; and that increased oxidation of food for the purpose of warming the body may occur under certain conditions, when, as in extremely cold weather, loss of heat is very rapid.

The living body, as a whole or in some of its parts, is ceaselessly in motion—"by night and by day labor goes on in the workshops of life"—and consequently the larger portion of the food must be utilized for muscular activity. Even though the body is apparently quiet, as in the case of a person sleeping in bed, the heart beats—pumping the blood to all parts of the body—the lungs are expanded and contracted in breathing, and the stomach and intestine keep up the movements which are essential to digestion.

> Besides, a living body is the seat of continuous, invisible, and complex chemical and physical changes, such as the breaking up of compounds in digestion and their rebuilding in assimilation, that, if not work in the common meaning of the term, are its equivalent.—Jordan: *The Principles of Human Nutrition.*

The food-energy becomes available through *combustion;* that is, the oxidation of the carbon-containing foodstuffs—carbohydrates, fats, and proteins—to the simpler substances, carbon dioxide and water. Protein is never wholly oxidized in the body; carbohydrates and fats may be.

Combustion of the food takes place in the tissues, the oxygen which was taken up in the lungs being used to slowly oxidize a portion of the food.

This combustion is believed not to take place by contact of the oxygen and nutrients in the blood vessels, but it occurs through cell activity by progressive steps throughout the minute divisions of the muscles and other tissues of the body. The tissue cells undoubtedly obtain their energy from oxidation of the nutriment furnished to them. Notwithstanding this oxidation must be very gradual and occupy much time, its ultimate products are, for the most part, similar to those which result from the rapid combustion of fuel.—Jordan: *The Principles of Human Nutrition.*

These two foodstuffs, carbohydrates and fats, contain only three elements, carbon, hydrogen, and oxygen, hence their use in the body must necessarily be limited, since the other elements in the list given (page 39) are just as essential as these three and must also appear in our food combinations if we are to be rightly fed. They are very valuable foodstuffs, nevertheless, since from them may be derived the main part of the body's ability to do work. They serve as fuel for the body, just as coal serves for the engine, and they may keep the body warm and give it the energy needed to make the machinery go. By themselves, they could not maintain life for any length of time, for they would have no power to build up the body's tissues and keep it in repair. They would supply the fuel for energy, but all the other needs of the body would be unsatisfied, the cells would hunger for the materials needed by them, and starvation would soon result. It must be kept in mind, however, that the main part of the food consumed daily is to supply the body's need for energy, and the carbohydrates and fats are the best foodstuffs to use for this purpose.—*Human Nutrition, Part I, Cornell Bulletin No. 6.*

Hutchison says that the greater the quantity of carbohydrate and fat supplied at the same time with protein, the less does the protein tend to be wasted in supplying energy and the more of it there is available for the higher purpose of keeping the tissues in repair. The fat and carbohydrate are sacrificed instead of the protein, which is thus "spared" or protected. This is what physiologists mean when they describe fats and carbohydrates as "protein sparers."

The most abundant and important *carbohydrates* are the *starches* and *sugars;* these are derived almost entirely from vegetable sources, practically the only exception being the sugar obtained from milk.

Carbohydrates yield heat and energy, but since they contain no nitrogen, they cannot build tissue. It is believed they may be changed into fat in the body. Being abundant sources of energy, easily digested, and comparatively inexpensive, these carbohydrates are important food ingredients.

The most familiar "starchy foods" are bread, potatoes, rice and other grains; the most familiar sugars are those commonly used in sweetening foods and beverages and in making confectionery.

Other carbohydrates are cellulose, or "crude fiber," and gums, like gum arabic, etc. Cellulose is the basis of the cell-walls of all the higher plants; it acts somewhat as the skeleton of an animal in giving a supporting framework to the softer tissues. Cotton or linen fiber and the bran of wheat are examples of pure cellulose. Except possibly when very young and tender, cellulose is indigestible, and in its old age is changed into woody fiber, as may be seen when vegetables in the late spring become tough and "stringy." A certain amount of this indigestible material in the food aids in throwing off intestinal waste products, and thus helps to keep the inside of the body clean.

Fats and *oils* are obtained from both animal and vegetable sources. These include fat of meats and fish, butter, olive and cottonseed oils, etc., fats and oils in various nuts and in some cereals, as oats and corn.

Fats, like carbohydrates, contain carbon, hydrogen, and oxygen, but in differing proportions, the amount of carbon in fats being greater, and that of oxygen smaller, than in carbohydrates. *Fats* also yield heat and energy to the body and help to form fatty tissue. They are more concentrated fuels, yielding, pound for pound, about two and one-fourth times as much heat as carbohydrates, but yielding it more slowly.

Food as a Regulator of Bodily Functions

Less is known about this function of food than about the other two. *Water* and the *mineral constituents* of food are the chief agents concerned with the regulation of the physiological processes of the body.

Water is of the greatest importance for the normal physical condition of the tissues.

The proper functioning of each cell and of the body as a whole is dependent upon water. It furnishes in the blood the liquid which holds foods in solution and carries them to the tissues. In the cell, water holds the body substances in solution. It dissolves out the waste products of the body and carries them to those organs which are concerned with getting rid of them.—*Human Nutrition, Part I, Cornell Bulletin No. 6.*

Water is also an important regulator of temperature, by its evaporation keeping the body at its normal temperature, 98.6° F. It is evident, therefore, that from the physical standpoint water is the most important of all the articles of food.

Certain elements of mineral matter are also essential to the body in carrying out some of its most important functions. During its activities waste products are produced, some of which are poisonous and, if allowed to remain in this form, very injurious. It is the function of some of these mineral substances—compounds of calcium, magnesium, potassium, and phosphorus—to unite with these harmful compounds in the body and to form other combinations which are harmless.

Note.—"The ability of the heart to beat, of the muscles to contract, of the nerves to carry impressions are all dependent upon the presence of some of these salts" (mineral compounds). They also aid digestion, absorption, and diffusion of the body fluids, and the activity of the intestine is dependent upon them.

CHAPTER VI

Cooking and Measuring

Cooking includes the preparation of food for the table, with the application of heat or without it, as in the dressing of salads, etc. The *object* of cooking food is to make it more palatable, more digestible, or to kill any germs or parasites it may contain.

Cooking may increase the digestibility of food by changing its mechanical condition so that the digestive juices can act upon it more freely, as in the case of boiled potato, etc.; or, for example, by improving its appearance and flavor, as in the roasting of beef, quickening the flow of these juices.

NOTE.—Hutchison in *Food and Dietetics* says that the mere sight and smell of food which is attractive calls forth a profuse flow of a peculiarly powerful gastric juice which may last for hours, and hence comes the importance for digestion of such esthetic aids to appetite as agreeable surroundings, a well-appointed table, and well-cooked food.

Such "aids to digestion" are not necessarily a question of expense, as the difference between the elegance and refinement of one table and the lack of them at another may lie merely in the manner of cooking and serving the food. The most inexpensive food can with a little attention to nicety of detail be made attractive in appearance, and a tasteful arrangement or combination of ordinary materials will give a pleasing sense of order and care. For example, have uniformity in size, shape, and arrangement of bread or toast, or of sections of food placed on the same dish.

Decoration of food, or garnishing, however, should not be lavish, and the garnish should be appropriate to the article and so placed as not to interfere with the serving. If to attractive appearance agreeable flavor and variety of seasoning are added, the plainest food will be eaten with a relish. And not only this, but the use of flavors is an economy, for with them inexpensive foods are varied and made palatable.

Methods of Cooking

The usual methods of cooking are *boiling, stewing, steaming, broiling, roasting, baking,* and *frying,* or a combination of two or more of these methods, as in *braising, pot-roasting,* etc.

Boiling is cooking by immersion in boiling water (212° F.). Food may be cooked in water which is *hot* but not boiling; this is often incorrectly called boiling.

Stewing is long, gentle cooking by moist heat. Stewing is best accomplished in a covered vessel, with a small quantity of liquid and a temperature considerably below the boiling point — from 160° to about 185° F.

Steaming is cooking by the heat of steam or vapor from boiling water.

Steaming in a strainer over boiling water is sometimes called "wet," because the steam touches the food directly. When, as in the double boiler, steam does not touch the food, which is contained in a closed vessel over boiling water, the steaming is said to be "dry."

Steam has a heat value far superior to that of boiling water, and although a longer time is often required, it is possible to cook a larger amount of food by steaming with a smaller amount of fuel than by any other method. Less attention is also required, as it is practically impossible to overcook food by steaming, the only precautions needed being to keep a supply of water in the boiler and to keep the water boiling.

Steam cookers have several compartments for food, all heated from one boiler, which is placed on a stove or over a gas burner. The steam from the water in the boiler passes through a flue and cooks the food in each compartment, the false bottom of which is so arranged as to allow the condensed steam to run off and thus prevent sogginess in the food.

The steam from an ordinary stewpan containing boiling water in which food is cooking could often be utilized for cooking or reheating food, which should be placed on a perforated pie plate or in a steamer fitted to the top of the pan and covered closely with a bowl or a dish.

Baking is cooking by the dry, confined air of a hot oven.

Roasting, as commonly done, is the same as baking. The term "baking" is generally used in connection with bread, pastry, etc., and "roasting" in connection with meats.

Broiling is cooking directly over hot coals or under the flame of a gas oven.

Frying is cooking by immersion in sufficient hot fat to cover.

To *sauté* means to cook in a small quantity of fat, first on one side, then on the other. It is commonly called frying.

Measuring

Exact measurements are absolutely necessary in order to get the best results in cooking. *Weighing* is more accurate than measuring, but is often less convenient. If possible, however, every kitchen should have a good scale and a set of accurate dry and liquid measures.

Flour, meal, powdered and confectioners' sugar should be sifted before measuring; they should be put into the measure with a spoon or scoop, and should not be pressed or shaken down.

All materials are to be measured level, whether by the cupful, teaspoonful, or tablespoonful, the leveling to be done with the back of a case knife.

To measure butter, lard, or any other fat, pack solidly into the cup or spoon and make level with a knife. Hard fat will soften quickly and can be measured more readily if cut or scraped fine.

To measure a spoonful of any dry substance, fill the spoon with the substance and level with a knife.

For *half* a spoonful, divide the spoonful lengthwise, holding the knife parallel with the handle of the spoon. Push off as much of one-half as possible before lifting the knife; remove the remaining portion carefully and leave on the spoon exactly half a spoonful.

To measure a *quarter* of a spoonful, divide a half-spoonful crosswise, the dividing line being a little nearer to the handle than to the point. A small spoon for measuring one-fourth of a teaspoonful is called a "saltspoon"; this is much larger than the saltspoons for table use.

To measure *one-eighth* of a teaspoonful, divide a quarter of a spoonful diagonally into two equal parts.

The indefinite quantity known as a "speck," a "pinch," or a "few grains," means ordinarily about as much as will lie on the tip of a pointed knife blade—about one-fourth of a saltspoonful or less. The quantities used in "individual" work being generally small, the "speck" or "few grains" must be regulated according to the amount of material used.

A cupful of liquid is all that the cup will hold.

A teaspoonful or a tablespoonful of liquid is all that the spoon will hold.

The capacity of ordinary teaspoons and tablespoons is a variable quantity, but the standard teaspoonful contains sixty drops.

NOTE.—Small quantities of liquid are often measured by drops; the kind of liquid, whether thick or thin, as well as the surface from which they drop, influences size of drops. Drops from a thick-lipped bottle are larger than those from a thin-lipped one. It is usual to allow sixty drops of thin liquids, such as flavorings, etc., to a teaspoonful.

Abbreviations and Equivalents

A "few grains" or a "speck" (spk.) = about one-fourth of a saltspoonful (ssp.)
4 saltspoonfuls = 1 teaspoonful (t. or tsp.)
3 teaspoonfuls = 1 tablespoonful (tb. or tbsp.)
16 tablespoonfuls = 1 cupful (c.)
1 cupful = ½ pint (pt.) or 2 gills

Approximate Measures of One Pound

2 cups butter = 1 pound
2 cups chopped meat = 1 pound
2 cups granulated sugar = 1 pound
2¼ cups powdered sugar = 1 pound
3 cups confectioners' sugar = 1 pound
1⅞ cups rice = 1 pound
4 cups white flour = 1 pound
4 cups entire wheat flour = 1 pound
4½ cups graham flour = 1 pound
Scant 3 cups granulated corn meal = 1 pound
6 cups rolled oats = 1 pound

U. S. Liquid Measure

4 gills = 1 pint (pt.)
2 pints = 1 quart (qt.)
4 quarts = 1 gallon (gal.)
31½ gallons = 1 barrel (bbl.)
2 barrels = 1 hogshead (hhd.)

U. S. Dry Measure

2 pints = 1 quart (qt.)
8 quarts = 1 peck (pk.)
4 pecks = 1 bushel (bu.)

Metric Equivalents

In the metric system the *liter* is the unit measure of capacity and the *gram* is the unit measure of weight.

Liquid Measure

1 liter = 0.94 quart

Dry Measure

1 liter = 1.10 quarts

NOTE.—When a quart of potatoes (or any other vegetable) is bought by dry measure, the law requires "heap" measure. This means that the measure itself must not only be full to the brim, but it must be heaped in the shape of a cone as high as the commodity itself will permit.

Number of cubic inches in U. S. Capacity Measures

1 gallon contains 231 cubic inches

A standard half-pint measuring cup contains 14.43 cubic inches

1 bushel contains 2150.42 cubic inches

Avoirdupois Weight

$27\frac{11}{32}$ grains (gr.) = 1 dram (dr.)
16 dr. = 1 ounce (oz.)
16 oz. = 1 pound (lb.)
100 lbs. = 1 hundredweight (cwt.)
20 cwt. = 1 ton = 2000 lbs.

Metric System

1 grain = 0.06 gram
1 avoirdupois ounce = 28.35 grams
1 pound = 453.59 grams

NOTE.—The ton of 2240 pounds and the hundredweight of 112 pounds (often called the *long* ton and the *long* hundredweight) are used in the United States Custom House and in wholesale transactions in coal and iron.

Wood Measure

(Used in measuring wood and other merchandise)
16 cubic feet = 1 cord foot (cd. ft.)
8 cord feet or 128 cubic feet = 1 cord (cd.)

A cord of wood, as generally piled, is 8 ft. long, 4 ft. wide, and 4 ft. high.

CHAPTER VII

Water in the Household

The chief *sources* of *water* are rain, snow, springs, wells, rivers, and lakes. The ideal water is that which has been slowly filtered through sand and gravel and comes out as a spring, giving what is called "living water." In cities it is not possible to get enough of this for general use, and therefore water from other sources must be drawn upon. Though wells are supposed to give filtered water, in cities the ground is not clean enough; so water from lakes and rivers is used, and persons are trained to watch them and keep them clean.

At the present time there are few large cities where the water supply is not subjected to some kind of artificial purification. Filtration—that is, the passing of water through layers of sand—is the process most frequently employed. Many different methods are applied to waters of different quality, however, and the purification of water on a large scale has become so complicated an art that special training is required for those who are to deal with the problem.

While pure water is composed of hydrogen and oxygen, no chemically pure water is found in nature, because, owing to its great solvent and absorbent power, all natural water has taken up mineral or gaseous substances in passing through the air, as rain, etc., and later in passing over or through the earth. The substances thus dissolved by water may be either *organic* or *inorganic*.

The *organic* substances in solution may be either the products of the activities of plant and animal life or the substances arising from the breaking down of these; while the organisms themselves, though not of course soluble, may, when of a nature to produce disease in human beings, constitute impurity of the most dangerous kind. Many of the organisms found in the water of lakes and rivers, etc., are harmless, but disease-producing forms do occur, and especially when the water has been contaminated with human waste, or sewage.

Of the *inorganic* substances in solution, perhaps the most important from the domestic standpoint are the salts of calcium, or lime salts. Water containing these is said to be "hard," which means that it contains mineral substances which destroy the power of soap to form a lather or froth readily. Insoluble compounds are formed instead, which separate as a curd and which have no cleansing properties. The greater the difficulty experienced in obtaining a lather and the greater the amount of soap required, the harder the water. A "soft" water, on the contrary, is one which, when shaken with a little soap, easily forms a lather that will last at least several minutes.

Rain water absorbs more or less *carbon dioxide* from various sources, and, soaking into the soil, often comes in contact with lime, magnesia, and other compounds. Water saturated with carbon dioxide will dissolve these substances, forming carbonates or other salts, which are soluble; such water is "hard." When the hardness is caused by calcium carbonate, it is called "temporary" hardness, because it may be overcome by boiling. Boiling drives off the excess of carbon dioxide and precipitates the lime. The addition of washing soda (carbonate of soda), ammonia, or borax will cause the same precipitation and thus render the water soft. Any scum or sediment can then be removed by straining.

The hardness which is due to sulphates of lime and magnesia is said to be "permanent," because it cannot be removed by boiling. Such water can be softened, however, by the addition of washing soda or other strongly alkaline substances.

The degree of hardness varies so much in different waters that no exact rule can be given for the use of softening agents, but for ordinary cleansing and laundry purposes a general rule is to use one tablespoon of washing soda to one gallon of moderately hard water, first heating a portion of the water in which to dissolve the washing soda.

For *drinking,* water should be free from harmful substances. Unclean water is dangerous, just as dust is dangerous, for we never know when disease germs may be present in either. Water from wells, springs, or from rivers which run through cities or towns is likely to receive sewage, and may thus communicate disease, such as typhoid fever. There has been a great reduction in the death rate from typhoid fever in those cities where filter plants have been installed.

While the carefully guarded water supply of most of our large cities affords a safe water for drinking purposes, it is said that nine-tenths of the country wells are more or less contaminated and are growing worse. The ordinary shallow well, thirty feet or so deep, is usually fed, in whole or in part, from near-by sources, and is always an object of suspicion, as is water taken from rivers, small streams, etc. When there is the slightest reason to doubt the purity of drinking water, it should be boiled. Water which has been boiled long enough to kill the germs contained in it is said to be *sterilized;* that is, freed from germ life.

Boiled water has a "flat" taste, due to the loss of the atmospheric gases which were driven off by boiling. The flat taste will disappear if the water is poured rapidly from one vessel to another a few times, or is shaken in a stoppered bottle.

Distilled water is obtained by condensing the steam from boiling water in a closed receptacle. It also has a flat taste.

The flavor may be restored, as in boiled water. Distilled water is free from germs.

Experiment: Hold a cold plate over boiling water so that the vapor will strike the bottom of the plate. Drops of water will soon appear on the plate. This is distilled water.

Water for *cooking* or *drinking* should always be freshly drawn. Water which has been standing over night in the pipes between the street and the cold water faucet should be drawn off every morning before any is taken for use. Never use for cooking or drinking the water from the hot water faucet. Since many pipes are made of lead or of brass, water standing in them for some time may become poisonous. Hot water is more likely to become so than cold, and soft water has greater solvent action than hard water on these metals.

Forms of Water: Water is found in nature in three forms—as a solid (ice or snow), as a liquid, and as a gas (steam).

Experiment: Melt a piece of ice in a saucepan placed over the heat. As the water heats, small bubbles appear on the bottom and sides of the saucepan. Soon they begin to rise slowly, after a time reaching the surface of the water and breaking there. This water is not very hot, as the finger may be held in it. The bubbles consist of gases from the air, which give to the water its usual flavor. As the water grows hotter, the small bubbles disappear; larger bubbles, of steam, form in groups on the bottom of the saucepan, where the heat is greatest. The water at these points seems to be in motion. The groups become larger and the bubbles rise higher and higher, soon reaching the surface, and breaking there rapidly with a slight noise; by this time the water is bubbling all over. This is boiling water. *Boiling* water is *bubbling* water. The thermometer shows that the temperature of boiling water is 212° F. Water freezes at 32° F.

Steam is invisible. When the water in a teakettle is boiling, there is sometimes a space just beyond the spout where nothing can be seen. Here is the true steam, or water in the form of a gas. Most gases are invisible. As the steam passes out beyond the spout, where it is cooler, the steam is condensed into watery vapor, which is commonly, though incorrectly, called steam.

Freezing

Salt and *ice* together make a freezing mixture several degrees colder than ice alone. Solids changing to liquids absorb heat from surrounding bodies. As the ice changes to liquid (water), it absorbs heat. Salt has a strong attraction for water, and makes the ice melt more quickly; the salt also changes to a liquid, absorbing still more heat. The heat is taken by the ice and salt from the mixture which is to be frozen, and around which they are closely packed. The smaller the pieces of ice, the more quickly they change to liquid; and the more salt used, the more quickly is the mixture frozen. If too much salt is used, the frozen mixture will be coarse-grained. The best proportion to use is three parts chopped ice and one part rock salt. Snow may be used instead of ice.

As liquids expand in freezing, the can of the freezer should never be more than three-quarters full. If too full, the cover may be pushed up, allowing the salt water to get in.

Directions for Freezing

Place the can of the freezer in the proper position in the pail; put in the dasher and pour in the mixture to be frozen. Cover, and adjust the handle so that it turns freely. Surround the can with alternate layers of ice and salt in the proportion given, beginning with the ice. As the ice and salt melt, more should be added to keep the freezer full. Turn steadily until the mixture becomes so stiff that turning is difficult. Wipe the cover, so that when it is removed no salt water can drop into the can. Take out the dasher, and with a long-handled spoon pack the frozen mixture solidly. Replace the cover, putting a cork in the opening. Cover the freezer with a thick cloth and set aside in a cool place.

If not to be served for some time after making, the "cream" or "ice" may be packed. In this case drain off water, remove can of frozen cream, and empty ice and salt from pail. Put a thick layer of ice in pail and replace can, and pack solidly, using four measures of ice to one of salt. Keep well covered in a cool place until wanted.

Milk Sherbet

2 c. sugar ½ c. lemon juice, strained 1 qt. milk

Mix the sugar and the strained lemon juice; put the milk into the freezer can and pour the lemon juice and sugar into it. Stir thoroughly, cover, and freeze. One-fourth teaspoonful of lemon extract may be added if desired.

Lemon Water Ice

Substitute water for milk in the above recipe.

Ice Cream No. 1

1 qt. thin cream 1 c. sugar
1 tb. vanilla

Mix ingredients and freeze; 1 pt. of heavy cream, mixed with 3 c. of milk, may be used instead of thin cream.

Ice Cream No. 2

1 pt. milk, scalded	1 pt. cream
1 c. sugar	2 eggs, beaten
2 tb. flour	1 tb. vanilla

Mix sugar and flour together; add the hot milk slowly, stirring constantly. Pour the mixture into the upper part of a double boiler, place directly over the heat, and stir constantly until it boils; then cover and cook over boiling water 10 to 15 minutes. Pour the mixture very slowly into the beaten eggs, return to double boiler, and cook 1 minute. Cool, add vanilla and cream, and freeze.

Ice Cream for One

Put into a wide-mouthed glass jar or a water-tight cocoa or baking powder can ½ c. cream, 4 t. sugar, and 15 drops vanilla or lemon extract. Stir until sugar is dissolved. Cover, and place can or jar in a bowl or pail, and surround it with broken ice and salt in usual proportions — 1 part salt to 3 parts ice. Turn the can or jar back and forth constantly. Take off the cover occasionally, and scrape the frozen cream from the sides and stir thoroughly. Replace cover, and repeat the scraping, etc., until cream is evenly frozen.

CHAPTER VIII

Beverages and Fruits

Water is used as a *beverage,* as a general *cleansing* agent, as an aid in the preparation of food by *cleansing, chilling, softening, dissolving, diluting,* etc., as a *carrier of flavor,* and as a *medium for conveying heat* to other substances.

The making of *beverages* illustrates the use of water for dissolving, diluting, and as a carrier of flavor.

Experiment 1. Water as a *solvent:* Put ¼ c. of sugar into a small saucepan; add cold water, 1 t. at a time, and stir until sugar is dissolved.

Experiment 2. Repeat Experiment 1, substituting hot water for cold.

Record the amount of water required in each case. Boil the sugar solutions 5 minutes; put into a glass jar, warmed to prevent breaking. Cover and reserve.

Experiment 3. Water for *diluting* and as a *carrier of flavor:* Wash one lemon, cut in halves, and squeeze the juice into a measuring cup of glass, if possible. Note the quantity of juice. Divide the juice into two parts and put each part into a separate glass. Dilute, to taste, with water. Use sugar sirup for sweetening one and granulated sugar for sweetening the other. Compare as to consistency and time required for completing the beverage.

Inference from Experiments.—Sweetening cold beverages with sugar sirup will save time. Sugar sirup will improve the consistency of a beverage, making it less thin and watery.

Note.—The word *dissolve* means to *disappear,* to *diffuse* through a liquid so that the material cannot be separated by straining or by other ordinary means.

Experiment.—Put a teaspoonful of laundry starch into half a glass of cold water and stir. The lumps fall apart and the starch is scattered through the water, giving it a milky appearance. When stirring ceases, the water soon becomes clear, the starch settling to the bottom. The starch does not *dissolve* or *disappear.*

Tea

Tea is made from the leaves of the tea plant, and is commonly classed as *green* or *black*, the distinction being due to differences in the methods of curing. The young, tender leaves contain the least fiber and the most juice, and consequently produce the finest quality of tea. The more mature the leaves, the poorer the quality of tea produced. *Green* tea is prepared from fresh leaves withered by heat in hot pans or by steam, then rolled to break up the fiber, and finally "fired," or dried. Because of the rapid drying by artificial heat, the leaves retain their natural green color. *Black* tea receives similar preparatory treatment, but after the leaves are rolled and mashed till soft, they are allowed to ferment a certain length of time before drying. This treatment lessens the amount of tannin and increases the proportion of flavoring substances.

Teas may be classified as follows:

1. Unfermented or green teas. *Examples:* gunpowder and hyson from China, and basket-fired and pan-fired from Japan.

2. Partially fermented or oolong. *Example:* Formosa oolongs.

3. Fermented or black teas. *Examples:* black tea, English breakfast from China, and black teas from India and Ceylon.

India and Ceylon teas are coming to the front more and more, and the importations from China falling off.

Theine is the substance which gives to tea its stimulating properties.

Tea should be used only in the form of an *infusion;* that is, it should be made by pouring boiling water upon the required amount of leaves and allowing it to stand a short time to "draw" out or extract the flavor. It should never be boiled. Boiling is objectionable for two reasons: first, the delicate aroma is lost, the flavoring substance going off with the steam; and second, the leaves are made to yield their tannin and other substances, which cause digestive disturbances. The finest and most delicate portion is that poured off within the first 5 minutes.

General proportions: Allow 1 t. of tea to 1 c. of boiling water. Freshly boiled water should be used. If stronger tea is desired, use less water or more tea.

To make Tea

Scald the teapot with boiling water; put in the tea and pour on the boiling water. Let it stand where it will keep hot, but not boil, 3 to 5 minutes. Strain, and serve at once.

Russian Tea

4 t. tea
1 c. boiling water
Thin slices of lemon
Sweet preserve or cubes of sugar

Put the tea into a heated teapot; pour on the boiling water, cover, and let stand 3 to 5 minutes. Serve in glasses. Put a spoon into each glass to prevent breaking when tea is poured in; add a slice of lemon or a few drops of juice, and pour in a small quantity of the strong infusion. Add boiling water to dilute to desired strength. A candied cherry is sometimes added.

NOTE.—In Russia, sweet preserve is served by preference with tea, a spoonful of preserve, then a "sup" of tea being taken. Pieces of loaf sugar are sometimes used instead. Milk is never used in Russian tea.

If the tea extract is not used as soon as made, it should be strained from the leaves. A silver tea ball is convenient in making a small quantity of tea.

Iced Tea

Left-over tea strained immediately from the leaves may be chilled and served as iced tea.

If fresh tea is made for this purpose, make double strength by using 2 teaspoonfuls of tea for each cup of boiling water. Have ready glasses or cups half-filled with cracked ice; add lemon juice and powdered sugar to taste, and pour on the hot tea, being careful to prevent breaking by first putting a spoon into each glass.

NOTE.—"All kinds of teas are not equally suitable for making iced tea," says Miss Susannah Usher in the *Journal of Home Economics* (June—July, 1915). "Some teas, especially the heavy-bodied India varieties, make infusions that turn turbid on cooling, . . . but they are delicious served hot with cream. Do not expect one and the same tea to be equally palatable and attractive served hot or cold, with cream or with lemon."

REFERENCES: Pitman Commercial Series, *Tea*; J. M. Walsh, *Tea*; *Chinese Year-Book*; Farmers' Bulletin 301, *Home-grown Tea*; Bulletin Plant Industry 234, *Cultivation and Manufacture of Tea in the United States.*

Coffee

Coffee is made from the seeds of the berries of the coffee tree, which are dried, then roasted and ground. The berries resemble a cherry and contain two flat seeds enveloped in a thick, leathery skin. This is removed and the seeds or "coffee beans" sorted according to size, so that they can be roasted evenly. The smallest berries, no matter where grown, receive the name of Mocha and command the highest price. Brazil supplies the largest proportion of the Mocha and Java of commerce. If instead of two flat seeds the berries have one round seed, these are carefully sorted out and sold under the name of "male berry" or "pea berry" coffee. They are supposed to have a finer flavor than the common varieties, and, therefore, command a higher price.

Coffee contains a stimulating substance, *caffeine,* similar in its nature to *theine.* It also contains flavoring substances and tannin.

Roasting develops the fine aroma, which, being volatile, will disappear soon after grinding unless the coffee is kept in an air-tight can.

The most economical way to make coffee and to obtain its full strength is to cover the coffee with cold water and let it stand for several hours, and then, just before serving the coffee, to heat the water to boiling point. It is, however, more commonly made by boiling or by filtering. Coffee may be boiled, or it may be allowed merely to reach the boiling point.

Coffee, if boiled violently, will lose its delicate aroma. To keep in the aroma, plug the spout of the coffee pot with soft paper or a cork.

General proportions: For each cup of coffee allow 2 tablespoons of ground coffee, mixed with 1 tablespoon of cold water, to 1 cup of boiling water, and a crushed eggshell or a little egg-white. When several cups of coffee are made, less ground coffee may be allowed for each.

NOTE.—Raw egg is often mixed with ground coffee to make the beverage clear. When heated, the egg as it cooks holds together particles of coffee which otherwise might float and render the liquid cloudy. Crushed eggshells are sometimes used for the same purpose because of the egg which adheres to them. The shells should be washed before the eggs are broken. "Coffee clearers" may also be purchased.

Boiled Coffee

1 c. ground coffee	1 c. cold water
1 egg or 1 egg-white	5 to 6 c. boiling water

Scald a clean, well-aired coffee pot. Wash an egg, break and beat it slightly, and put it with the crushed shell and the coffee into the coffee pot; add $\frac{1}{2}$ c. cold water and mix all thoroughly; add the boiling water and stir well. Cover and boil gently 3 minutes. To free the spout from grounds, pour a little coffee into a cup. Pour it back into the coffee pot again, and repeat if necessary. Add the remaining half-cup of cold water and put coffee pot where it will keep hot without boiling. Let stand 5 to 10 minutes. Serve with hot cream or milk and sugar.

The flavor of coffee "settled" without the addition of cold water is preferred by some.

If not served immediately, coffee should be strained from the grounds. Reheat to boiling point when needed. Cold coffee may be used for flavoring jellies, etc.

Coffee No. 2

1 to 2 tb. ground coffee to each cup of cold water

Put coffee in cold water, cover, and let stand several hours or over night. Heat slowly to boiling point. Strain the coffee, and use two or three times as much hot milk as coffee. Let stand a few moments before serving. If heated cream is added, use less milk. The coffee and cold water may be heated together without previous soaking, if a less strong beverage is desired.

Filtered Coffee

1 c. coffee, ground fine — 6 c. boiling water

Use a coffee pot having a strainer of wire or cloth. Scald coffee pot with boiling water, empty, and put coffee pot into a pan of boiling water or on back of stove. Place strainer in coffee pot, put in the coffee, and pour on the boiling water slowly, a little at a time. Cover and let stand a few moments to allow water to filter through each time after water is added. If desired stronger, pour the liquid through a second time, being careful that coffee is kept hot. Filtered coffee should not be boiled. Serve with hot milk or cream and sugar.

Black or "After-Dinner" Coffee

Allow ¼ c. ground coffee to each cup of boiling water, and make as directed for Filtered Coffee. Black coffee is served without milk, but may be sweetened or not.

REFERENCES: Dept. Agricultural Bureau Statistics, Bulletin 79, *Coffee;* Pitman Commercial Series, *Coffee;* J. M. Walsh, *Coffee.*

Cocoa

Cocoa and chocolate are both prepared from the seeds of the cacao, a small tropical tree. The seeds, or "cocoa beans," are dried, and roasted to develop the flavor. The outer covering is then removed. This covering makes cocoa shells, while the beans are broken into cocoa "nibs," or cracked cocoa. The prepared cocoa is made from the nibs, and much of the fat, known as "cocoa butter," is pressed out, the cocoa being powdered and frequently mixed with other substances, as sugar, starch, and flavoring. All of the fat is left in chocolate. Since cocoa butter does not become rancid readily, it is often used in confectionery, etc., instead of butter. It is sometimes called "caramel butter."

Cocoa and chocolate contain a stimulating substance, called *theobromine,* similar in its nature to theine and caffeine. Unlike tea and coffee, cocoa contains valuable food material.

4 t. cocoa	½ c. boiling water
2 t. sugar	1½ c. milk

Heat the milk in a double boiler until small bubbles appear around the edge; mix cocoa and sugar thoroughly in a saucepan; add boiling water and boil 3 minutes; add the scalded milk and bring to the boiling point. If not served at once, cover, to prevent film from forming. Beating until frothy will also help to prevent the formation of a film. Equal parts of milk and water may be used. If a richer cocoa is wanted, use less water. The quantity of cocoa needed varies slightly, according to the kind used.

Chocolate

1½ squares unsweetened chocolate	4 tb. sugar
	2 c. milk
2 c. boiling water	

Scald the milk; scrape the chocolate, mix with sugar and a little of the water; heat the mixture in a saucepan and stir until smooth. Add remainder of the water and the scalded milk. Boil 2 minutes. Beat with an egg beater until foamy. Serve with or without whipped cream.

Milk is heated for three reasons: First, to find out whether it is sweet; second, to cook more quickly the food with which it is combined; third, to kill the germs which cause the souring of milk. If milk is to be combined with other materials, it is safer to scald it first, unless one is certain that it is fresh. It may not taste sour, but may curdle when heated, and thus spoil the food in which it is used. Milk is said to be "scalded" when heated until a film forms over the top; this film will not form if the milk is closely covered while heating. The film forms at too low a temperature to kill germs; so if milk is heated to make it keep sweet longer, it is better to heat it in a double boiler until small bubbles appear around the edge. It should then be cooled quickly, and kept covered in a cool place.

FRUIT

Fruit, from the botanist's standpoint, is the seed-bearing portion of the plant. A glance at the general composition of fruits will show that they are watery foods, containing as they do an average of from 80 to 90 per cent of water.

Average composition of fresh fruit (*Food and the Principles of Dietetics*, Hutchison):

	Per cent
Water	85 to 90
Protein	0.5
Fat	0.5
Carbohydrates	$5\frac{1}{2}$ to $10\frac{1}{2}$
Cellulose	$2\frac{1}{2}$
Mineral matter	0.5

Fruits which contain more than 80 per cent of water are sometimes grouped together as "flavor fruits," while those with a larger proportion of solids—20 per cent or more—are called "food fruits." Among the former are strawberries, peaches, lemons, pineapples, etc., while bananas are a good example of the latter.

The flavor of fruits is due principally to the sugar and fruit acids they contain, but the special flavor which is characteristic of each kind is almost entirely due to volatile substances present in such small amount that they cannot be determined by the usual chemical methods. In some cases, however, as in the strawberry, a volatile oil with a pronounced strawberry flavor has been extracted from the fat of the dried berries, and the flavor of the oil found in the yellow rind of oranges and lemons is well known. While the exceedingly small amount of flavoring substance present adds little if any to the nutritive value of fruits, yet the agreeable flavors and odors add materially to their attractiveness and palatability; and, as previously mentioned, there is reason to believe that palatable foods are really digested more easily than those which are not, because of the greater abundance of digestive juices produced.

The food material in fruit is chiefly in the form of carbohydrate, one-half to three-fourths of which is sugar, the proportion varying with the stage of growth and the degree of ripeness.

The amount of *cellulose* varies greatly in different fruits, diminishing during the ripening of the fruit, while the amount of sugar increases.

The *mineral* constituents of fruit are of considerable importance, and being in combination with the fruit acids present, form compounds which are of especial value to the body. These, together with the flavoring substances, not only stimulate the appetite and supply, in an agreeable form, the acids which man seems to crave and require, but also benefit the body in other ways.

Since, as has been said, considerable bulk is a necessity in the diet, bulky foods, like fruits and vegetables, are of importance because they usually contain a fairly large proportion of indigestible material, such as cellulose, etc., which stimulates the action of the intestine. Dried fruits and some preserved fruits are much more concentrated, comparing favorably with some of the cereals and other dry vegetable foods in the total amount of nutriment. For example, dates and raisins contain nearly 75 per cent, prunes 71 per cent, and figs 68 per cent of carbohydrates, chiefly sugar.

Since the chief nutrients of fruits are carbohydrates, they are naturally and properly used with foods richer in protein, such as cereals, peas and beans, nuts, eggs, milk, meats, and fish.

Uncooked fruits should be washed, unless one can be quite certain that they have not been exposed to uncleanly conditions. Washing of small fruits, like berries, may cause a slight loss of flavor, but it seems prudent to sacrifice a little flavor for the sake of removing dirt and dust, and possibly dangerous organisms. Fruits with a firm, dry skin, such as apples and pears, have less dust adhering to them than fruits with a soft, sticky surface, such as berries, dates, figs, etc.

Overripe fruit is often injurious, probably because it has begun to ferment; and raw, unripe fruit may also be harmful, either because of the large proportion of hard cell tissue or possibly because of the excess of acid in the green fruit. Cooking will render green fruit both wholesome and palatable, since it softens the texture and thus allows the digestive juices to act upon it more readily, and seems also to decrease the acidity.

Fresh fruits in good condition are both wholesome and inviting, and add greatly to the attractiveness of a meal. In general, fruit is more refreshing when cool. Some fruits, like melons, should be thoroughly chilled. Bright-colored fruits, by themselves or combined with a few green leaves, make a pleasing table decoration.

Apples should be wiped, or washed if necessary, and then rubbed till dry, and polished.

Bananas may be wiped and served whole, or peeled, sliced, and served with sugar and cream; or first sprinkled with lemon juice and then with shredded cocoanut. They may also be combined with strawberries or other fruits.

Berries. Look over carefully, then put them, not too many at a time, into a strainer or colander, and gently pour cold water over them. Avoid crushing. Drain the washed berries in the strainer placed over a dish. Reserve the water which drains through. Chill the berries, but do not add sugar until they are served, as it will extract the juice and destroy their firmness.

Berries which are bruised, but in good condition otherwise, may be washed and allowed to stand covered with sugar; then crushed and strained, with or without heating. Add the juice to the water drained from the washed berries to use for flavoring pudding sauce or fruit lemonade.

Raspberries or *strawberries,* when served in large quantity, should be put into several small dishes rather than into one large dish, as they will be crushed by their own weight.

Strawberries are hulled, unless exceptionally fine, and cream and sugar may be passed with them; or they may be grouped around mounds of sugar in the center of each dish. If the berries are washed, the washing should be done before the hulls are removed.

Cantaloupes and muskmelons. Melons should be ripe and thoroughly chilled. A ripe melon is soft to the touch when pressed on the blossom end, and the stem can be readily separated from the fruit. Small melons should be divided in halves, crosswise, the seeds removed, and the melon chilled. One-half is served to each person.

Larger melons may be cut into halves, lengthwise, then cut into long strips, and placed rind down on a platter covered with grape or other green leaves.

The cantaloupe is a choice variety of muskmelon, said to have originated from muskmelon seeds brought from Armenia to Europe, nearly four centuries ago. Cantaloupes were so named either from Cantalupo, a town in Italy, or from the Villa Cantaluppi in the Papal States, where they were first grown.

Farmers' Bulletin 193, *Experiment Station Work,* states that: "The term 'muskmelon' is here used in a wide, generic sense, to include not only the furrowed, hard-rind melons known as 'cantaloupes,' but also the netted, soft-rind kinds known as 'nutmeg' or 'netted' melons. The term 'cantaloupe' is thus confined to a particular class of muskmelons."

According to the same bulletin "the Rockyford muskmelon . . . is simply the Netted Gem variety as selected and improved by growers in the region of Rockyford in the Arkansas Valley, Colorado, where . . . ideal conditions apparently exist for the production of melons of the highest quality. The Rockyford variety is now grown extensively in other parts of the United States, and probably a large proportion of the melons sold in Eastern markets under this name are derived from this source or are simply the ordinary Netted Gem produced by local growers. The true Rockyford melon does not come into the market in any quantity before the middle of August."

This Bulletin continues: "According to P. K. Blinn, of the Colorado Station, a perfect Rockyford cantaloupe should be slightly over four inches in diameter and about four and five-eighths inches long; it should have silver-gray netting that stands out like thick, heavy lace, practically covering the entire melon, save the well-defined slate-colored stripes; these should run the whole length of the melon, clear-cut as if grooved out with a round chisel, and terminating at the blossom end in a small button. The interstices in the netting should be light olive green, that turns slightly yellow when the melon is ready for market. . . . The flesh should be thick and firm, of a smooth texture, and free from watery appearance, rich and melting in flavor. The shipping and keeping qualities depend largely on the solidity of the melon, so the seed cavity should be small and perfectly filled with seed. The color of the flesh near the rind should be dark green, shading lighter toward the seed cavity, which should be salmon or orange in color. The flesh is often mottled with salmon, and not uncommonly the entire flesh is of that color."

Cherries. Look them over and remove imperfect ones. Serve cherries with the stems on and without separating clusters.

Currants should be washed, drained, and chilled, and may be stemmed or not, as preferred. Fine clusters are sometimes crystallized by dipping first in beaten egg-white diluted with a tablespoonful of cold water, then into granulated sugar, and dried. Raspberries may be served with currants.

Grapes are most attractive with the "bloom" on. It is safer, however, to wash those bought in the market by allowing cold water to run through the bunches, and then to drain and chill them.

Grapefruit or Pomola. Wash fruit and cut in halves, crosswise. Serve one-half to each person. Remove all seeds. Insert a sharp-pointed knife between the rind and the pulp, and cut all round the inside. Cut the pulp away from the membrane between the sections, then, inserting the knife under the core, cut it free from the skin. Take out the core and membranes, leaving only the pulp. A pair of scissors may be used instead of a knife. Chill the fruit and serve with powdered sugar. The pulp may be served in glasses.

NOTE.—*Pomola* is believed to be the oldest name for this fruit, and is the one commonly used by horticulturists. The name *grapefruit* is thought to have originated from the fact that the fruit grows in clusters, like grapes. Another name sometimes used is "shaddock," but this term is more properly applied to another variety which is much larger, of a different shape, and, to American tastes, of inferior quality.—*Farmers' Bulletin 169.*

Oranges should be wiped or washed, if served with the skins on. Serve whole or in halves and prepare like grapefruit, with pulp in the peel cut to form baskets. A simpler way is to cut the peel into six or eight sections lengthwise, beginning at the blossom end and cutting almost to the stem end; loosen the skin from the orange and fold the points of the peel inward. The sections of orange may be separated or not. Or the peel, with the exception of a narrow band around the middle, may be removed. Cut the band at one point and separate the sections of pulp, leaving them attached only by the band of peel.

Peaches. Use a towel or a soft brush to remove the "down" from the skins, and serve the fruit cold. Peaches may be peeled, sliced, and served with cream and sugar, or with sugar alone.

Pineapples. The separate "leaves" which form the crown can be easily pulled out from a *ripe* pineapple. To prepare, cut off the skin and take out every remnant of the "eyes." Hold the fruit by the crown while preparing, or use a strong fork. Pineapple may be sliced lengthwise or across, the core in either case being discarded. Slicing lengthwise instead of crosswise cuts the fruit across the grain, and so makes it more tender. Pineapple may be served in slices, in small pieces, or shredded. To shred: after paring and removing the eyes, use a strong silver fork to tear off pieces lengthwise, or cut slices crosswise.

Put two or three slices together on a plate and shave them very thin lengthwise, cutting round and round until the core is reached. Put the shredded pineapple in a serving dish with sugar to taste, cover closely, and let stand several hours or over night in the refrigerator to chill thoroughly.

Strawberries, halved or crushed and mixed with sugar, may be added to the pineapple before chilling; or cherries, stoned and sweetened; or bananas, sliced and sprinkled with sugar; or orange pulp or juice.

The prepared fruit is sometimes served in the hollow "shell" of a large pineapple from which the pulp has been dug out. To prepare the "shell," cut off the base of the pineapple so that it will stand square. Without removing the leafy crown, cut a slice from the top and reserve this to use as a cover. Dig out the pulp with a fork or with a sharp knife, being careful not to break the skin. Fill the shell with the fruit, replace the top, and chill the whole; or sweeten the fruit, put it into a bowl, cover, and put into the chilled shell just before serving.

Watermelon. Chill thoroughly and wipe with a soft cloth. Cut a slice from each end, and then divide the melon into halves crosswise. Use a sharp knife to cut around the pink pulp, but do not remove it from the melon. Place each half on a large, flat dish, covered with a doily, or green leaves, if convenient. Use a large spoon for serving the pulp.

Or, cut the melon into slices and these into quarters. Or divide the pulp of thicker slices into separate portions.

Cooking Fruits

Since fruits, when fresh, contain so large a proportion of water, little or no additional water is needed in cooking them. Before dried fruits can be softened by cooking, the lost water must be restored by soaking in cold water for several hours.

Fruits are dried to prevent their spoiling by molds and bacteria, which, like other plants, cannot grow unless they have sufficient moisture.

In order still further to prevent decay, and also to improve their appearance, chemical substances are often used in the preparation of dried fruits; and as some of these substances may be harmful, it is advisable for this reason, as well as because of the dust and dirt which adhere to the sticky surface, always to wash dried fruits thoroughly. If fruit is very hard and dry, it should be soaked in slightly warm water for a short time before it is washed.

General rule for cooking dried fruits: Wash thoroughly, but quickly, in cold or slightly warm water, rubbing the fruit between the hands. Having changed the water frequently until the fruit is clean, cover with fresh water and let fruit soak several hours, if possible. Cook, until soft, in the water in which it was soaked. Long soaking, then cooking with intense heat for a few moments, gives a flavor most like that of fresh fruit.

The fruits commonly dried are apples, pears, peaches, apricots, plums (prunes), and grapes (raisins and currants).

NOTE.—Currants are very small grapes, dried. Being first brought from Corinth, in Greece, they were called "Corinths," a word which in time assumed its present form of "currants."

Steamed Apples

Wipe, pare, and core sour apples; put them in a shallow dish. Place the dish with the apples in a steamer or squash strainer, over boiling water. Cover and cook until apples are tender, but not broken. Serve hot, with butter, sugar, and nutmeg or cinnamon; or serve cold, with cream, plain or whipped, sweetened and flavored; or the juice may be sweetened, flavored with lemon juice and rind, and poured over the apples.

Steamed apples make a palatable addition to cooked breakfast cereals.

Baked Apples

Wipe and core tart apples; they may be pared or not. Put them into an agate or earthenware baking dish; fill the center of each with sugar, and add spice if desired. Use 1 t. of water to each apple, and pour it around, not over them. Bake 30 to 45 minutes, or until apples are soft, basting them every 10 minutes. Place apples in serving dish and pour the juice over them. Serve cold.

Sweet apples also may be baked. Serve with cream and sugar.

Apple Sauce

Wipe, quarter, core, and pare sour apples. Put into a saucepan with enough water to cover the bottom of saucepan; use more if apples are not juicy. Cook slowly, and stir occasionally to keep from burning. When soft, sweeten to taste, a general rule being to use 1 c. of sugar to 7 or 8 large, tart apples. To flavor, add ground cinnamon or nutmeg, or both; or if apples are not tart, lemon juice and rind may be used. A very little salt will improve the flavor. The sauce may be strained or not.

Coddled Apples or Apple Compote

Make a sirup by boiling together 1 c. sugar and 2 c. of water 3 minutes; wipe, pare, and quarter 8 sour apples; cook as many pieces of apple as will float in the sirup; remove apple when soft and add more. When all are cooked, boil the sirup until it is slightly thickened, and pour over the apples. Apples may be pared and cooked whole, in which case a larger quantity of sirup will be needed; turn the apples when the under part is soft, to cook the other side. Flavor the sirup with lemon rind and juice, or a piece of stick cinnamon, or with a few cloves. Serve apples cold, with whipped cream.

Cranberry Sauce

2 c. cranberries
1 c. sugar
1 c. water

Pick over and wash cranberries, and put them with the water into a saucepan; cover and cook 8 minutes, or until skins burst. Add sugar and boil 5 minutes longer. Strain or not, as preferred.

Cranberry Sauce No. 2

1 qt. cranberries
1½ c. granulated sugar
½ c. water
⅛ t. salt

Put berries and water in a saucepan, cover, and cook until soft; mash gently with a spoon, to break the skins; remove from stove and add the sugar and salt. Do not cook after the sugar is added.

Cranberry Sauce No. 3

1 qt. cranberries
1½ c. granulated sugar
1½ c. boiling water

Cover and cook slowly 15 minutes. Do not stir, as fruit is to be kept whole. Care will be necessary to prevent burning.

Jellied Cranberry Sauce

1 qt. cranberries
2 c. granulated sugar
2 c. water

Make a sirup by boiling sugar and water together 5 minutes; skim, add berries, and cook slowly, without stirring, until berries are soft. Serve cold.

Baked Bananas

6 bananas
Juice of 1 lemon
2 tb. butter, melted
$\frac{1}{4}$ c. sugar

Use firm bananas, not over-ripe. Remove skins, cut bananas in halves lengthwise, and place in a shallow baking dish. Mix melted butter, sugar, and lemon juice, and spread half of the mixture over bananas, and use remainder for basting fruit while baking. Bake 20 minutes in a slow oven.

The bananas, covered with the sirup and cooked in an agate saucepan over moderate heat instead of in the oven, are less liable to burn.

Baked Rhubarb

$1\frac{1}{2}$ c. sugar
4 c. cut rhubarb

Wash rhubarb and cut, without peeling, into inch pieces. Put into an earthenware dish and add the sugar. Mix well, cover, and let stand over night, or until a considerable amount of sirup is formed. Bake in a very moderate oven until rhubarb is tender. Rhubarb sprinkled with sugar may be baked immediately without extracting juice. Rhubarb, with half the quantity of pineapple cut in half-inch cubes, makes an agreeable variation.

Stewed Prunes No. 1

½ lb. prunes	Cold water to cover

Wash prunes thoroughly; cover with cold water and let stand several hours or over night. Put prunes and water into a saucepan and cook slowly until fruit is soft, but not broken. Add sugar, if desired, and cook a few minutes longer. The rind and juice of half a lemon may be added. Serve cold.

Stewed Prunes No. 2

Prepare prunes as in No. 1. Put soaked prunes into the upper part of a double boiler; place directly over the heat and *boil* 5 minutes; then cover, and place the upper over the lower part of double boiler containing boiling water. Cook until prunes are soft.

Prunes cooked by this method have a rich flavor and the juice is thick and sirupy, instead of thin and watery.

Prunes and Cranberries

1 c. prunes	Water to cover
1 qt. cranberries	1 c. sugar

Wash prunes, cover with cold water, and let stand till plump. Put prunes with water into a saucepan and cook until soft; remove stones. Return prunes and juice to saucepan and add cranberries. Cook, stirring occasionally, until cranberries are soft; then add sugar and cook until mixture is thick. Serve cold. Cream, plain or whipped, may be added, and more sugar if desired.

Stewed Figs and Apples

$\frac{3}{4}$ lb. figs	$\frac{1}{2}$ lb. evaporated apples
Cold water to cover	Juice and grated rind of
1 to 2 tb. of sugar	$\frac{1}{2}$ lemon

Wash fruit thoroughly; remove any imperfect portions. Cut or chop the figs into small pieces, and put into top of double boiler with the apples. Cover with cold water and let stand 1 hour or longer. Put top of double boiler over the lower part, which is one-third full of *cold* water, and cook slowly until figs are soft. Add the lemon rind and juice and sugar, and cook a few moments longer. Serve cold, with or without cream.

CHAPTER IX

Vegetables

All plants are made up of innumerable cells having walls of cellulose. The cells contain the protoplasm, or living substance, in which lies the nucleus or center of cell activity. Within the cells, in most cases, may be found minute starch grains, and dissolved in the cell sap are sugars, mineral matters of various kinds, and the volatile oils and other substances to which their flavors are due.

Early in the growth of the plant, wood cells begin to develop and grow into a fibrous substance that may be torn or pulled apart like threads. This is "woody fiber," an example of which may be seen in the "threads" or stringy portion of the coarser celery stalks, or the tough, hard fibers of beets and turnips in the late spring.

Vegetables are usually best when young, because the cellulose is then tender and the flavor delicate. When the cellulose becomes old and tough, the digestive juices do not so readily reach the nutriment inside the cells; and such cellulose, if too abundant, is believed to be the cause of digestive disturbances. The flavoring substances also become so plentiful as to make the vegetables "strong" and bitter, or otherwise unpalatable, like radishes, for example, when old.

Freshness is almost as important as tenderness. Vegetables when gathered are still living things, and the ferments or enzymes in their tissues which are concerned in their ripening processes are still active, and may so continue for a long time. The ripening of green tomatoes after they are picked from the vines is due to the action of such ferments, and the loss of the sweetness in green corn and peas is also believed to be caused by ferments.

NOTE.—While it is true that the terms "enzymes" and "ferments" are not synonymous, it is sufficiently accurate for our purpose to use them interchangeably.

Wilting of vegetables is caused by the loss of water through evaporation. Wilting, as well as other undesirable changes, may be delayed by keeping vegetables in a refrigerator or other cool place. Salad plants, after washing, may be wrapped in a cloth or put into a clean paper bag or covered pail, and kept in a cool place.

If already wilted, they may be freshened, to some extent at least, by standing in cold water. With young vegetables a few moments only will be necessary; old ones often require many hours.

Withered or badly wilted vegetables, or those which have lost their fresh color and become yellowish or brown, should be avoided, having lost flavor and quality. Those which have begun to decompose should be rejected, particularly if they are to be eaten raw, as the molds, bacteria, etc., on or in the plants are sometimes the cause of illness more or less serious.

Cleanliness in handling, marketing, storing, and preparing food for the table is in all cases important, but is particularly necessary in the case of green vegetables or other foods which are eaten raw. As vegetables usually grow near the ground, earthy matter may adhere to them, and fertilizing materials also, which may be of a dangerous nature. If the vegetables are afterwards exposed to street dust and dirt, the possibility of contamination is increased, and especially if they are not handled in a cleanly way. The micro-organisms present often include those which cause typhoid fever and the intestinal disturbances so common in summer. Green vegetables, therefore, should always be looked over carefully, all bits of foreign substances removed, and the plants washed thoroughly in several waters. Hasty rinsing under the faucet or in a pan of water seldom frees lettuce, spinach leaves, etc., from sand, and is even less likely to remove other undesirable material, if present. Green plants, such as cabbage and cauliflower, may become the lodging place of insects or other forms of animal life. These vegetables, therefore, should be soaked half an hour or more in cold, salted water.

Vegetables may, for convenience, be classified as follows: *cereals, "root crops," herbaceous or green vegetables, vegetable "fruits," flower-heads, legumes.*

The *cereals,* among vegetable foods, are first in importance, including as they do nearly all the bread-making grains of the world.

"Root Crops." Next comes the group of plants which store up during the summer a supply of reserve material in thickened roots, which may be, like beets, true roots; or enlarged underground stems, or *tubers,* like the potato; or bulbs, like the onion

While botanically these belong to many different groups, from the standpoint of food value their common characteristic of producing underground parts filled with nutritive material makes it sufficiently accurate for the present purpose to include all such vegetables under the head of "root crops." These may be divided roughly into two main classes:

(1) Starch-yielding vegetables, like potatoes.

(2) Succulent or "juicy" root crops, so called because of the large proportion of water or "juice" they contain—85 to 90 per cent, on an average. Of these, beets, carrots, parsnips, turnips, and onions are the most common.

The chief nutritive ingredients of the succulent vegetables are sugar and other substances dissolved in the watery plant juices.

These succulent vegetables, as a class, possess marked flavors and odors, due to volatile oils and similar substances. They are appetizing and generally relished, and their use often renders palatable an otherwise flavorless dish or meal.

The tubers and root vegetables together, roughly speaking, contain from 70 to 90 per cent of water and from 10 to 30 per cent of solid material, the greater part of which is some form of carbohydrate. Small quantities of nitrogenous or protein substances are present, and, compared with most food materials, considerable quantities of mineral matters or "ash."

Green Vegetables. This group includes leaves, stems, stalks, the so-called "pot-herbs" or "greens," seed-pods, and, in general, those parts of plants in which water is very abundant, averaging 85 to 95 per cent; for example, cabbage, lettuce, spinach, and asparagus.

The *mineral substances* in green vegetables and in similar foods include potassium, iron, phosphorus, and sulphur. Some of these are in combination with citric and other plant acids, in forms which the body can use. Not all combinations of mineral matter are of equal value to the body, but some of those which the body requires are more abundant in fruits and succulent vegetables than in most other kinds of food; so that if for any reason the body lacks these foods for a long time, disease will result.

Although green vegetables, in spite of their solid appearance, contain a larger proportion of water than milk contains, yet they have a decided value in the diet. Their value lies (1) in the amount and kinds of mineral matter present; (2) in their appetizing qualities; (3) in their flavor and appearance; (4) in the bulk which they give the diet; (5) in the variety which they make possible; and (6) in the presence of vitamines which exist in the vegetable kingdom, and which are necessary to the normal growth and nutrition of animal tissue.

Vegetable fruits include tomatoes, okra, squash, pumpkins, cucumbers, eggplant, peppers.

Among *flower-heads* used as food, the cauliflower is the most common.

Legumes. The legumes or pulses include many varieties of beans, peas, and lentils. Though green beans and peas are not so highly nutritive as the dried seeds, they are more delicate and apparently are more easily digested. (See *Legumes,* page 271.)

Preparation of Vegetables for Cooking: Wash thoroughly; pare, peel, or scrape, according to the kind. Let them stand in cold water to keep them crisp, or to freshen them when wilted, or to prevent discoloration.

Cooking. Cook in freshly boiling, salted water, enough to cover, and keep the water boiling. Allow one teaspoonful of salt to one quart of water. In the case of delicate green vegetables, as peas, spinach, etc., salt should not be added until they are nearly done.

To preserve the color, cook green vegetables *uncovered.* To lessen the flavor and odor of cabbage, onions, and turnips, cook them *uncovered* in a large quantity of water; if the water is changed once or twice during cooking, more of the strong odor and flavor will be lost.

Time. The time required for cooking will vary according to the freshness, age, and size of the vegetables. They should be cooked only until tender, and served as soon after cooking as possible. Potatoes and root vegetables are tender or "done" when a fork will penetrate them easily.

Overcooking causes a loss of flavor and develops a strong taste and odor. It also injures the appearance; the loss of green color may be taken as a measure of the overcooking. Green vegetables cooked until brown or yellow no longer possess a delicate flavor; vegetables such as cabbage and cauliflower, if cooked only just long enough to make them tender without loss of their delicate color, will usually be digested without difficulty.

The water in which vegetables have been cooked is called "vegetable stock." Into this a considerable portion of the soluble mineral matter, sugar, etc., may escape. The loss when such vegetables as carrots, etc., are cut into small pieces may amount to one-third of the total food material present. Vegetable stock should, therefore, if of agreeable flavor, be used in making sauces for vegetables or as a basis for soups.

Note.—To give additional flavor, vegetables are sometimes cooked in the water in which meat has been cooked; and a little meat juice used to flavor the less expensive vegetable foods is often an important item when expense must be closely calculated.

Experiments have shown that when vegetables are steamed, only about one-third as much material is lost as when they are boiled; and when baked, there is little loss except the water, which is driven off by the heat.

Serving. Vegetables may be served plain, with salt, pepper, and butter, or with a cream, milk, or stock sauce.

Seasoning. General rule: Two level tablespoonfuls of butter, one-half teaspoonful of salt, and one-fourth saltspoonful of pepper for each pint of cooked vegetables.

Sauce for Vegetables

1 tb. butter	1 c. milk or ½ c. milk and
2 tb. flour	½ c. vegetable stock
¼ ssp. white pepper	¼ t. salt

Scald the milk; melt the butter, add the flour, and mix thoroughly. Cook until mixture bubbles; do not allow it to brown. Remove from fire and add milk gradually, about one-third at a time. Stir until smooth each time after adding milk. Return to fire, add seasoning, and stir until mixture boils. If not served immediately, cover to prevent a film from forming.

Beets

Wash beets, being careful not to break the skins; leave on the roots and about an inch of the leaf stems, to prevent loss of sugar in the water. Put beets into a stewpan with a generous supply of boiling water and boil until tender, from 1 to 4 hours, according to the age of the beets. If they are tender, plunge them into cold water and rub off the skins. Serve hot, sliced, with butter, salt, and pepper; or cold, sliced, and covered with vinegar.

Carrots

Young carrots may be cooked in a very little water. The flavor of old carrots becomes strong and the center grows hard and woody. When this stage is reached, only the deep yellow outer layers are desirable for food.

Boiled Carrots

Wash and if necessary scrub, and scrape off the skin. Cook whole, if small, or cut in thirds. Cook in sufficient salted, boiling water to cover. Cook young carrots 30 minutes; old carrots, 45 minutes or longer. Drain, season slightly with salt, put into a hot dish, and cover with white or stock sauce.

Carrots No. 2

Wash and scrape off the skin; cut in cubes or in "straws," and cook until tender in sufficient salted, boiling water to cover.

Drain, and reserve the water. Put carrots back into the saucepan, and for every pint add 1 to 2 tb. of butter, 1 t. sugar. ½ t. salt, and ½ c. of the vegetable stock. Cook over a hot fire until carrots have absorbed the liquid and seasoning. Serve hot.

Molded Carrots

Chop cooked carrots fine. Put into a saucepan and reheat. Season with salt, pepper, and butter, and stir occasionally, to prevent burning. Fill hot, buttered cups or one large mold with carrot and press lightly. Turn out on a hot dish. Garnish with parsley.

A second method is to fill unheated molds with cold chopped carrot and heat in a covered strainer placed over boiling water. Other vegetables may be reheated in the same way.

Parsnips

Wash and scrub parsnips. Cook 30 to 35 minutes, or until a fork will penetrate them easily. Drain off water, remove skin. Serve parsnips whole or mash. Season with salt, pepper, and butter, or serve with white sauce.

An equal quantity of potato may be combined with the parsnips before mashing.

Parsnips No. 2

Wash and scrape the skin and cut parsnips into half-inch cubes. Cook in salted, boiling water till tender; drain and serve with white sauce. To reheat cold parsnips, slice lengthwise and brown in hot fat; or mash or chop, and reheat.

Turnips

Wash and scrub turnips; pare off the thick skin. Cut turnips in quarters, in thick slices, or in cubes; cook uncovered in plenty of freshly boiling, salted water until soft. Flat white turnips will cook in 30 minutes; yellow turnips in 45 to 60 minutes. Drain as soon as tender. Serve plain; or mash, and season with salt, pepper, and butter; or serve creamed in white sauce.

Hashed Turnips No. 1

Chop the drained turnips into rather large pieces. Return to the saucepan, and for $1\frac{1}{2}$ pt. of turnips add 1 t. of salt, $\frac{1}{4}$ t. of pepper, 1 to 2 tb. of butter, and $\frac{1}{4}$ c. of water. Cook over a hot fire until the turnips have absorbed the seasonings. Serve immediately.

Turnips No. 2

Add to the chopped turnips salt and pepper and 1 tb. of butter creamed with 1 tb. of flour. Put into a saucepan and cook over a hot fire 5 minutes, stirring to prevent burning; then add 1 c. of milk, or of water in which meat has been cooked. Stir well and cook 10 minutes. Serve hot.

Onions

Onions are the most useful of vegetables for flavoring soups, stews, etc.

White onions are less strongly flavored than the red or yellow varieties. To lessen the strong flavor, put onions into boiling water with $\frac{1}{4}$ t. of cooking soda for each quart. Let them stand for half an hour; then drain, and put them into a saucepan with plenty of salted, boiling water. If onions are very strong, the water may be changed once or twice during the cooking.

NOTE.—To remove odor, wash at once in cold water, *without soap,* all knives, etc., used with onions.

Boiled Onions

Choose onions of about the same size. Cut off tops and root-ends and peel under cold water, to avoid irritating the eyes. Drain and put into a saucepan with plenty of salted, boiling water. Boil rapidly, uncovered, until onions are tender. Cook small onions 30 minutes; larger ones, 45 to 60 minutes or longer. Drain, and reserve the water as a basis for soups or stews. Serve onions with salt, pepper, and butter, or reheat in milk or white sauce.

Onions No. 2

Drain peeled onions from the cold water and cook uncovered in plenty of salted, boiling water. Boil rapidly 10 minutes, drain, and cover the onions with hot milk, using 1 pt. of milk for 1 qt. of onions. Cook gently 20 minutes. Mix together 2 tb. of butter with 1 tb. of flour and 1 t. of salt and ¼ t. white pepper. Take ½ c. of the milk in which onions are cooking and blend it with the butter and flour mixture. When this mixture is smooth, add it to the onions and milk. Cook 10 minutes longer and serve hot.

Boiled Cabbage

Choose a head heavy for its size. Take off the coarse outer leaves, cut the head into quarters, and reject the core; soak half an hour in cold, salted water, to draw out any insects. If large, cut each quarter into two or more parts; rinse cabbage in clear water and drain in a colander.

Fill a large kettle two-thirds full with cold water and place over the heat. Add 1 tb. of salt and ⅛ t. cooking soda for a cabbage of medium size. When the water boils rapidly add the cabbage, a few pieces at a time, to check boiling as little as possible.

Cook *uncovered* in rapidly boiling water; young cabbage 25 minutes, but *no longer*. Older cabbage may need 45 minutes, but all cabbage should be cooked only till tender. It should retain its color, the green part remaining green and the white portion white. Turn cabbage into a colander to drain, pressing out as much water as possible. Put cabbage back into the empty kettle, chop slightly with a knife if pieces are large, and reheat. Season with butter, salt, and pepper. Serve at once.

Fat rendered from ham, bacon, pork, or sausages may be used instead of butter.

Creamed Cabbage

Put the cooked and drained cabbage into a kettle. Cream together 1 tb. butter or other fat with 1 tb. of flour, $\frac{1}{4}$ t. salt, and $\frac{1}{8}$ t. pepper; mix with the cabbage, using a knife to cut it slightly; then add $\frac{1}{4}$ to $\frac{1}{2}$ c. of milk, according to amount of cabbage. Cook about 1 minute after milk begins to bubble, stirring gently to prevent burning. Serve immediately.

Tomatoes

Put ripe tomatoes into a pan and pour boiling water over them. Let them stand about 1 minute, then pour water off and remove the skins. Or fill a wire frying basket with raw tomatoes, and lower the basket into a deep stewpan containing sufficient boiling water to cover the tomatoes. Let the water boil 1 minute; then lift the basket, cool the tomatoes, and remove skins. Chill tomatoes before serving.

Stewed Tomatoes

Peel tomatoes and cut them into small pieces. Put them into an agate or enameled stewpan placed over fire. Boil gently

20 to 30 minutes. Five minutes before the cooking is completed, add seasoning. Allow for each quart of tomatoes 1 t. each of salt and sugar, $\frac{1}{4}$ t. of pepper, and 1 tb. or more of butter. More seasoning may be added if desired.

POTATOES

The potato is a "tuber," or enlargement of the underground stem, which serves as a storehouse for material held in reserve for the growth of new plants.

The outer skin consists of a thin, grayish-brown, corky substance, and corresponds roughly to the bark of an overground stem.

The framework of the potato, as in all other plant forms, is made up of *cellulose,* which forms the walls of a network of cells. These in turn form the body of the potato, the cells varying in shape and size in the different portions, according to their position and use; those in the flesh serve mainly for storage, and in these cells are contained the minute grains, or granules, of starch.

"If a cross-wise section of a raw potato is held up to the light three distinct parts besides the skin may be seen. The outermost one is known as the cortical layer, and may be from 0.12 to 0.5 inch in thickness. This layer is slightly colored, the tint varying with the kind, and turns green if exposed to the light for some time, thus showing its relation to the tender, green layer beneath the bark of overground stems. It is denser than the other parts of the potato and contains many fibro-vascular bundles, especially on the inner edge, where a marked ring of them plainly separates this layer from the next. The interior or flesh of the tuber is made up of two layers known as the outer and inner medullary areas. The outer one forms the main bulk of a well-developed potato and contains the greater part of the food ingredients. The inner medullary area, sometimes called the core, appears in a cross-section of the tuber to spread irregular arms up into the outer, so that its outline roughly suggests a star. It contains slightly more cellulose and less water and nutrients than the outer medullary portion."—*Farmers' Bulletin 295*.

Experiment: Wash and pare a potato; grate it into a piece of cheesecloth placed over a glass. Fold the corners of the cloth together, hold it over the glass, and squeeze as dry as possible. The liquid in the glass is the *water* or "juice" in which is dissolved nearly all the soluble ingredients of the potato.

Let the cloudy liquid stand until the white sediment, *starch*, settles to the bottom. Pour off the water gently, without disturbing the starch; add fresh water, if necessary, and stir thoroughly to wash the starch, and repeat until the starch is clean and the water colorless; then pour off the water and dry the starch. More starch may be obtained by adding water to the pulp, stirring thoroughly, and straining, as before. Reserve and dry the pulp. Notice the change in color.

Note.—"If peeled potatoes are exposed to the air, the outer surface turns brown, just as does the flesh of many fruits. Such change is due to the action of enzymes or unorganized ferments naturally present in the plants. In the presence of oxygen of the air they work upon tannin-like bodies in the tuber or fruit in such a way that the latter change color. In the case of potatoes this browning may be prevented by putting the peeled tubers into salted water or even into cold plain water."—*Farmers' Bulletin 295*.

Note.—Starch, especially if cooked, will turn a deep blue if moistened with a dilute solution of iodine. Iodine is therefore used by chemists as a test for the presence of starch.

The average composition of potatoes is as follows:

	Water	*Protein*	*Fat*	*Carbohydrates*	*Fiber*	*Ash*
Per cent	78.3	2.2	0.1	18.0	0.4	1.0

Farmers' Bulletins 244 and *295* contain the following useful information concerning potatoes: American markets demand potatoes 2 to 3 inches long and 5 to 10 ounces in weight, "since such potatoes have more uniform cooking qualities, a better appearance when served, a more nearly accurate weight when sold by measure, and sustain smaller losses when boiled. In the northern United States a light yellow or whitish-skinned tuber is preferred, while in some parts of the Southern States pink-skinned varieties are sought." As far as could be determined, the pink-skinned potatoes are in general as good in quality as those of light or yellowish color. Those having a more or less netted skin are usually preferred, as potatoes with smooth and clear skin are often excessively watery or immature.

A good potato should feel firm when pressed in the hand. If cut, it should separate crisply under the knife, and should be of even texture throughout. If the "core" is large and soft, it will be soggy and full of holes in the center when cooked.

Very large potatoes are not desirable, partly because it is hard to cook them evenly, and partly because they are apt to be variable in texture.

Potatoes of irregular shape, or having numerous and deep eyes, are objectionable because they may carry much dirt, and the labor, time, and waste in preparing them are much greater than is the case with potatoes of even surface and fewer eyes.

The "mealiness" of potatoes is dependent mainly upon the amount of starch present. Early and young potatoes have a better flavor, but are not so mealy and will not keep so well as older ones.

Potatoes should be stored in a cool, dark, dry place. Those which have grown on the surface of the ground often turn green, and potatoes which have been exposed to the light develop an unpleasant flavor. It is best not to use such potatoes. Old potatoes which have sprouted should have the part around the sprout cut away, as these portions are believed to contain a poisonous substance.

NOTE.—*Solanin* is a characteristic constituent of potatoes and other plants of the same family. It is acrid in taste and is poisonous. Only a trace, however—about 0.01 per cent on an average—is found in the tubers of the varieties which are grown for the table, and this quantity is far too small to cause any unpleasant symptoms. It is maintained that the characteristic flavor of potatoes is due to this mere trace of solanin. Cases of actual poisoning from potatoes are not unknown, and perhaps, without exception, have been found to be due to an abnormal solanin content such as is found in sprouted tubers, in very old potatoes, and in potatoes which have turned green on exposure to light.—*Farmers' Bulletin 295.*

Under ordinary circumstances, however, potatoes are unquestionably wholesome food and form a staple article of diet in almost every household. This is doubtless owing to their mild flavor and their low price, and also because they are easy to cook and can be prepared in a great variety of ways. Ordinarily, potatoes are eaten with other foods rich in protein, such as meat, fish, eggs, etc., and thus supply bulk as well as carbohydrate, chiefly in the form of starch. Their mineral matter is also abundant and valuable, and they are in general thoroughly digested. "One sometimes hears the statement made that potatoes are indigestible on account of the large quantities of cellulose they contain," says *Farmers' Bulletin No. 295*. "In reality, there is as much or more in almost all the cereals and other vegetable foods, and such a criticism of the potato has no warrant in fact."

The Cooking of Potatoes. By the ordinary methods of preparation and cooking, a large proportion of the nutritious substances of the potato, as in the case of other vegetables, may be lost. The temperature of the water in which potatoes are put on to cook influences the loss of nutriment. The use of cold water instead of boiling water at the beginning results in the loss of a small amount of mineral matter and over twice as great a loss of protein. "If potatoes are washed thoroughly and then, without being pared or soaked, are put on to cook in boiling water, there is practically no loss," writes Miss Helen Canon (*Potatoes in the Dietary: Cornell Bulletin, Food Series No. 15*).

"From all points of view, baking and steaming are apparently the best methods of cooking potatoes, and the latter method has the advantage in economy of fuel used. A potato baked in a slow oven is much inferior to a potato properly boiled, however, because the heat has not been intense enough to cause the cell walls to be broken down, and the result is a soggy mass on which the digestive juices cannot act freely. Too rapid boiling is likely to pulverize the outside of the potato before the inside becomes tender, thus causing waste and an unattractive appearance when served. The method by which potatoes are cooked deserves consideration because it affects both nutrition and the pocketbook."

When potatoes are pared, or cut into pieces before cooking, more surface is exposed, thus permitting the escape of soluble ingredients into the water. It has been estimated that a loss of 20 per cent may occur in a pared potato; and since the larger proportion of the valuable protein and mineral matter is in the outer layers, this is a serious loss. The total loss of substance is about twice as great when the paring is done before boiling as it is when done afterward, because the skin aids in preventing the loss of mineral matter, protein, and starch.

While it is true that "only the skin comes off when a boiled potato is peeled, and that it peels off with much greater ease," resulting in the saving of both time and nutriment, nevertheless it may be that time needed for removing the skin can be spared early in the day better than at the hour of serving a meal, when several other dishes may demand attention at the same moment.

NOTE.—"Old potatoes are often soaked in cold water. Experiments have shown that a pared potato soaked for from three to five hours loses about three times as much of its mineral matter and seven times as much of its protein as one that is pared and put on to cook immediately," says the *Cornell Bulletin* just quoted; and that "When potatoes are both pared and soaked, the loss in one bushel is estimated as equivalent to one pound of sirloin steak." Therefore, "If old potatoes must be soaked in order to improve their condition, let it be with the skins on."

Boiled Potatoes

Choose potatoes of about the same size; cut in two, if large. Wash, pare thinly, cut out "eyes" and imperfect parts; drop potatoes at once into cold water to prevent discoloration. Cook in freshly boiling, salted water until a fork will penetrate them easily. Drain, uncover, and shake gently over the heat until the outside is dry and mealy; sprinkle with salt and serve hot in an uncovered dish. If not used at once, cover with a napkin or towel, to absorb the steam.

New potatoes have thin skins, which can be scraped off. In the spring, old potatoes are improved by soaking 1 hour in cold water.

Steamed Potatoes

Put washed and pared potatoes into a steamer placed over a kettle of rapidly boiling water. Cover and keep water *boiling* until potatoes are soft—30 to 40 minutes.

Mashed Potatoes

6 medium-sized potatoes	$\frac{1}{4}$ ssp. pepper
1 t. salt	3 tb. butter

$\frac{1}{4}$ to $\frac{1}{3}$ c. hot milk

Boil the potatoes and drain; mash in the saucepan in which they were boiled. Season; add the hot milk gradually; beat until light and creamy, and pile on a hot dish.

Riced Potatoes

Press hot potatoes through a potato ricer, or coarse strainer, into a hot vegetable dish. Serve at once, or brown lightly in a hot oven.

Baked Potatoes

Wash and scrub potatoes of uniform size. Bake on the grate of a hot oven from 30 to 45 minutes, or until soft. Turn them every 15 minutes, to keep them from burning. Test by pressing them, with the hand wrapped in a towel. When soft, break open the skins, to let steam escape, and serve potatoes at once. If any are left over, remove skins and save potatoes for warming over.

Potatoes greased with lard or other fat before baking will cook in a shorter time.

Sweet Potatoes

Wash sweet potatoes, but do not pare, as without the skins they would lose some of the sugar to which they owe their sweetness. Cook in boiling water till soft; or steam over boiling water, as directed for white potatoes.

Baked Sweet Potatoes

Wash and bake as directed for white potatoes. Small ones will bake in 30 to 35 minutes; large ones will require an hour or more. If liked very moist and sweet, bake rather slowly for 1 hour, or until skin will separate from potatoes.

Warmed-Over Potatoes

Warmed-over potatoes, to be palatable, should be well seasoned; they should be heated as hot as possible without burning, and they should be served very hot.

The potatoes may be sliced thin, cut in eighths, cubes, or chopped, and used by themselves, or added to other vegetables, or to meat or fish, as hash.

Milk or fat in some form is generally used; a little onion or parsley will give additional flavor. Cheese is sometimes added. A few slices of crisp bacon or ham will give variety as well as additional nutriment.

Potatoes may be reheated by browning in hot fat, in milk, or in thin white sauce as creamed potatoes, or in gravy, or as scalloped potatoes.

Mashed potatoes may be reheated with a little milk; or made into small cakes and browned in hot fat or in the oven; or used in hash, croquettes, soup, or as crust for meat pies, etc.

Lyonnaise Potatoes

2 c. potato cubes	1½ tb. melted fat
½ t. salt	1 tb. chopped onion
⅛ t. pepper	1 tb. parsley, chopped fine

Cut potatoes into half-inch cubes. Sprinkle with the salt and pepper. Heat the fat, add the onion, and cook till deep yellow. Add the potatoes and stir lightly until they have absorbed the fat. Add the chopped parsley and turn into a hot dish. Serve very hot. A teaspoonful of vinegar is sometimes added.

Creamed Potatoes No. 1

Cut cold boiled potatoes into thin slices. Measure and allow for each cupful ¼ c. of milk, ½ tb. butter, ⅛ t. salt, and a few grains of pepper.

Heat the milk in a shallow pan; add the sliced potatoes and stir slowly until they have nearly absorbed the milk; add seasoning, stir until well mixed; cook 5 minutes longer and serve hot. One teaspoonful of fine-chopped parsley may be added.

Creamed Potatoes No. 2

Cut cold potatoes into cubes and heat in milk or in thin white sauce; allow $1\frac{1}{4}$ c. white sauce for 2 c. of potato cubes.

Creamed Potatoes No. 3

Cut cooked potatoes into cubes or dice; put into a saucepan, dredge with flour, and stir until cubes are well covered. Place saucepan over the fire, cover potatoes with milk, add salt and pepper and butter to taste. Stir all together until the milk bubbles and the mixture becomes smooth and creamy. Serve hot.

Potatoes with Cheese

Slice potatoes, season, put into a baking dish, and cover with milk. Sprinkle grated cheese over the top if liked. Cover and bake until the milk is nearly absorbed, then uncover and cook until cheese is melted.

Potato Cakes

Form cold mashed potatoes into balls and flatten them into cakes about half an inch thick. Arrange on a buttered baking pan, putting a small piece of butter on the top of each. Bake on the grate of a hot oven until slightly browned, or brown in hot fat in a frying pan.

VEGETABLE SOUPS

Fresh, canned, or dried vegetables may be used for soups. The foundation liquid for such soups may be water, milk, cream, or vegetable stock, either separately or together. When the liquid used is cream, or milk thickened to the consistency of cream (thin white sauce), it is called a cream of vegetable soup, the distinctive name being that of the vegetable used. A very thick cream soup is called a purée. Meat stock, or the water in which meat has been cooked, is sometimes added to vegetable soups, or a few drops of meat extract may be used to give additional flavor.

Tomatoes, celery, onions, carrots, squash, potatoes, beans, peas, either green or dried, and in fact nearly all vegetables, may be used for soups. They may be freshly cooked or "left-overs," but must be cooked until soft enough to be mashed or pressed through a strainer.

The liquid is generally thickened with flour or other starchy material, to keep the vegetable pulp from settling. Dried bread or cracker crumbs, rice water, etc., are also used for this purpose.

The proportion of liquid and the amount of thickening will vary according to the kind of vegetable, whether watery or starchy. Very watery vegetables, like onions, celery, etc., will need more, and potatoes, peas, or beans need less thickening to make soup of the right consistency.

Butter or other fat is generally added, either blended with the flour or added after the soup is cooked.

A general rule is to allow from one-fourth to one level tablespoonful of flour to each cup of liquid (including milk or water and the vegetable pulp) and one level tablespoonful or more of butter or other fat.

Mixed Vegetable Soup

1 onion, chopped	4 tb. beef or ham fat
1 c. potato, cut in dice	1 tb. flour
½ c. carrot, diced	4 c. boiling water
½ c. celery, sliced thin	Salt and pepper to taste

Put the fat in the stewpan and heat until smoking hot; add all the vegetables except the potatoes, and stir gently until vegetables are delicately browned. Add the flour and stir until well mixed, then add the water and the seasoning and cook slowly 1 hour. Parboil the potatoes 5 minutes and add to the soup 20 minutes before serving. Hot milk, also more flour, may be added if desired.

Rice and Tomato Soup

½ can tomatoes or	1 stalk celery, sliced
6 tomatoes, peeled and sliced	1 t. sugar
	1 t. salt
1 small onion, sliced	⅛ t. pepper
2 tb. butter	1 tb. butter
2 c. boiling water	1 tb. flour

½ c. cooked rice

Heat 2 tb. butter in a stewpan, add the sliced onion, and cook until yellow. Add tomatoes, stir until very hot; add the boiling water and the celery. Cook slowly 40 minutes, or until tomatoes are very soft. Press through strainer and reheat to boiling. Add the rice, sugar, salt, and pepper, and more seasoning if required. Cream together 1 tb. butter and 1 tb. flour, add to soup, stirring until butter is melted. Boil 1 minute. Serve hot.

Water from boiled rice may be used instead of clear water. The flavor may be varied by the use of a *small* piece of bay leaf, or one or two whole cloves, or chopped parsley. Celery leaves may be used instead of the stalk.

Potato Soup No. 1

1½ c. mashed potatoes	2 tb. flour
2 c. milk	½ t. salt
1 c. water	⅛ t. celery salt
½ small onion	Spk. white pepper
2 tb. butter	1 t. fine-chopped parsley

Freshly boiled or cold mashed potatoes may be used. Add onion to milk and scald; add the mashed potatoes to the milk. Melt the butter, add the flour, and a little of the potato mixture. Boil 1 minute, combine with remaining potato mixture, and add seasoning. Strain, reheat, and add parsley. Serve with croûtons or crisp crackers.

Potato Soup No. 2

2 c. mashed potatoes	1 c. milk
1 onion	1 tb. butter
1 stalk of celery	1 tb. flour
4 c. boiling water	Salt and pepper to taste

Cook the mashed potatoes, onion, and celery in the water half an hour, press through a strainer, and return to fire. Melt the butter, add the flour, then the milk to make a white sauce. Add to the soup, with the seasoning; reheat and serve.

CHAPTER X

Starches and Sugar

Starch occurs in more or less abundance in various parts of all plants, in minute particles known as "granules," but is stored chiefly in seeds, roots, and tubers.

Though *starchy substances* form a large part of the food of man, in most foods the starch is combined with other substances. Cornstarch is an example of a *nearly* pure starch.

The principal *starchy foods* are the *cereals,* including wheat, corn, oats, rye, barley, and rice. From these grains are produced the different kinds of flour and meal and the numerous varieties of "breakfast foods," whether raw or "ready to eat."

Buckwheat, although botanically widely separated from the cereals, is classed with them because its seeds are similar in composition and uses. The name was originally "beech-wheat," and was so called from the resemblance of its seeds in shape and color to the triangular seeds of the beech tree.

Macaroni, spaghetti, vermicelli, etc., are made of flour from a special variety of wheat, known as "durum wheat."

Tapioca is prepared by heating in a moist state the starch from the root of the *cassava* plant, which grows in some South American countries.

Sago is obtained from the interior of the trunks of East Indian palm trees.

Arrowroot, the purest form of starch, is obtained from plants native to the West Indies and tropical America. It is the most expensive starch, but is useful in thickening sauces and soups when great clearness is desired.

Among vegetables, *potatoes* take the lead, being nearly one-fifth starch. Dried peas, beans, and lentils contain a large proportion of starch, but being also rich in protein, they will not be considered among the exclusively starchy foods.

Experiments with Starch

1. Mix 1 t. starch with 1 t. cold water, add ¼ c. cold water; stir well; let stand 10 minutes or longer.

2. (*a*) Mix 1 t. starch with 1 t. cold water and stir constantly while adding ¼ c. boiling water.

(*b*) Mix 2 t. starch with 1 t. cold water and stir constantly while adding ¼ c. boiling water. Put into a wet cup to cool.

3. Add 1 t. starch to ¼ c. boiling water and stir.

4. Mix 1 t. starch with 2 t. granulated sugar; stir constantly while adding ¼ c. boiling water.

5. Mix 1 t. starch with ½ t. butter or other fat; add gradually ¼ c. boiling water and stir constantly.

6. (*a*) Heat 1 t. of dry starch carefully, stirring constantly until the starch is light brown; mix with ¼ c. cold water. Note consistency; compare with that of mixture made with unbrowned starch.

(*b*) Heat 1 t. of dry starch until it becomes charred and blackened.

Substitute flour for starch and repeat experiments, using same proportions; compare as to thickness, color, clearness, etc.

NOTE.—Flour contains starch, and is therefore often used for thickening soups, gravies, and sauces. As flour is not pure starch, nearly twice as much flour as cornstarch must be used for thickening. (See test for starch, p. 99.)

Inference from Experiments with Starch

1. Cold water separates the granules, but does not dissolve the starch.

2. (*a*) Starch absorbs boiling water, swells, softens, and partially dissolves, and thus thickens the water. If starch has been wet with cold water before boiling water is added, a smooth paste is formed.

(*b*) If the proportion of starch to liquid is increased sufficiently, the cooked starch when cold will form a "jelly" stiff enough to retain the shape of the dish in which it was cooled. Application—making of cornstarch mold, etc.

3. Dry starch mixed with *boiling water* forms lumps, soft and sticky outside and raw within.

4. Starch mixed with *sugar* before adding boiling water forms a smooth mixture. Application—making sweet sauces, etc.

5. Starch mixed with *fat* before adding boiling water also forms a smooth mixture. Application—thickening for vegetable and meat sauces, soups, etc.

6. (*a*) Starch heated without water until light brown becomes soluble in water; it also loses part of its thickening power, and therefore more of the browned starch or flour must be used for thickening a given quantity of liquid. Application—to brown sauce and gravies.

NOTE.—Dry starch heated to about 340 to 400° F. is changed into a pale yellowish-brown substance called *dextrin*. It has a slightly sweet taste and is soluble in water. A similar change takes place in bread when toasted and in the crust of bread when baked.

(*b*) Starch heated without water becomes "sticky," yellow, brown, and then black; it does not swell or soften.

Therefore, in order to cook starch properly, moisture, as well as heat, is necessary.

Raw starch is very difficult to digest, but as soon as the starch granules become swollen and softened they are readily attacked by the digestive juices; and therefore *the chief object in cooking starch is to change it from a form exceedingly difficult to digest to one easy to digest*—a change which is effected by means of sufficient *heat, moisture,* and *time.*

Although starch will *swell* and *soften* before boiling point is reached, a better flavor will be developed if it is boiled for at least 1 minute and then cooked for a longer period at a lower temperature, the time varying from 10 or 20 minutes to several hours, according to the kind of starchy food to be cooked.

Since there is less danger of burning if starch is cooked over boiling water instead of directly over the fire, a double boiler is useful for this purpose.

If not to be used immediately, starchy foods should be covered closely after cooking, to prevent a tough "skin" or film from forming. This "skin" is even more difficult to digest than raw starch.

Cornstarch Mold

3 to 4 tb. cornstarch
1 tb. cocoa
2 tb. sugar
¼ t. salt
2 c. milk

Scald 1¾ c. milk in a double boiler; reserve ¼ c. cold milk for wetting cornstarch. Mix dry ingredients, add cold milk, and stir until smooth. Stir scalded milk slowly into wet cornstarch, etc. Cook in top of double boiler directly over the heat, stirring constantly until it boils 1 minute; then cover, and cook 20 minutes or longer over boiling water. Pour into a cold, wet mold. Serve with milk or cream and sugar, or omit sugar and serve with sweet sauce. Thirty drops of vanilla or lemon extract may be used instead of the cocoa.

If extracts are used for flavoring, add when the cornstarch is taken from the fire; if boiled they will evaporate, and the flavor will be lost.

Shredded cocoanut or macaroon crumbs may be added to the cornstarch just before pouring into the mold.

Apple Tapioca, or Sago Pudding

$\frac{3}{4}$ c. tapioca or sago	$\frac{1}{2}$ t. salt
Cold water to cover	6 or 7 sour apples
3 c. boiling water	$\frac{1}{2}$ c. sugar

$\frac{1}{4}$ t. cinnamon or $\frac{1}{8}$ t. nutmeg

Cover tapioca or sago with cold water and soak 1 hour. Drain, and add boiling water and salt. Cook in a double boiler until tapioca or sago is clear. Core and pare the apples; put them into a buttered baking dish; fill cavities of apples with mixture of sugar and spice. Pour the tapioca over them and bake until apples are soft. Serve with cream or milk and sugar.

Pineapple, peaches, or rhubarb may be used instead of apples. The fruit may be sliced and cooked in double boiler with the tapioca or sago for 5 minutes before putting into baking dish, or uncooked strawberries may be used. Pearl, flake, or minute tapioca may be used; minute tapioca needs no soaking.

WHITE SAUCE, ETC.

White sauce is the basis of many sauces, gravies, and of some soups. The liquid may be milk, cream, milk and water, or vegetable or other stock. The thickening may be flour or cornstarch, combined with butter. The usual seasonings are salt and pepper.

The proportion of flour to each cup of liquid varies from 1 tb. to 2 or more tb., and the proportion of butter from 1 t. to 2 or more tb. to a cup, according to the use to be made of it. One-fourth teaspoonful of salt is the usual quantity for each cupful of sauce, a little more being necessary if the amount of butter used is small. Pepper is added according to taste. By substituting sugar and flavoring for salt and pepper, a simple pudding sauce may be made.

Methods of Combining Materials for White Sauce

First Method: Heat a portion of the milk; reserve enough cold milk to make with the flour a mixture thin enough to pour easily. Use at first equal proportions of flour and liquid, stir till smooth, and add more liquid if necessary. Pour flour mixture slowly into scalded milk, stirring constantly until thickened. Boil 1 minute, stirring constantly, and cook 10 minutes or longer in double boiler. Add butter, salt, and pepper; stir well and serve. If not to be used immediately, cover closely to prevent a film from forming. Omit pepper if sauce is used for toast.

Second Method: Melt the butter or other fat and add all the flour; place over heat and stir constantly until mixture becomes noticeably thinner. Remove from heat, add the hot milk, one-third at a time, each time stirring until perfectly smooth before adding more liquid. Return to heat and cook until mixture boils. Add seasoning and serve.

NOTE.—The intense heat of the hot fat cooks the flour very thoroughly before the liquid is added; therefore, in making sauce by this method, longer cooking is unnecessary.

Third Method: Warm the butter until soft, and mix the flour with it thoroughly in the top part of double boiler; add all the liquid and heat, stirring constantly, until mixture boils.

Or heat the milk and add the creamed butter and flour; stir constantly until mixture boils; then cook over boiling water 10 to 15 minutes or longer.

In the second and third methods the seasoning may be mixed with the butter and flour if preferred, instead of adding it at the last. The amount of butter used in these two latter methods must be at least one-half as much as the flour, if sauce is to be smooth.

The first method takes longer, but is preferable when the sauce is to be used for persons with weak digestion, since the cooking of butter may render it less digestible and will destroy the delicate flavor. In this connection, however, *Farmers' Bulletin No. 391* says: "It is difficult to see how heating the fat before adding the flour can be unwholesome, unless the cook is unskillful enough to heat the fat so high that it begins to scorch. Overheated fat . . . contains an acrid, irritating substance called 'acrolein,' which may be readily considered to be unwholesome."

The fundamental principle in using flour or cornstarch for thickening sauces is to separate the starch granules before cooking so that all the granules will absorb liquid and swell, thus making a smooth mixture.

The separation of starch granules, we have seen, may be accomplished in three ways: by mixing with (1) cold liquid; (2) with sugar; (3) with fat.

General Rules for Thickening 1 c. of Liquid with Flour

For soups, use $\frac{1}{4}$ to 1 tb. of flour to each cup of liquid.

For thin white sauce, use 1 tb. of flour to each cup of liquid.

For medium white sauce, use 2 tb. of flour to each cup of liquid.

For thick white sauce, use 3 tb. of flour to each cup of liquid.

For a very thick white sauce, use 4 or 5 tb. of flour to each cup of liquid.

A little more than twice as much of browned as of raw flour will be required for gravies, etc., owing to the loss of thickening power. (See experiments with starch.)

Toast

Cut stale bread into slices one-third of an inch thick, and remove crusts if desired. Place slices of bread in a wire toaster and fasten. Dry them slowly, first on one side and then on the other, by holding toaster several inches above a clear fire; then, holding toaster nearer, move it slowly from side to side to avoid scorching, till toast is golden brown on both sides. Serve dry, or butter and lay buttered sides together and serve immediately. If toast is not served at once, pile slices loosely on a plate and put into the oven to keep hot and dry, for if piled closely, toast steams and loses its crispness. If toasted under the oven burners of a gas stove, turn the slices often until evenly browned. Bread may be browned in the oven if preferred.

When toast is to be used as a garnish, or for serving with soup, the bread should be cut into shape before toasting. For toast "points," cut squares of bread diagonally into two or four triangles; for serving with soups, cut the bread into "fingers," or strips one-third inch wide and three or four inches long, or make croûtons.

Croûtons

Cut bread a day or more old into $\frac{1}{2}$ inch cubes. Put in a pan and bake in a moderate oven until light brown. The bread may be buttered before cutting, or butter may be put into the pan with croûtons, which should be stirred frequently to become evenly browned. Sprinkle a very little salt over the croûtons while hot.

Crisped Crackers

Put crackers into a shallow pan and bake in a moderate oven until deep yellow. The crackers may be buttered very slightly before baking. Crisped crackers are often served with cream soups.

NOTE.—In summarizing the results of investigations concerning the comparative digestibility of bread and toast at the California and Minnesota Experiment Stations, *Farmers' Bulletin 193* (*Experiment Station Work*, XXV) states that "In thoroughly toasted bread the change of starch into soluble compounds and the sterilization are factors which may be sufficient to account for the increased digestibility noted in the experiments and also for the commonly observed fact that such toast is more readily digested by invalids than bread, but according to Professor Hilgard [California Experiment Station Report, 1902–03] the case is otherwise with the toast made by the ordinary household method. Such toast, he states in effect, is only browned delicately on both sides, the toasting changing the bread only to a very slight depth, so that the toasted layer on the two sides together will hardly exceed a millimeter (about 0.04 inch) in thickness.

"When toasting is carried to the delicate yellow stage the increase in soluble matter will be insignificant, and the soft interior of the slice will be no more sterilized than it was in the baking of the bread. Thus neither increased solubility of the carbohydrates nor sterilization can explain the fact that such toast is nevertheless apparently easier of digestion by invalids than the bread from which it was made.

"In view of these results, Professor Hilgard believes that it is improbable that the beneficial effect of toasting bread is in the main due either to an increase of soluble ingredients or to sterilization. The experiments offer little more than a probable indication of the really effective conditions, but they point to the conclusion that not solubility, but the flavor produced by the toasting, is the true cause of the readier digestion of ordinary toast as compared with bread, probably owing to the fact that it stimulates the flow of digestive juices."

Hot Water Toast

Use $\frac{1}{2}$ t. salt to each cup of boiling water. Dip each slice of toast quickly into the boiling, salted water, put on a hot dish and spread with butter; pile slices one upon another and serve immediately. "Left-over" toast may be reheated in this way. Common crackers, toasted or not, may be substituted for bread.

Hot Milk Toast

To each cup of hot milk add $\frac{1}{4}$ t. salt, and proceed as directed for hot water toast. After dipping the toast, pour the remaining milk over the slices.

If desired, 1 t. of butter may be melted in the milk, or the toast may be buttered before wetting it.

Cream Toast

Substitute cream for milk and omit butter, or use thin white sauce.

White or Cream Sauce for Toast

1 c. milk	1 t. butter
2 tb. flour or 1 tb. cornstarch	$\frac{1}{4}$ t. salt

Make according to *First Method,* page 115. This quantity of sauce is sufficient for from four to six slices of toast. Pour sauce between and over slices. Toasted bread may or may not be dipped in salted water before adding sauce.

Toast Water

Cut or break slices of stale bread into small pieces of nearly equal size, put them into a pan, and dry in the oven until crisp and brown. The crusts cut from bread before toasting may also be used. Pour boiling water over an equal measure of the toast. Cover and let stand 1 hour. Strain through cheese-cloth or a fine strainer, pressing out as much of the water as possible. Serve the toast water slightly salted, either hot or cold.

NOTE.—Toast water can often be taken when the stomach will retain nothing else, and as the intense heat necessary for browning the bread all through changes the starch present into compounds soluble in water (dextrin, etc.), a certain amount of nutriment may thus be given, which will vary according to its concentration.

CEREAL FOODS

The results of investigations carried on in a number of experiment stations and extending over several years, concerning the digestibility, nutritive value, and comparative cost of cereal breakfast foods, are summarized in *Farmers' Bulletin 249*, of which the following is largely a compilation.

The *cereals,* or edible grains, extensively cultivated in all parts of the world except the Arctic regions, belong to the family of grasses. They contain in unusually good proportions the necessary food ingredients, are easily prepared, and are palatable and wholesome. Because of their dryness they are compact and are easily kept from spoiling.

Composition: The cereals are about two-thirds *carbohydrates*, chiefly in the form of starch, one-tenth *protein,* one-tenth *water;* they contain a little *fat* and *mineral matter*, and more or less *cellulose,* or "crude fiber."

The majority of cereal breakfast foods are made from wheat, oats, corn, and rice, although some are prepared from barley. The grains may be whole, coarsely ground into grits, or more or less finely ground, as flour and meal, but all need thorough cooking. The grains may be simply husked and more or less crushed; or partly cooked, as in the case of rolled oats and wheat; or cooked and "ready-to-eat"; while others are still further treated, as the malted and predigested foods.

In view of the high food value of cereal products and their palatability and wholesomeness, the extravagant claims often made by manufacturers as to the value of special breakfast cereals are unnecessary, and have little, if any, basis in fact.

"The so-called partially digested or ready-to-eat cereals seem to supply no more digestible material than the plain grains when well cooked," says *Bulletin No. 249*. Certainly "the claims made for some brands that the carbohydrates are completely or largely predigested are quite unwarranted. Furthermore, it must be remembered that if the cereal foods are thoroughly cooked at home before serving, the proportion of soluble . . . carbohydrates formed will be fairly high, certainly as high or higher than in the predigested foods designed to be eaten raw."

The claims made for quick cooking, also, are generally not true, and almost all such preparations should be cooked for at least half an hour, and usually longer, to insure complete digestibility of the starch, while the flavor is greatly improved by cooking one or more hours.

The converting of "the nutrients into more digestible forms is especially important in vegetable foods, which, like the cereals, contain a large proportion of crude fiber. As has been stated, the nutrients of the grain are found inside the starch-bearing and other cells, and the walls of these cells are made of crude fiber, on which the digestive juices have little effect. Unless the cell walls are broken down, the nutrients cannot come under the influence of the digestive juices until the digestive organs have expended material and energy in trying to get at them. Crushing the grain in mills and making it finer by thorough mastication breaks many cell walls, and the action of the saliva and other digestive juices also disintegrates them more or less, but the heat of cooking accomplishes the object much more thoroughly. The invisible moisture in the cells expands under the action of heat, and the cell walls burst; and the water added in cooking also plays an important part in softening and rupturing them. Then, too, the cellulose itself may be changed by heat to more soluble forms. Heat also makes the starch in the cells at least partially soluble, especially when water is present. The solubility of the protein is probably as a rule somewhat lessened by cooking, especially at higher temperatures. Long, slow cooking is therefore better, as it breaks down the crude fiber and changes the starch to soluble forms without materially decreasing the solubility of the protein."

There is more variation in price than in composition, and the goods sold in bulk are as nutritious as the same article sold in packages at a higher price. The retail prices of breakfast cereals vary from three cents a pound for some of the plain meals sold in bulk to fifteen cents or more for some of the "ready-to-eat" brands, while the proportion of nutrients supplied, pound for pound, does not differ greatly. The higher price is paid mainly for convenience, novelty, and, perhaps, for special flavor.

The cost of labor and fuel in preparing should be taken into account in determining the real economy of a food. If a fire is kept in the range all day for other purposes, no extra fuel and very little labor is needed to cook the cheap raw cereals. If, however, a gas stove is used, and time and labor are limited, it may be better economy to use the partially cooked or ready-to-eat brands. The goods in packages, too, take less room for storage, and under some conditions may be fresher and cleaner.

A "fireless cooker" is ideal for cooking cereals. The cereal should be prepared as usual, then boiled 5 to 10 minutes over the heat, covered closely, and placed in the cooker for 3 or 4 hours.

"All things considered, the cereal breakfast foods as a class are nutritious, convenient, and reasonably economical foods," and when judiciously combined with other foods are worthy of an important place in the diet. They are believed to be particularly desirable foods for children.

Method of Cooking Cereals and Gruels: Put the required quantity of boiling water and salt in the upper part of double boiler; place directly upon stove, and when the water boils rapidly, stir the cereal slowly into it. If cereal is coarse, stir it in dry; if fine, wet it with an equal quantity of cold water before adding it to the boiling water. Whole grains may be soaked in cold water before cooking.

Cook directly over the heat 5 to 10 minutes, stirring constantly. Then place upper part of double boiler over the lower part, which should be one-third full of boiling water; keep the water boiling. Do not stir the cereal after it is placed over the boiling water, or the granules will break up and cause the mixture to be "pasty."

The *time* for cooking depends upon the cereal used, and will vary with the amount and character of the fiber, the size of the pieces, and the degree of cooking to which the cereals have been subjected in the course of manufacture.

Granulated wheat preparations, as wheat germ, wheatlet, etc., need nearly four times their bulk of water. To prevent lumping, sprinkle slowly into boiling water, stirring constantly. Boil 5 to 10 minutes over stove or gas, and cook over boiling water 30 minutes to 1 hour or longer.

Shredded wheat biscuits may be used as a breakfast cereal by dipping quickly into salted water and heating in the oven between buttered plates. Serve with milk or cream and sugar, or with butter only.

All cereals may be used for porridge; with the addition of more water they may be made into gruel. Cold cereals may be sliced, dipped into flour, and browned in a small quantity of smoking hot fat, or may be added to muffin mixtures, or to stews, etc. They may also be molded and served with cream and sugar, with or without the addition of sliced bananas or other fruits.

Rolled Oats or Rolled Wheat

1 c. rolled oats or wheat 2 c. boiling water
1 t. salt

Pick over the oats or wheat and remove foreign substances; follow directions for cooking cereals. Boil 5 minutes, stirring constantly; then cook over boiling water 20 to 30 minutes, or longer. Serve with cream or milk and sugar. Steamed or baked apples and rolled oats make an agreeable combination. Dates, washed, stoned, and quartered, make a palatable addition to either oat or wheat cereals; or seeded raisins may be added before serving.

The rolled oats, being crushed and partially cooked, need less cooking than coarse oatmeal.

Coarse Oatmeal

1 c. oatmeal 5 c. boiling water
$\frac{1}{2}$ t. salt

Pick over the meal, follow directions for rolled oats, then cook from 8 to 12 hours. It may be cooked the day before it is needed and reheated, adding more water if necessary.

Oatmeal Gruel No. 1

$\frac{1}{4}$ c. rolled oats	$\frac{1}{4}$ t. salt
1 c. boiling water	1 c. milk

Prepare as for cereal. Cook in a saucepan 30 minutes, stirring all the time, or in a double boiler 1 to 2 hours. Strain the gruel, add the milk, and heat just to the boiling point. Serve hot, with 1 t. sugar and a sprinkling of nutmeg, if desired.

Cold oatmeal porridge may be used to make gruel by adding more water and reheating. It may be served strained or unstrained.

Oatmeal Gruel No. 2

$\frac{1}{2}$ c. coarse oatmeal	$\frac{1}{2}$ t. salt
$1\frac{1}{2}$ to 2 c. cold water	Milk

Roll or pound the meal until floury, add one-third of the water; stir well and let settle a few seconds. Pour the milky-looking water into a saucepan, add a second portion of cold water to the oatmeal, stir, and let settle; then pour off the milky water as before. Add the remaining water, stir, and pour off as before, being careful each time not to allow any of the coarse portion to go into saucepan. Boil 10 minutes, stirring to prevent burning, then cook 1 hour in a double boiler. Add milk to make of desired consistency, and proceed as in Gruel No. 1.

CORN MEAL

Corn meal was formerly made by grinding corn between millstones turned by water power, and it is still in some regions termed "water-ground corn meal." The entire kernel was ground at once, and the skin was afterwards partially removed by sifting, etc. In the newer process the corn is first kiln-dried, after which the outer skin is removed in one piece. The germ is also easily separated; and after skin and germ are removed, the corn is ground, bolted, or sifted, and purified by air currents. By the removal of all the skin before grinding, the percentage of crude fiber is much reduced; by the removal of the germ, the proportion of protein and fat is lessened.

The new-process meal consequently has a slightly lower nutritive value, pound for pound, than the old process. Its keeping qualities are increased, however, because the heating and drying of the grain lessens or destroys the molds and decay-producing bacteria; while the removal of the germ is also an advantage, because it contains corn oil, which is likely to become rancid.

It is sometimes asserted that the new-process meal does not possess so good a flavor as the old-fashioned corn meal. In this connection *Farmers' Bulletin 559* says: "Those who have studied the subject carefully believe that any inferiority in dishes made from the new meal as compared with the old is due, in part at least, to the fact that cooks have not adjusted their methods to the changed character of the material."

The following suggestions also are made concerning the cooking of corn meal: "In general, 10 per cent more water is needed for the new-process meal than for the old process, and where the large amount of water used renders the meal liable to sink (in breads, for example), the mixture of meal and water should be thoroughly heated before being used.

"In experiments made in this office it was found that, when convenience as well as the final result is taken into consideration, it is best for almost every purpose to put the meal and cold water together, and then heat them over boiling water in a double boiler. Except when very finely ground meals are used, it is unnecessary to stir the mixture at any time, not even when the meal and water are put together. The conclusion has been reached, in fact, that in all cases—even those in which the liquid used is not water, but either sweet or sour milk—the best results are obtained by heating the meal and liquid together without stirring. This applies to the making of corn-meal mush and also to more complicated dishes, such as breads."

Indian Pudding

5 c. milk
½ c. Indian meal
½ c. molasses
1 t. salt
1 t. ginger

Cook meal and milk in a double boiler 20 minutes; add molasses, salt, and ginger. Pour into buttered pudding dish and bake 2 hours in a slow oven. Serve with cream.

Molded Corn Meal

1 c. corn meal
1 tb. flour
1 t. salt
1 c. cold milk or water
2 c. boiling water

Mix dry ingredients, add cold liquid, and stir until smooth; then add boiling water. Cook directly over stove or gas 5 minutes, stirring all the time to prevent burning. Cook 1 to 2 hours over boiling water. If wanted for frying, turn into a wet pan or dish to stiffen; cover, to prevent crust from forming. When cold, cut in slices ¼ inch thick; dip each slice in flour, and brown in enough smoking fat to keep from burning. Serve hot, with sirup or molasses or caramel sauce. Other cereals, when cold, may be browned in the same way.

If to be used as a breakfast cereal, the flour may be omitted and 1 c. more water added.

Molded corn meal will brown more quickly when fried if a portion of the liquid used is milk.

Caramel Sauce

½ c. sugar	½ c. boiling water

Put sugar into a small frying pan or a saucepan; stir constantly over the fire until melted to a light brown sirup. Add water and boil 10 minutes. Cool before serving. Fifteen drops of vanilla may be used to flavor sirup.

MACARONI

Macaroni, spaghetti, vermicelli, and the various forms of Italian pastes are made from a wheat flour rich in gluten. The flour is made into a stiff paste with hot water, kneaded for a short time, and then pressed by machinery through holes in the bottom of a metal cylinder, forming tubes, ribbons, etc., which are then dried; or the mixture may be rolled and cut into various shapes, and then dried. These pastes absorb about three times their weight of water in cooking. Boiling, salted water is used, the macaroni, etc., being cooked until soft enough to be easily divided when pressed against the side of the saucepan with the side of a fork.

Tests for good macaroni: (1) a creamy color; (2) breaking with a flinty fracture, and not splitting; (3) not losing its tubular shape nor growing pasty when cooked; (4) swelling to nearly three times its bulk when boiled; (5) when cooked it will be tender and have a slightly sweetish taste as well as the characteristic nutty flavor.

NOTE.—Durum or macaroni wheats were introduced into this country from Russia. They have large and very hard grains which contain a larger proportion of nitrogenous material than common wheats.

Durum wheat is used chiefly in the manufacture of a coarse, granular flour called semolina, from which macaroni and other edible pastes are made. Durum flour is used also in breadmaking, either alone or with other flours; and notwithstanding the fact that the hardness of the grains increases the cost of grinding, its use for the purpose of blending with other flours is increasing.—*Farmers' Bulletin 534.*

Boiled Macaroni

1 c. macaroni, broken into inch pieces	2 qts. boiling water
	1 tb. salt

Cook macaroni in the boiling, salted water 20 to 30 minutes, or until soft. Turn it into a strainer; pour over it a cup of cold water, to prevent pieces from clinging together. Reheat and serve hot, with butter, pepper, and salt, or in white sauce. Spaghetti or vermicelli may be used instead of macaroni. Vermicelli need not be broken and will cook in 10 to 15 minutes.

Boiled Macaroni with Tomato Sauce and Cheese

Drain the cooked macaroni, return it to the saucepan, and place it where it will keep hot.

Tomato Sauce for Macaroni

¼ onion	4 tb. salad oil or butter
½ stalk celery	½ can tomatoes or
2 or 3 sprigs of parsley	4 or 5 tomatoes sliced
Very small piece of bay leaf	½ t. salt; pepper

Chop fine the onion, celery, and parsley; put them with the bay leaf, if used, into a saucepan with the oil, and cook, stirring constantly, until the onion is yellow. Add the tomatoes and seasoning, and cook slowly until tomatoes are soft and the sauce thick. Add more seasoning if necessary, and strain over the macaroni in the saucepan, which should be placed over the heat. With a fork and spoon mix the sauce and tomato thoroughly, and add 2 or 3 tb. of grated Parmesan or other cheese. Serve immediately. The cheese may be omitted.

Baked Macaroni

Put boiled macaroni into a buttered baking dish, pour over it 1 c. thin white sauce, cover with buttered crumbs, and bake in a hot oven till top is brown.

To butter crumbs: Allow 1 to 4 tb. butter for each cup of crumbs. Melt the butter and add the crumbs, stirring until butter is absorbed. Part of the seasoning may be mixed with the crumbs.

Baked Macaroni with Tomato

Substitute stewed and strained tomato for milk and make as white sauce, using flour, salt, pepper, and butter in same proportions. A tablespoonful of fine chopped onion may be cooked in the butter, if desired, before flour is added.

Note.—Pour tomatoes or other canned goods into an earthen dish as soon as opened. Let stand an hour, if possible, before using, to become aërated.

Baked Macaroni with Cheese

Put boiled macaroni into a baking dish in layers; sprinkle each layer with grated cheese. Pour thin white sauce over, cover with buttered crumbs, and bake until crumbs are brown.

Baked Macaroni with Bacon

Arrange cooked macaroni in layers, using white sauce or brown gravy to moisten. Add a few slices of fried bacon or ham, broken into small pieces. Ham or bacon fat may be used instead of butter in making the sauce.

RICE

Of all the cereals, *rice* is the richest in *starch* (having about 76 per cent) and the poorest in *protein* and *fat*. Since rice is easily digested—it contains but little cellulose and its starch granules are very small—it is often used in invalid cookery. When boiled, rice absorbs nearly five times its weight of water and loses some of its already small amount of mineral matter. It is preferable, therefore, to cook it by steaming, though more time is required. The water in which rice has been boiled may, however, be utilized in mixing bread, or may be combined with vegetables and as a basis for soups. The older and drier the rice, the longer it takes to soften.

When properly cooked, the kernels should be whole and distinct, yet perfectly soft. If rice is a wet, sticky, pasty mass, it has been cooked too long; or in the case of steamed rice, too much water has been added. Boiled rice will also be sticky if too little water is used, or if it boils away so that what remains becomes thickened with starch and will not drain away completely. If boiled rice is put into a strainer to drain and a very little cold water poured over it, the kernels will be separate and distinct. It should then be dried a little by placing the dish containing it in a warm oven for a few minutes with the door open.

During its preparation for marketing, many rice kernels become broken. The broken grains are separated from the whole kernels and sold at a cheaper rate. They are just as nutritious as the whole grains, but do not make so good an appearance when cooked.

Custom demands rice having a very highly polished surface, which is obtained by the sacrifice of some of the most nutritious portions of the grain during the polishing process, including nearly all the fat, to which much of the natural flavor of the rice is believed to be due.

It is estimated that the portion of the grain which is removed by polishing (rice "polish," or flour) is nearly twice as valuable for food as the polished rice.

In preparing rice for their own use, the farmers of the South follow the oriental custom of removing the hulls and bran with a pounder, instead of by more modern methods. The grain is not polished, and the rice, therefore, is of much higher food value and of better flavor.

Natural brown, unpolished rice can be purchased at the present time.

Rice is sometimes coated with talc or other substances, to improve its appearance or to keep it from injury by insects. Rice should therefore be very thoroughly washed before cooking.

To wash rice: Put rice in a strainer; place strainer in a pan of water and rub the rice between the hands. Change water two or three times, or until rice is clean, when the water will be clear.

Steamed Rice No. 1

1 c. rice 3 c. boiling water
1 t. salt

Pick over the rice. Wash thoroughly. Put boiling water and salt in top of double boiler; place this over stove or gas until water boils, and add rice slowly. *Boil* 5 minutes, then place top part of double boiler over the lower part. Cook without stirring from 30 to 45 minutes, or till soft. To test rice, taste a kernel or crush it between the thumb and finger. The rice is done when no hard particle can be detected in the center. Stir lightly from the bottom with a fork, to avoid crushing the kernels; let it dry slightly, uncovered, on back of range. Serve plain, as a vegetable, or mold it by pressing lightly into cups, and turn out on dish in which it is to be served. Serve with cream or milk or a pudding sauce, as sweet white sauce or an egg sauce.

Steamed Rice No. 2

1 c. rice	2 c. boiling water
1 t. salt	

Put the washed rice into a buttered tin or earthenware pudding dish, with the salt and boiling water. Have ready a squash strainer or a steamer, placed over a kettle containing boiling water. Do not allow the water to reach the steamer. Put the dish with the rice and salted water into the steamer. Cover; keep the water boiling until the rice is soft.

A piece of thin cloth may be used to cover the steamer before putting on the tin cover, to absorb the moisture from the under part of cover and prevent it from dropping on the rice.

Egg Sauce

$\frac{1}{4}$ c. hot milk	1 c. powdered sugar
2 eggs, whites and yolks separated	30 drops vanilla

Heat the milk; beat egg yolks until creamy; add half the sugar, beat well, and add the hot milk gradually. Beat the whites very stiff, add remaining sugar gradually; combine with yolk mixture. Add vanilla last.

Boiled Rice No. 1

1 c. rice — 3 qt. boiling water — 1 tb. salt

Pick over and wash the rice. Have the water boiling rapidly; add salt. Sprinkle the rice in slowly, so that water will not stop boiling. It should boil so rapidly that the kernels are kept in motion all the time; if the kernels should settle to the bottom of kettle, stir gently with a fork, to prevent burning. Cook the rice 15 or 20 minutes, or until soft. Pour into a strainer to drain; reserve the water for thickening soup, etc. Pour over the rice half a cup of cold water; then put rice into a dish and place where it will keep warm for 5 minutes, or until kernels are somewhat dry. Serve hot.

Boiled Rice No. 2[1]

1 c. rice — 2 tb. salt — 5 qt. boiling water

Look the rice over carefully and place it in a strainer set in a bowl of cold water. Wash it with the hands, changing the water as often as is necessary until all cloudiness disappears. Soak for 1 hour. Have the water boiling vigorously, add salt, drain the rice, and sprinkle it in so slowly that the water does not stop boiling. Boil violently 15 minutes, but be careful not to overcook. When no hard core can be felt on pinching the kernel between the thumb and finger, it is done. Pour into a colander, *saving the rice water for soup*. Set a colander over a pot containing a little boiling water or in a cool oven, and let it steam until ready to serve. Each grain should be large and perfectly distinct.

[1] *Cornell Bulletin:* "Rice and Rice Cookery."

Serve as a vegetable by itself in an uncovered dish, or as a border for creamed meats, fish, and eggs, fricasseed chicken, veal cutlets, and the like. Hot boiled rice is delicious with tomato sauce, brown gravy, or cheese sauce.

In order to prepare cold rice for croquettes and salads, spread well-steamed rice lightly on a large plate or platter.

Rice Water

2 tb. rice	4 c. boiling water

Pick over and wash rice, add water, and let it soak 30 minutes. Heat gradually to boiling point, then cook until rice is very soft and partially dissolved. Press through a fine wire strainer; add salt or sugar to taste. Serve hot or cold and add milk if desired.

Cream Rice Pudding

½ c. rice	¼ t. salt
4 c. milk	½ c. sugar

Soak the washed rice in the cold milk 30 minutes; put it into a pudding dish and bake, covered, in a moderate oven, 2 hours, or until rice is soft and partially dissolved in the milk. Stir occasionally, and add salt and sugar when rice is nearly soft. Remove cover the last half hour and brown slightly. Serve hot or cold. The pudding may be cooked on top of the stove until it is to be browned.

SUGAR

Sugar is a useful and valuable food. Like starch, sugar is a carbohydrate, and can therefore yield *heat* and *energy* to the body. Aside from its sweet taste, sugar differs from starch in being soluble in either cold or hot water. It is more soluble in hot water than in cold.

Within certain limits, sugar may be considered as the equivalent of starch that has been digested and made ready for the body to use. All starchy food must be changed by the digestive juices into a certain form of sugar before it can be absorbed as food. When any starchy food is taken into the mouth, the starch is at once acted upon more or less by a ferment contained in the saliva, and this action is continued by another ferment in the intestines. The starch is changed into simpler substances and finally into *glucose*, the only form of sugar which can be "burned" in the body to yield muscular energy and heat.

Miss Rose says in effect (*Human Nutrition, Part I, Cornell Bulletin No. 6*) that since all the starch eaten is eventually turned to sugar before it reaches the blood and it is carried to the cells, it may be asked, Why may not sugar take the place of starch in the dietary? In the first place, starch is digested slowly and is changed to sugar by the digestive juices only a little at a time. This little is very much diluted, and can be made use of as soon as absorbed. Sugar, on the contrary, is ready or nearly ready to pass into the blood stream, and it may pass in too quickly and in too large quantities to be properly cared for, and may thus cause disturbances inside the body as well as in the digestive tract.

The rapid assimilation of sugar makes it useful in preventing or overcoming fatigue during periods of great muscular activity or exhausting labor, but for persons of ordinary digestive powers, when there is sufficient time for the digestion and utilization of starch, sugar has no advantage over starch, writes Mary H. Abel in *Farmers' Bulletin* 535. She says also that sugar, being a concentrated food, should be eaten in moderate quantities, and like other concentrated foods seems best fitted for the use of the body when taken in connection with other foods which dilute it or give it the necessary bulk. Candy, therefore, should not be eaten to excess, nor habitually between meals.

A lump of sugar contains about as much nutriment as an ounce of potato, but while the potato will be eaten only because hunger prompts.

the sugar, because of its taste, may be taken when the appetite has been fully satisfied.—*Sugar and Its Value as Food. Farmers' Bulletin, 535.*

Sugar differs greatly from starch in the amount that can be used properly in the body, for while large quantities of starchy foods like bread, potatoes, etc., can be digested without difficulty, four or five ounces of sugar a day seems to be as much as the average adult can eat under ordinary circumstances without ill effects. A person doing hard work or exercising in the open air, however, especially in cold weather, can digest without difficulty a much larger quantity than one living indoors and taking little exercise.

In continuation, Mrs. Abel says, in effect, that when the diet of *children* is in question, the fact that sugar has a high food value is not the only point to be considered. Because of the great activity of the child, the desire for sweets is a natural one; sugar supplies energy most readily. In the case of children under a year old, who have little or no power to digest starch, the needed carbohydrate is supplied by the sugar in the milk, which is its natural food. The older child will easily obtain carbohydrates in other forms, as in well-cooked cereals, in simple puddings, etc., and in sweet fruits fully ripened. Many of the best authorities state that the child, up to its third year, should never be allowed to taste sweets, in order that its appetite may not be spoiled for simple, wholesome foods; and in particular that from the very first no sugar should be added to the dish of cereal or of bread and milk, which should form the staple food of the child.

One of the main objections to the abnormal amounts of candy consumed by children is that the highly flavored sweet substance satisfies the appetite, which should be satisfied by a more varied diet. It is said that a frequent cause of decayed teeth among children is due not to the direct effect of the candy on the teeth, but to the fact that in the over-supply of candy there has been an under-supply of the bone-building materials such as lime and phosphorus.—*Cornell Bulletin No. 6.*

Candy: In cooking sugar for candy, use an agate or iron pan, as it is less liable to burn than in tin. Butter pans before beginning to cook candy.

Have ready some cold water in which to try the candy.

When candy is poured into the pan, do not scrape the saucepan over it, nor allow any of the "scrapings" to fall into it. Stirring candy while boiling or while cooling will cause it to become sugary. Acid substances, such as cream of tartar, vinegar, or lemon juice, added to the candy while cooking will help to keep it "clear" by preventing crystallization.

Barley Candy

1 c. granulated sugar	$\frac{1}{8}$ t. cream of tartar or
$\frac{1}{4}$ c. water	1 t. lemon juice or vinegar

Mix ingredients together before heating. Cook, *without stirring*, until a few drops put into cold water will harden. Boil until the sirup turns light yellow; remove at once from fire and turn into a buttered pan. When nearly cool, mark into squares with a slightly warm and buttered chopping knife. The candy may be cooled in round muffin tins.

Glacé Nuts

Cook sugar, water, and cream of tartar together, as for Barley Candy. As soon as the sirup begins to change color, remove saucepan from the fire. Dip one or two nuts at a time into the sirup, lift out with a buttered fork, and place on a buttered pan. The sirup should be disturbed as little as possible. When it gets too cool, it may be reheated once or twice, but is liable to burn after the second time. If in danger of burning, the sirup may be used for fruit or nut bar.

Fruit or Nut Bar

Have ready in a buttered, shallow pan a layer, about an inch deep, of nut meats or candied fruit cut into pieces, or a mixture of both. Pour over them the hot sirup. When partly cooled, mark into bars and squares.

Dried or shredded cocoanut, seeded raisins, or puffed rice may also be used; or figs, dates, citron, etc., cut into suitable pieces.

Peanut Candy

2 c. granulated sugar
¾ c. chopped peanuts
⅛ t. salt

Remove the skin from shelled peanuts; chop or roll the nuts fine, add the salt, and keep them warm in a dish placed on the back of the stove. Have ready a tin sheet or an inverted baking pan, slightly warmed, to keep candy from hardening too quickly. Melt the sugar in an agate or iron saucepan, and stir constantly to prevent burning. When melted to a clear, light sirup, stir in the chopped peanuts and turn candy at once onto the pan, which need not be buttered. Shape candy as nearly square as possible and mark into squares before it cools.

Horehound Candy

½ sq. in. pressed horehound leaves
½ c. boiling water
1½ c. sugar
⅛ t. cream of tartar

Pour the boiling water on the horehound; let it stand 1 minute, then strain through fine cloth. Put the strained liquid into saucepan with the sugar and cream of tartar, and boil until it begins to change color and hardens when tried in cold water. Do not stir while boiling. Pour into buttered pans and mark into squares while warm. Break apart when cold. Keep closely covered in tin or glass.

Butter Taffy

2 c. brown sugar
$\frac{1}{4}$ c. butter
Juice of $\frac{1}{2}$ lemon or
1 tb. vinegar
2 tb. water

Cook all the ingredients together until mixture will "snap" when tested in cold water. Pour into a buttered pan and mark into squares while warm. One-half cup chopped nuts may be added.

Sirup for Cornballs

2 c. molasses
$\frac{1}{2}$ c. sugar
2 tb. butter

Cook together until the mixture is brittle when tested in cold water. Pour over popcorn and shape into balls. To use for candy, add $\frac{1}{8}$ t. of cooking soda before pouring into the pans. When slightly cool, pull until light-colored, and cut into pieces.

Cocoanut Drops

$\frac{1}{2}$ c. sugar
$\frac{1}{2}$ c. molasses
1 c. grated cocoanut

Cook sugar and molasses together, stirring constantly until a little of the mixture will harden in cold water. Remove from fire, add cocoanut, and stir until candy thickens. Drop by the spoonful onto a buttered pan and cool.

CHAPTER XI

Flour, Yeasts, and Bread

Bread in one form or another is probably more generally eaten than any other kind of food, except, perhaps, milk. Bread has been known since the earliest times of which we have any historical record, and though bread made at different periods and by different races varied greatly in character, "ever since the far-off days when the wild cereals were first found or cultivated, men have known that food prepared from them would support life and strength better than any other single food except milk."

Because of its extensive use and the important part played by bread as the "staff of life," something should be known about the materials from which bread is made, the changes which occur during its making and baking, its nutritive value and digestibility, and the best methods of preparing it.

Bread is divided broadly into *two* general classes, *leavened* bread and *unleavened* bread. Leavened bread is that which is "raised," or made light and porous by the addition of yeast or other "leavening agent," as any substance used for this purpose in mixtures of flour or meal is termed.

The simplest forms of bread are the unleavened varieties, examples of which are *hoe-cake,* old-fashioned *johnnie cake,* the unleavened *Passover bread* of the Hebrews, and certain varieties of *crackers* or *biscuit.* These are made from meal or flour, mixed with water and baked. Such breads are hard and dry, and are usually baked in very thin cakes, as otherwise they would be unpalatable and difficult to masticate. Baked in this form, however, they will keep indefinitely. It is said that originally johnnie cakes were called "journey cakes," because they could be conveniently carried when traveling.

Wheat or *flour* from any of the cereals may be used for unleavened bread; leavened bread can be made only from those cereals which, like wheat and rye, contain the protein substance *gluten*.

Though wheat varies as to kind, the climate, and other conditions, the average composition of wheat flour is as follows:

	Per cent
Protein (gluten, etc.)	11.4
Carbohydrates (chiefly starch, with a little sugar, etc.)	75.1
Fat	1.
Mineral matter	0.5
Water	12.
	100.0

The qualities and properties of wheat depend more upon the conditions of the soil, the temperature, the rainfall, etc., of the place where it is grown than upon the species to which it belongs, and variations in these factors result in the production of two general classes: (1) soft and starchy wheats and (2) hard and glutinous wheats.

Wheat is also classified, according to the time of sowing, as *spring wheat* and *winter wheat*, winter wheat being sowed in the fall and harvested early in June or July; while spring wheat is planted in the spring and harvested late in July or in August.

Spring wheat yields hard grains, which contain an abundance of tough, elastic gluten. The flour made from such wheat is specially fitted for bread made with yeast, because the tenacity of its gluten enables the dough to resist the strong pressure of gas produced within it by the growth of the yeast. Flour made from spring wheat is, therefore, often called *bread flour*.

Bread flour is slightly granular in texture and somewhat dry; if pressed in the hand, it will fall apart loosely when the hand is opened.

Winter wheat yields grains which are softer and which contain less gluten and proportionately more starch and slightly more water than spring wheat. The gluten of winter wheat is also less tough than that of spring wheat, which makes it more suitable for use in pastry; therefore, flour made from winter wheat is sometimes called pastry flour. The aim at present is to mix or "blend" both kinds of wheat before grinding, so that the flour produced will combine the best qualities of both and be suitable for any purpose.

Pastry flour is smooth in texture and rather moist; if pressed in the hand, it will retain the shape into which it is pressed.

Durum wheat, says *Farmers' Bulletin 534,* is, botanically, very closely related to the common wheats which comprise the principal wheat crop of the country. The durum varieties, so far as known, are all spring wheats, and while some of them have been grown as winter wheats, by planting in the fall, none has proved equal to the standard winter common wheats.

Durum wheat differs from the other spring wheats in the size and character of both plant and grain, the former being taller and more vigorous than common wheat, while the grains are large, and, as the name "durum" indicates, are very hard. There are, of course, wide variations among the different varieties in the size, shape, color, and general appearance of both plant and grain. The Russian varieties have proved superior to all others in being well adapted for cultivation in the northern area of the Great Plains.

As previously stated, the chief use of durum wheat is in the manufacture of macaroni and of flour for breadmaking; it is used also, to a limited extent, for cereal breakfast foods.

In using durum flour for bread, the dough is sticky and less easy to handle than dough made from other flours. The bread is yellower in color and the volume of the loaf less, but the "strength" or power of absorbing water of the durum flour is in general higher than that of common wheat flours; the flavor is as good or better than that of ordinary bread, having a distinct nutty taste, and is also slightly sweeter. Bread from durum flour holds moisture better than that made from other flours.

Excellent results in breadmaking are obtained by blending the durum wheat flour with flours from spring wheat and winter wheats. Thus blended, the stickiness of the dough is lessened, the color made lighter, and the volume of the loaf increased.

The principal protein in wheat is a mixture of proteins known as *gluten.* Gluten as such does not exist in the wheat, but is formed from the union of two of the most abundant proteins present, *gliadin* and *glutenin,* which together form gluten when flour is moistened and kneaded. *Gliadin,* a sort ot plant gelatin, is the sticky material which binds the flour particles together to form dough, and thus gives it tenacity; and the *glutenin* is the material to which the gliadin adheres. If there is an excess of gliadin, the dough is soft and sticky; while if there is a deficiency, the dough lacks expansive power.

The breadmaking properties of flour, therefore, depend chiefly on the gluten. The important thing, however, is not entirely the quantity, but rather the character of the gluten, and this depends upon the proportions in which the two constituents, gliadin and glutenin, are present. From the data at hand it would appear that the proper proportion of gliadin to glutenin in hard wheat flour of the highest breadmaking properties is about 65 to 35 in 100 parts. (*Wheat Flour and Bread.* Reprint from Year-Book of Dept. of Agriculture for 1903.)

Experiment 1. To separate the gluten from flour.—Put 2 tb. bread flour into a saucer; add water, a few drops at a time, to make a stiff dough. Note the amount of water used. Knead the dough thoroughly, then let it stand 20 minutes or longer. Half fill a bowl or pan with cold water. Wash the dough in the bowl of water, and rub it between the fingers until as much as possible of the starch is washed out. Let the water stand until the starch settles, then pour off the water and dry the starch. Reserve for further examination.

Take fresh water and continue to wash the dough until the water looks clear, showing that practically all the starch is washed out. Squeeze out as much water as possible and collect the sticky, elastic substance. This is gluten.

Experiment 2. Roll the moist gluten into a ball, place on a pan, and bake it in a rather hot oven until thoroughly dry.

Examine the baked gluten outside and inside, and from its expansion, stiffness, etc., draw conclusions as to the effect of its presence in bread.

Experiments 3 and 4. Repeat experiments 1 and 2, using pastry flour. Compare results with those obtained with the bread flour.

Rye, like wheat, contains gluten, but the gluten of rye differs in some important features from that of wheat. The gliadin of rye resembles in its properties the gliadin of wheat, but rye contains no protein which corresponds to the glutenin of wheat; and therefore rye flour does not form a gluten similar to the gluten of wheat, although it comes nearer to doing so than does any other cereal. The bread made from rye flour alone is moist and clammy, and lacks the light, spongy texture of that made from wheat; consequently a considerable quantity of wheat flour added to the rye makes a much better bread.

The cereals as a class, as mentioned before, may be said to contain on an average about 10 per cent each of water and of protein, a very small percentage of fats, and from 60 to 80 per cent of carbohydrates, chiefly starch. The amount of sugar present, though small, is an essential consideration, because this is the substance upon which yeast acts directly and out of which it can form the gas by which bread is usually made light.

The protein compounds of the cereals other than wheat and rye, while of nutritive value, are not suitable for breadmaking, because they are wholly lacking in the elastic, tenacious property of gluten, which enables a dough containing it to catch and hold any gas that comes in contact with it, and to expand and "rise," and by its firmness when baked to make a loaf which is light and porous.

The Wheat Grain.—Structure. The wheat grain is a small, oval seed, brownish in color on the outside and white within. The brown outside, the "*bran coating,*" as it is called, consists of five outer coats, as may be seen when a grain is cut into thin slices and examined with a powerful microscope.

The three principal or outermost layers form what is called the skin of the grain, and the two remaining layers form the envelope or covering of the seed proper. The outer one is known as the "testa," and contains the greater part of the coloring matter of the bran, and it is the presence of this which makes flour dark. Inside this lies a thin layer of membrane.

The layer next to the bran is called the *cerealine* or *aleurone* layer, the large, rectangular cells of which are filled with a nitrogenous material known as cerealine or aleurone, and the total weight of the bran and aleurone layer together is about 13 per cent of the entire grain.

Within the bran and aleurone layers lie the starch-containing or flour cells. The starchy portion of the seed consists of irregular-shaped cells containing the gluten-forming proteins and the starch granules, and other substances produced by the plant; and these cells, together with those of the aleurone layer, constitute the *endosperm,* as the main central portion of the grain or kernel is termed.

At the lower end of the grain, almost surrounded by the endosperm, is the germ or embryo—the part which, when the grain has thoroughly ripened and the conditions are favorable, will develop into a new plant, feeding upon the starch and other substances in the endosperm. The cells of the germ contain a large proportion of fat. The germ is removed during the process of grinding, because its fat is liable to become rancid and spoil the flour, and also because, if left in, the germ will darken the flour.

Each cell of the very large number making up the wheat grain is inclosed by a cell wall of woody fiber or cellulose, which differs in character in different parts of the grain, being both more woody and more abundant in the outer layers, which are ordinarily sifted out from the finer grades of flour.

The grades of flour most commonly used are *Graham, entire wheat,* and *standard patent flours,* the last named being the white flour most generally used.

Graham flour is made by grinding the whole kernel at once, including the outer bran coats of almost useless cellulose. It is really a wheat meal, the cleaned grain being simply ground between two stones or rollers placed as close together as possible and having their surfaces cut so as to insure complete crushing of the grain. This process is known as low milling. As Graham flour is not bolted or sifted, it is coarse and contains a large proportion of bran. To overcome this objection, much of the flour sold as Graham has been subjected to more or less sifting, though when thus treated the product is not really the Graham flour which was first advocated by an American physician, Dr. Sylvester Graham, whence the name.

White Flour. Standard patent flours, etc., are produced by the process known as high roller milling. The grain is screened to remove foreign substances, then cleaned and tempered, that is, treated with heat and moisture in such a way as to make it easier to remove all the bran at one grinding. After the bran is removed, the grain is run through five or even more pairs of rollers, each successive pair being set a little nearer together than the last pair. After each grinding, or "break," as it is termed in milling, the fine flour is sifted out by passing it through fine silk bolting cloth, and the "leavings" of each sifting, called "middlings," are themselves ground and sifted several times, a number of different streams of flour being thus produced, which after purification and other treatment are united to form the standard grades. The grades of flour commonly ground from wheat are: (1) First patent; (2) Second patent; (3) Straight grade or Standard patent; (4) First clear; (5) Second clear; and (6) Red Dog. These various flour streams may also be combined to form special brands of flour, but mixing the grains before milling is more satisfactory, because it gives more uniform results.

In a mill where the grain goes through a series of six breaks, there are as many as eighty different direct milling products, varying in quality from the finest white flour to pure ground bran. To make sure that each product is up to the standard set for it in the mill, samples of it are frequently tested and the milling regulated accordingly.

The *first patent* is the highest grade of flour manufactured; the gluten in it has a greater power of expansion than that of any other grade, and the loaf made is the largest and whitest.

Second patent is somewhat similar to first patent, but the gluten has not so high a power of expansion and the bread is a shade darker.

The *first clear* grade is obtained after the first and second patent have been removed. This grade contains slightly more protein than either of the two patent grades, but the gliadin and glutenin are not present in such favorable proportions for breadmaking.

All three of these flours are combined to produce the standard patent flour, and the quantity of first or second patent flour put upon the market is relatively small compared with that of standard patent, which is also known as "straight patent," "straight grade," "family grade," and "household flour."

Although this flour contains neither the germ nor the bran, nearly 73 per cent of the kernel is recovered in it by the modern milling processes.

After the standard patent flour has been removed, there is still obtained about 0.5 per cent of a flour called second clear, or low grade, which contains a high percentage of protein, but with a gluten of poor quality for breadmaking. Lastly, there is the so-called "red dog" flour, the lowest grade produced, which is obtained mainly from the germ or embryo and the parts of the wheat nearest to it. It contains large proportions of protein and fat, but since the proteins of the wheat germ are decidedly different from gluten in character and composition, germ flour has little power of expansion and produces a poorly raised, dark-colored loaf.

Entire or *whole wheat flour* is also produced by high roller milling, and differs from ordinary flours mainly in that about one-half of the bran is removed before grinding, leaving the inner portion of the bran and the aleurone layer. This flour is finer than Graham, but not so fine as the patent grades of flour, from which all the bran is removed. Some of the whole wheat flour is made, it is said, by including with the patent grades the middlings and low grade flours, with considerable of the germ.

Gluten flour is the name applied to flour prepared by removing the greater part of the starch. Such flours are prepared especially for persons who are unable to digest starch, and as the name "gluten flour" has been commonly applied to flours containing only a slightly higher percentage of protein than ordinary flour, and sometimes even to ordinary wheat flour or mixtures of whole wheat flour, middlings, and bran, a standard was necessary. The United States Government standard requires that gluten flour be made from flour by the removal of starch, and that it contain at least 35 per cent of protein and not over 10 per cent moisture.

Tests for Quality of Flour. To determine the exact quality of a flour, very complicated chemical tests are necessary; "but," says *Farmers' Bulletin 389, Bread and Breadmaking,* "there are certain general rules by which a good bread flour may be judged offhand. In general, the flour housewives prefer is white with a faint yellow tinge. After being pressed in the hand, flour should fall loosely apart; if it stays in lumps, it has too much moisture in it. When rubbed between the fingers it should not feel too smooth and powdery, but its individual particles should be vaguely distinguishable; when put between the teeth it should 'crunch' a little; its taste should be sweet and nutty, without a suspicion of acidity. . . . An intelligent housekeeper who wishes to know the quality of the flour she is buying could easily learn from the dealer or the miller the character of different brands and could use samples to compare their breadmaking qualities in her own kitchen before buying her supply for the season."

Care of Flour. Flour which leaves the mill in good condition will not remain so unless it is properly cared for. Molds and bacteria may spoil the flavor and breadmaking qualities of flour; and as dampness and darkness are favorable for their growth, a dry, well-lighted storeroom is best for flour, as well as for all cereal products. The color of flour, like many natural colors, fades more or less during storage and the flour becomes whiter. Flour absorbs moisture readily, consequently the amount of moisture contained will vary according to the dryness or humidity of the place of storage. For this reason, and also because of the fact that flour absorbs odors readily, the storeroom should be well ventilated; and flour should not be stored in the vicinity of fresh varnish, fresh pine wood, decaying vegetables, kerosene, smoked meats, or fish, or other substances with a pronounced odor.

YEASTS

Yeast is used to make bread light and porous, and therefore more digestible, because the greater amount of surface exposed enables the digestive juices to act upon it more readily. One-fourth of a yeast cake is usually allowed for one pint of liquid when it is desired that the bread rise slowly, over night, for example. The more yeast used the more quickly the bread will rise, but too much will give an unpleasant flavor. One, two, or even four yeast cakes may be used with one pint of liquid when it is desirable to hasten the process. By this "short" or "quick" process, bread can be made and baked in five hours or less.

Yeast is composed of a mass of tiny plants belonging to the class of budding *fungi*. Under the microscope, a single yeast plant is seen to be a nearly colorless round or oval cell.

Three kinds of yeast are used in breadmaking: *liquid*, *dry*, and *compressed* yeast. At the present time, the yeast most commonly used in the home is the compressed yeast cake. The yeast for these cakes is obtained from distilleries. The froth which rises during the manufacture of whisky from prepared grain contains innumerable yeast cells. This froth is skimmed off, mixed with water, and strained, the process being repeated several times. When sufficiently washed, the yeast cells are allowed to settle and the water removed. The yeast is next pressed into large cakes, with or without starch. These are cut into smaller cakes, which are wrapped in tin foil to keep them moist and clean.

Compressed yeast is the most convenient and reliable that has been produced. In the fresh cake nearly all of the yeast plants are alive and vigorous, says Professor Conn in *Bacteria, Yeasts, and Molds in the Home,* and the results obtained from their use are almost uniformly satisfactory. Compressed yeast must be used while fresh, however, or the results will not be satisfactory. Professor Conn continues:

If a yeast cake is kept for a day or two only, the plants begin to die, and after three or four days only a small number of them may be alive. Yeast when a few days old, therefore, will not raise the bread as quickly as a fresh cake. The loss of activity in an old yeast cake is not the only disadvantage, since the commercial yeast cake always contains microscopic plants, among which are bacteria, as well as other species of yeasts; and these may cause unpleasant flavors through the undesirable fermentation to which they give rise.

If it should be necessary to keep a yeast cake some days before using it, put it into cold water in a refrigerator. Do not allow it to freeze.

Characteristics of a Good Yeast Cake. A good compressed yeast cake should be firm and slightly moist; it should be creamy white in color throughout, and when broken it should be brittle, breaking off clean without bending. When placed on the tongue it should melt readily; it should have an odor of apples, not of cheese, neither should it have an acid odor or taste. Any cheesy odor shows that the yeast is stale and that incipient decomposition has set in.—Jago: *The Technology of Breadmaking.*

Dry yeasts are prepared by mixing fresh yeast with flour, meal, or starch, pressing the mixture into little cakes, and then drying them at a low heat. Being without moisture, the yeast cells remain inactive; and though drying may injure or kill some of them, a great many remain alive a long time in the dried yeast cake, and are capable of growing when placed under proper conditions.

When ready to use, the dried yeast cake should be soaked in warm water containing a small amount of sugar, which furnishes food for the yeast plant. The warm water will soon bring it into a condition to grow and produce fermentation when added to bread dough. Potato water may be used because of its stimulating effect on the action of the yeast.

Liquid yeasts were in former years almost universally used, but have practically disappeared from the household, being less convenient and also less reliable than either the compressed or dried yeasts. Liquid yeasts are susceptible to changes in the weather, and unless they are made and kept with great care are likely to contain the bacteria which produce fermentations that give to bread a disagreeable taste and odor.

Yeast Growth. Yeast grows best when supplied with air (or oxygen, more strictly speaking), warmth, moisture, and a sweet, nitrogenous soil, with some mineral matter. If a growing yeast cell is watched, after a time a bulging appears near one end. This is called a "bud." The bud increases in size gradually until it forms a new cell, which may remain attached to the first one and bud in its turn, or it may separate and bud. Yeast, therefore, is said to reproduce by "budding." Under favorable conditions this increase may be very rapid. The temperature most favorable for the growth of yeast is between 77° and 95° F. Cold water will chill yeast so that it cannot grow, and water above 122° F. will kill it; therefore *lukewarm* water is best for breadmaking.

As the yeast cells grow they produce changes in the substances which supply them with food, the cells themselves merely increasing in number.

If a little yeast is put into a slightly warm, sweet liquid, as molasses and water, and allowed to stand in a warm place for some hours, several changes may be observed. Bubbles will appear and form a froth. A peculiar odor may be noticed, and if the liquid is tasted it will be found to be no longer sweet. These changes are due to the action of the yeast, which under suitable conditions has the power to change sugar into alcohol and a gas, called carbon dioxide. This process is known as "alcoholic fermentation," and the substance in the yeast which causes it is called a "ferment," or enzyme. The peculiar odor noticed is due to the alcohol formed, and the froth is caused by the bubbles of the carbon dioxide gas produced. The same changes take place when the familiar root beer is made, the gas being compressed within the bottle. Its sudden expansion when the bottle is opened causes the flying of the cork, etc. If fermentation is allowed to continue too long, or at too high a temperature, the conditions become unfavorable for the growth of the yeast, because of the production of an amount of alcohol sufficient to render the yeast plant torpid. When the yeast ceases to grow, the bacteria present become active, and by their growth produce acids, which cause the liquid to turn sour.

When yeast is mixed with flour and a lukewarm liquid and kept in a warm place, all the conditions needed for its growth are supplied. The changes which then take place are complicated, and are not all well understood. The most important are the changing of some of the starch of the flour into a kind of sugar (by a substance contained in the flour itself, or by a ferment in the yeast), and the changing of the sugar in the flour into alcohol and carbon dioxide gas by the action of the yeast. The production of this gas fills the dough full of bubbles, and the tough, elastic gluten of the flour gives to the dough its power to stretch and rise as the gas from the yeast expands within the dough, making it light and porous.

BREAD

Ingredients. The essential ingredients of bread are flour, liquid, yeast, and salt. Salt is added for flavor; salt also has a tendency to retard fermentation; and therefore when quick raising is desired, the salt should be added toward the end of the mixing.

Sugar in small amount hastens the process of raising. Shortening (fat of some kind, as lard, butter, beef dripping, etc.) is often used to make the bread more tender, to add to the flavor, and to aid in keeping it moist.

The liquids commonly used are water, milk, or milk and water in equal proportions.

Water should be boiled, and milk should be heated in a double boiler until small bubbles appear around the edge; both should be cooled until lukewarm before adding the yeast. The dough made with milk rises a little more slowly, but milk gives to bread a better color, flavor, and texture, and adds to its nutriment. Skimmed milk may be used to good advantage.

The water in which potatoes have been boiled is sometimes used; a boiled potato mashed fine is added to the dough to hasten the rising, as a substance present in potatoes acts as a "tonic" and will stimulate the action of the yeast plant.

Water produces a finer-textured, sweeter-flavored, but more inelastic bread than do any of the liquids ordinarily used for mixing, but such bread dries out more rapidly than any other.

When potato water is used, the lightness and sponginess of the bread is increased to a marked degree. The use of milk, either sweet or sour, or of potato water, also increases slightly the rapidity of fermentation, but the use of buttermilk increases it somewhat more. Potato water increases greatly the keeping qualities of the bread in which it is used. Milk, either sweet or sour, also increases such qualities, but to a less extent.—*Some Results of a Study of the Factors of Breadmaking. Anna A. Williams, Journal of Home Economics, February, 1914.*

Temperature. The mixing and raising of bread should be done in a warm place, as free as possible from drafts; but too high a temperature should be avoided. All the ingredients should be at least lukewarm, because yeast develops best at a moderately high temperature, 80° F. being a good average for quick raising.

In cold weather keep the flour in a warm, not hot, place for three or four hours before using. Sift flour before using, to mix air with it and also make it more easily worked.

Dough. Flour may be made into dough at the first mixing, such a dough being termed a "straight" or "offhand" dough; or a batter or "sponge" may be prepared by mixing the yeast, liquid, etc., and adding to them at first only about one-half the required amount of flour, and allowing it to raise until full of bubbles. The remainder of the flour is then added and kneaded in very thoroughly. The continuation of the process from this point is the same as for a straight dough.

The dough should not be made too stiff; a moderately soft dough makes bread of a more tender, even texture, and insures its keeping moist longer than bread made from a stiff dough. *A general proportion is about three times as much flour as liquid.* No exact rule can be given, however, owing to the difference in flours. The amount of flour required for a dough of a certain consistency varies also according to the liquid used. By a little practical experience the right consistency is soon learned.

Kneading and Raising. Dough is kneaded the first time to mix the ingredients thoroughly; kneading also incorporates air in the dough and makes the gluten more elastic. Continue the kneading until the dough is smooth and elastic, and will not stick to the board or hands. Place dough in a bowl or pan large enough to allow for rising, and put in a warm place; cover closely to prevent a crust from forming, or rub the top with soft butter or lard. When the dough is raised to twice its original size, cut it down, or knead it a second time; for if the rising of the dough is allowed to proceed too far, the growth of the yeast plant is checked by the accumulation of the products of fermentation. If these, however, are allowed to escape, through the process of cutting down or kneading the dough, the yeast again becomes active, and the souring of the dough by bacteria is thus prevented.

Bacteria may gain access to the dough from the yeast, the flour, or the other ingredients; or from the utensils, or the hands of the mixer. The utmost cleanliness should, therefore, be observed, not only in the making and handling of bread, but with every utensil with which it comes in contact; not only because clean food is most desirable, but also because otherwise bacteria may get into the bread and produce harmful fermentations. The use of bread mixers is preferred to hand kneading by many, owing partly to the saving of time and labor, and also because so little handling is necessary.

This second kneading forces out most of the gas and makes the bread of a fine, even texture, and should be continued only until no large bubbles can be seen when the dough is cut apart. Use little or no flour during second kneading. Next, shape dough into loaves or biscuit and put into the pans; let them rise once more until nearly or quite double their bulk.

Baking. When bread is raised sufficiently, bake until brown all over and a hollow sound is produced when the loaf is tapped with the finger; loaves require fifty to sixty minutes and biscuit fifteen to twenty minutes, or more, according to their size.

The heat of the oven causes the dough to rise higher by expanding the gas within it and also by changing the water into steam. The yeast cells and some of the bacteria are killed, and the alcohol, carbon dioxide, and part of the moisture are driven off. The starch and gluten of the flour are cooked, the starch being made more soluble and the gluten stiffened so that even after the gas has escaped the walls still retain the shape of the bubbles, making the interior or "crumb" firm and spongy, and the exterior or crust crisp and dry. The more intense heat on the outside of the loaf changes its starch into dextrin (a stiff, gummy substance which gives the crust its hardness) and sugar, which, being partly caramelized, gives it a brown color.

Baking Temperature. The *heat* of the oven should not be too great, especially at first, or the outside of the loaf will harden too quickly and the interior will not be cooked when the crust is brown; the gas also, being unable to escape, will sometimes push up the crust and leave large holes beneath it.

Bread should not brown the first ten minutes, and only gradually after that. Opinions differ somewhat, even among experts, as to the oven heat for baking bread, some preferring a temperature of 400° F., others from 360° F. to 400° F. The chemist of a large milling company, who has tried different methods, finds the following most satisfactory:

First heat the oven to 440° F. When the bread is ready for baking, cool off the oven by opening the oven door. Put in the bread and let it stand until it is well raised, then close the oven door and bake the bread with a rising heat of not more than 390°. This method gives a light loaf of good texture.

The following conclusions are the result of investigations carried on in the Household Science Department of the University of Illinois:

"It was easily seen that the baking temperature must be regulated according to the degree of lightness of the dough. Too hot an oven causes an under-raised dough to crack after crusting over, thus producing holes in the crumb, while too cool an oven allows fairly well-risen dough to become over-light."

Further proof of this statement was shown by experiment, the result of which shows that "bread allowed to rise to the desired degree of lightness before baking, and put into a hot oven, produces a better shaped loaf than if allowed to finish its rising in the oven. However, the bread which is barely doubled in bulk and allowed to rise in the oven reaches the same maximum volume attained by bread risen entirely outside, and in addition is of much finer texture, better color, and increased tenderness and silkiness."—*Journal of Home Economics*, Vol. VI, No. 1.

It was shown that "overheating of the dough during raising results in a loaf of small volume, coarse texture, dark crumb, and dull, unattractive crust. Chilling of bread tends to lessen its volume, and to produce compactness, coarseness, and toughness of the crumb.

"Doughs which are thoroughly warmed during mixing and kneading are not easily chilled afterwards. The later it is in the process when such chilling occurs, the less the influence on the bread."

Among other conclusions are the following: "Increase of yeast up to four or five cakes adds to the fineness of texture, but a greater amount produces coarseness. Increase of yeast causes a very gradual but constant increase in the tendency to crumble and in the pallor of the crust. An exceedingly large excess of yeast seems to cause deterioration in flavor, this deterioration being more in lack of flavor than in any unpleasant taste, provided the yeast is of good quality."

"Length of time of rising in the oven is increased by an increase in amount of yeast. When a good quality of yeast is used an increase up to two cakes per loaf is to be recommended for shortening time and producing better bread, although it cannot be recommended from an economic standpoint."

Care after Baking. If kept in a close, warm, moist atmosphere, or covered with a cloth while hot, bread is far more likely to develop sourness, mold, etc., than if stored where the bread may cool rapidly and lose any excess of moisture.

Good Bread:

Bread should be thoroughly baked. This is best accomplished by using a small, single pan. A desirable size is one $8\frac{1}{2} \times 3\frac{1}{2} \times 3$ inches.

The loaf should be evenly raised, top well rounded, and no protruding crusts.

The *crust* should be an even bright brown in color; crisp, crackly, pliable, and smooth to the touch; not too thick.

The *crumb,* or interior, should have the appearance and feeling of lightness with no heavy streaks or spots anywhere: fine, even texture, due to the even distribution of small gas cavities, having thin, delicate walls; neither doughy nor crumbly, but soft, yet firm, and elastic enough to spring back after pressure with the finger.

Flavor. Good bread should have a nutty flavor, entirely free from mustiness or sourness. Good flavor is due to the right amount of fermentation, to the quality and condition of the flour, and to the amount and character of the other ingredients added, and also to proper baking, since in under-baked bread the heating has not been sufficient to kill all the bacteria.

Some Defects in Bread:

Heaviness may be due to the use of too much water in proportion to the flour; to too little or too poor yeast; to insufficient kneading, rising, or baking.

Tough, leathery crust may be due to insufficiently fermented dough or to too cool an oven. Protruding crusts are caused by placing loaves too close together in the oven, so that, on expanding, they touch each other.

Too *soft* a dough causes the loaf to be small in volume and too flat on the top; the texture is apt to be coarse, and in the case of exceedingly soft dough the crumb is somewhat dark, tough, and clammy. The *stiffer* the dough the more rounded is the top and the greater is the tendency of the loaf to crack open on the side; the finer is the texture, also, and the whiter and drier is the crumb.

Crumbly bread, which breaks when cut, instead of separating, results from the use of harsh, dry flours not sufficiently fermented, or from over-kneading of the dough. Large, irregular holes in the crumb, instead of the small, even pores it should show, occur in over-kneaded or over-raised dough; or if found just under the crust, the oven was too hot, so that the crust formed before the carbon dioxide had finished expanding.

Sour bread. Sourness in bread may be caused by (1) too long rising; (2) rising in too hot a place; (3) rising in too cool a place; (4) oven not hot enough to kill the yeast plant quickly.

Bread — Short Process

1 tb. sugar
1 tb. shortening
1½ t. salt
2 c. boiling water, or 1 c. boiling water and 1 c. scalded milk
1 yeast cake, mixed with ¼ c. lukewarm water
Flour to make dough stiff enough to knead—about 6 c.

The sugar and shortening are sometimes omitted. If used, put sugar and shortening into a large bowl or pan, and pour on them the hot liquid. Mix yeast cake with $\frac{1}{4}$ c. of lukewarm water; when the mixture in the bowl is *lukewarm*, stir in the yeast. Add 5 c. of sifted flour and the salt, and stir until smooth; then add enough more flour, a little at a time, to make a dough stiff enough to knead. Turn it upon a floured board, scrape every particle of dough from bowl, and knead until it is smooth and elastic to the touch and will not stick to board or hands. Return dough to bowl, cover closely, and let stand in a warm place (about 80° F.) until double its bulk, which will take between 2 and 3 hours. Turn the dough upon the board and knead again until no large bubbles can be seen. The touch should be light and as little flour as possible used during the second kneading. Shape dough into loaves or biscuit, and place in greased pans. Dough for loaves should half fill pans. Cover and put in a warm place. When double their bulk, which will take about 1 hour, bake in a hot oven—loaves, 50 to 60 minutes; biscuits, from 15 to 20 minutes, according to size. Have the crust brown on all sides. Remove bread from pans as soon as taken from the oven, and cool in such a position that the air can circulate freely around the loaves. If desired more tender, rub the crust with melted butter just before taking bread from the oven.

Bread — Long Process

If more convenient to allow bread to rise over night, use but $\frac{1}{4}$ yeast cake with the above quantities of other materials. The temperature of the room should not be over 70° F., the ordinary room temperature. The second kneading is to be done the following morning, and the remaining process is the same as directed for the "Short Process" bread. An extra $\frac{1}{2}$ t. of salt may be added if bread is allowed to rise over night.

Whole Wheat Bread

1 pt. boiling water	½ yeast cake, mixed with
1 tb. butter or lard	2 tb. lukewarm water
1 t. salt	1½ c. white flour
¼ c. sugar or molasses	3½ c. whole wheat flour

Put salt, butter, and sweetening into a bowl, and pour on them the boiling water; cool until lukewarm. Mix the yeast cake with the 2 tb. lukewarm water and add to mixture in bowl; stir in the flour, mix thoroughly, and let rise over night. In the morning, beat it well and put into pans. Let rise until double the bulk. Bake in a hot oven about 45 minutes.

Whole wheat bread may be made as directed for white bread, using two-thirds whole wheat flour and one-third white.

Graham bread may be made by substituting Graham for whole wheat flour in the above recipe.

Nutritive Value and Digestibility. Concerning the nutritive value of bread, Hutchison, in *The Principles of Food and Dietetics,* says: "Weight for weight, but not bulk for bulk, bread must be regarded as one of the most nutritious of our ordinary foods. This is due largely to the fact that three-fifths of it consist of solid nutriment and but two-fifths of water, and there is no animal food and but few cooked vegetable foods of which the same can be said.

"Of the chemical constituents necessary for proper nutrition, bread yields to the body a large proportion of carbohydrates, a moderate amount of protein and mineral matters, but almost no fat. The fact that bread is usually eaten with butter, however, renders the absence of fat a matter of but little importance.

"Yet bread cannot be regarded as a perfect food, because the proportion of protein to carbohydrate is too low. An ideal food would contain 1 part protein to 4.2 parts of carbohydrates, whereas in white bread the proportion is only 1 to 8½. . . . To the ordinary mixed feeder this does not matter, for he supplements the deficiency of protein by adding to the bread a 'protein carrier,' such as milk, eggs, meat, or cheese. Where bread forms the staple article of diet, however, as it does in the diet of the very poor, this lack of protein must be regarded as a serious drawback."

The use of skimmed milk instead of water in mixing bread will increase the protein about 2 per cent, with only a slight increase in cost.

As compared with most meats, bread has practically no waste and is completely digested, though its digestibility seems to depend largely upon the lightness of the loaf (*Farmers' Bulletin 389*). The result of a large number of experiments made to determine the comparative digestibility of different kinds of bread showed in all cases that the digestibility of standard patent flour was the highest, that of entire wheat the next, and that of Graham the lowest. It seems safe to say, therefore, that as far as is known white flour yields the most actual nourishment for a given amount of money.

Dr. Sherman (*Food Products,* pp. 292, 293) in this connection says in substance that, regarding the coarser and finer flours simply as sources of protein and energy, they are so nearly equal, both in digestible nutrients and cost, that they are equivalent and interchangeable, yet in their mineral constituents and in their effect upon the digestive tract they are quite different. The coarser flours stimulate intestinal action more than do the finer flour products, an effect which is desirable in some persons, undesirable in others. This property of the whole wheat products is probably due in part to mechanical irritation and in part also to the laxative effects of the oil of the germ and the phytin (one of the phosphorous compounds), which is especially abundant in bran, these two substances being largely removed in the preparation of fine white flour.

The ash constituents of the grains are mainly in the germs and outer layers, and the wheat-grain contains three to five times as much of the total ash as the fine flour made from it. Thus, three-fourths of the ash constituents of wheat are lost to man in the process of manufacturing wheat into fine flour.

While no adequate experiments to test this point have been made with man, the value of the ash constituents of the bran for growing rats has been shown conclusively. Rodents fed on whole wheat bread grew much better than those fed on white bread, and were better nourished, though all appeared equally well nourished at the beginning of the experiment.

He continues: "In view of recent studies, the probable effect upon the 'vitamine' content of rejecting all but the interior portion of the grain naturally suggests itself as a subject worthy of consideration. . . . It is also true that many American family dietaries show little margin of safety with regard to iron, phosphorus, and calcium; it is only reasonable, therefore, that we should wish to include in the products used for human food as much as is practicable of those parts of the grain which are rich in these elements."

Left-over Bread

Not a scrap of bread need be wasted. Pieces of suitable size may be used for toast or croûtons; small or irregular pieces for puddings of various kinds, for griddle cakes, or for stuffing meat, fish, etc.; or they may be dried and rolled for breading croquettes, chops, etc.

SCALLOPED DISHES

The crumbs for scalloped dishes are prepared from the inside of a loaf of bread a day or more old. Grate the bread, or, if dry enough, crumb by rubbing two pieces together. Cracker crumbs may also be used, but will need more liquid to moisten them. Half bread and half cracker crumbs may be used.

Cold meats, or fish, and oysters, some vegetables, or some fruits may be used in scalloped dishes.

General rule for preparing scalloped dishes:

Put one-fourth of the crumbs on the bottom of a buttered baking dish, then one-half of the material to be "scalloped," half the seasonings and liquid; next, another fourth of the crumbs, another layer of material, seasoning, and liquid. Cover the top with the remaining half of the crumbs.

Scalloped Apples

3 c. apples, thinly sliced or chopped	½ c. sugar
	⅛ t. nutmeg
2 c. crumbs	¼ t. cinnamon
4 tb. butter	¼ t. salt

½ c. boiling water

Cut apples in quarters; pare and core them. Slice or chop the apple. (Stewed apples may be used.) If apples are not tart, add juice of ½ lemon to the water. The yellow rind of ½ lemon, grated, may be used if the flavor is liked. Melt the butter and stir in the crumbs. Put one-fourth of them in the bottom of a buttered pudding dish; add half the apples; mix sugar, spices, salt, and lemon rind (if used), and sprinkle half of it over the apples and add half the water; then a layer of crumbs, apples, sweetening, and water. Use remaining half cup of crumbs for the top, sprinkling them evenly and lightly, without pressing. Cover and bake on bottom of oven 30 or 45 minutes, or until apples are soft. Remove cover and place on the grate to brown. Serve hot, with milk or cream, or pudding sauce. Peaches or berries, fresh or cooked, may be used instead of apples. If cooked fruit is used, cook only until crumbs are browned.

Nutmeg Sauce

1 tb. cornstarch or	1 c. boiling water
2 tb. flour	⅛ t. nutmeg
½ c. sugar	1 tb. butter

Mix cornstarch and sugar; add water gradually, stirring constantly. Boil 5 minutes, remove from fire, add butter and nutmeg.

Scalloped Tomatoes

2 c. tomatoes	¼ ssp. pepper
1¼ t. salt	1½ c. crumbs
3 tb. butter	

Cook tomatoes 10 minutes with salt and pepper. Butter crumbs and arrange as for scalloped apple. Cook, covered, for 20 minutes; uncover, and brown on grate or under gas in broiling oven. If raw tomatoes are used, bake 1 hour, covered for 30 minutes. If desired, sugar may be added.

Scalloped Onions

Arrange the boiled onions between the layers of crumbs, using thin white sauce to moisten them. Cook 20 minutes covered. Uncover and brown.

Dried Bread Crumbs

Dry pieces of stale bread in a warm oven until crisp, but not brown. Crush fine with a rolling pin; sift and when quite cold store in glass jars, to use in covering croquettes, etc., for frying. Tie double cheesecloth over the top of jars, instead of the usual covers, as the crumbs are less likely to acquire a stale taste and odor.

Crusts may be broken in small pieces and heated in an oven until brown all through, and used as a breakfast cereal or for pudding.

Browned Crust Pudding

2 c. browned bread crusts	¼ t. cinnamon
¼ c. sugar	½ c. raisins, seeded
¼ t. salt	2 c. hot milk

Put the browned crusts with the sugar, salt, cinnamon, and raisins in a pudding dish. Mix well, pour on milk, and let stand 10 minutes; bake until milk is absorbed. A beaten egg may be mixed with sugar, salt, and cinnamon, and the milk added slowly before pouring over the crumbs. Use 3 c. of milk if egg is added. One-half cup of molasses may be used instead of sugar. Serve with hard sauce.

Hard Sauce

¼ c. butter	30 drops vanilla or
½ c. powdered sugar	⅛ t. nutmeg

Rub the butter in a bowl until creamy; add the sugar gradually, then the vanilla if used. The nutmeg may be grated over the top. Put in a cold place to harden. Serve with hot pudding.

CHAPTER XII

Eggs and Meat

EGGS

The eggs of many birds, both wild and domestic, including ducks, geese, etc., are used for food, as well as turtle eggs and the eggs of many kinds of fish (in the form of spawn or roe). The eggs of the domestic hen, however, are most commonly used.

If an egg is broken, it will be found to consist of the shell, the white, the yolk, and membranes. The most conspicuous membrane is the one which lines the shell; a thin membrane also incloses the yolk, which is attached to the white of the egg by two white cords, which often form small lumps when the egg is cooked. The white of an egg consists of a thick, central portion, with the thin, watery portion surrounding it. An attempt to lift a spoonful of the thick part of the white will show that it is held together firmly; but if beaten thoroughly, a spoonful may be easily separated.

It has been found that the white of the egg consists of millions of tiny cells filled with a clear, sticky, and nearly colorless liquid, known as *albumin*. The walls of these cells consist of exceedingly delicate membranes, which are ruptured or broken when the egg is beaten, allowing the contents to escape.

The shell of the egg is porous, and consists almost entirely of carbonate of lime.

An egg of average size weighs a little less than two ounces. Owing to the porous nature of the shell, the water in the egg evaporates, and air enters to take its place; therefore the longer the egg is kept, the lighter it becomes.

Tests for freshness: (1) A fresh egg will sink at once when placed in water, or better, in a solution of one part salt to ten parts water. The older the egg, the nearer the surface it will float.

(2) The shell of a fresh egg is rough and dull, while that of a stale one is smooth and glossy.

(3) Shake the egg while holding it close to the ear. If fresh, no sound will be heard.

(4) A fresh egg, if held between a bright light and the eye, will show a clear, rosy tint throughout, with no dark spots. A stale egg will look cloudy, with dark spots. Eggs are often thus tested in a dark room with a candle, therefore this method is called "candling."

Eggs grow steadily poorer the longer they are kept, even if they are not decidedly spoiled. The spoiling of eggs is due chiefly to the growth within them of bacteria, which may enter the shell either from the place where the egg has been lying, or by means of the air which goes in through the porous shell as the water evaporates. Molds on the surface of the shells sometimes push through and sprout, and thus cause the eggs to spoil.

NOTE.—Under normal conditions the shell is bacterium-proof. Moisture lessens its impervious character, however, and when combined with dirt and filth, makes it possible for micro-organisms to enter and bring about decay. Increased temperature added to this hastens the decomposition.—*Storrs Agricultural Experiment Station Bulletin No. 75.*

Eggs are preserved or kept from spoiling for periods varying from a few months to about a year, many methods being used with varying degrees of success. A common method is that of excluding the air. This is done by packing the eggs in bran, oats, etc.; by coating the surface with vaseline or other substances; or by covering them with limewater, with or without salt. Various other materials are also used for the purpose, the most satisfactory being a solution of silicate of soda, commonly called "water glass." (See Part II, *Preservation of Food.*)

Eggs are also preserved by "cold storage," at a temperature just above the freezing point. Eggs are sometimes removed from the shell, stored in large cans, and frozen. It is said that by this method they can be kept any desired length of time; but if not used soon after thawing, they will spoil quickly. Eggs preserved in any way are inferior to fresh eggs. Preserved eggs, even if they are not spoiled, have a flavor often so unpleasant that they are unfit for food.

Since in all cases the egg is designed to furnish the sole source of nutriment for the growth of the young bird or other animal to be developed within it, it is evident that the egg must contain all the elements required for the purpose. It must contain protein, mineral matter, and water, for these are absolutely necessary for the making of muscle, blood, bone, etc. It needs fat, for that is the most compact form in which heat-giving material can be stored. Carbohydrates the egg need not contain, for the chief use of carbohydrates is to serve as a source of muscular energy, and very little muscular movement is possible within the narrow limits of the eggshell; protein can furnish heat and energy when required. As a matter of fact, the egg consists practically of these substances: protein, water, fat, and mineral matter; the average composition of the edible portion of hens' eggs being as follows:

	Whole egg	White	Yolk
Water	73.7	86.2	49.5
Protein	14.8	13.0	16.1
Fat	10.5	0.2	33.3
Mineral matter (or ash)	1.	0.6	1.1
Carbohydrates	0	0	0
	100.0	100.0	100.0

(U. S. Dept. of Agriculture, Chart 2. Prepared by C. F. Langworthy.)

The amount of carbohydrate present is so small that the figures are not usually given.

The *yolk* and *white* of egg differ greatly in composition, as may be seen by comparison. The egg white is more than eight-tenths water, the remaining portion being principally protein (albumin), with a little mineral matter, etc. The yolk is about half water, one-third fat, and nearly one-sixth protein, with almost twice as much mineral matter as the white.

The nutritive materials of eggs being principally protein and fat, they resemble in this respect such animal foods as milk, cheese, and meat. Their lack of carbohydrates explains the combination of eggs with food materials containing them, as flour, sugar, etc. When eggs, meat, fish, cheese, or other similar foods rich in protein are eaten, bread, butter, potatoes, rice, etc., are usually served at the same time. The wisdom of this combination has been proved by long, practical experience as well as by modern science.

The protein material in eggs is a mixture of proteins. For convenience they may be considered as a single substance, *albumin* (from a Latin word, *albus,* white).

The white of eggs contains albumin in the purest form in which it occurs in nature, and so egg white is taken as a type of albuminous food. The yolk also contains albumin. Simple experiments will serve to show some of the characteristics of albumin and the manner in which it is affected by heat, etc.

Experiments with albumin:

1. Break an egg carefully and put white and yolk in separate dishes. Use scissors to divide the white; put one teaspoonful of egg white into a small bowl with ten teaspoonfuls of water and beat until thoroughly mixed. Strain through fine cloth or filter paper into a glass.

2. Put one-half the strained liquid into a small saucepan and heat slowly until a white froth separates and rises to the top. Remove froth and examine.

NOTE.—This froth is albumin which was dissolved in the cold water and is now coagulated by the heat. (Coagulate means to congeal or to thicken; to change from a fluid to a solid mass of moderate consistence; to clot.)

3. Mix one teaspoonful of egg yolk with ten teaspoonfuls of cold water and mix thoroughly. Heat in a small saucepan until the egg yolk separates from the water in curd-like masses.

4. Half-fill a small saucepan with water; heat until water boils. Remove from heat and put into it a small portion of egg white. Let stand 5 minutes, then take egg white from the water and reserve.

5. Half-fill a small saucepan with water; heat until it boils. Put into it a portion of egg white equal in quantity to that used in Experiment 4. Boil 2 minutes, remove, and compare with egg in preceding experiment.

6. Mix a small portion of egg white and egg yolk; put the mixture into a small saucepan or frying pan, and cook directly over heat 2 or 3 minutes. Remove egg and compare with that in the two preceding experiments.

From these experiments we learn:

Albumin is soluble in cold water.

Heat coagulates albumin, making it insoluble in water either hot or cold.

Albumin cooked in water considerably below boiling temperature is delicately coagulated, becoming tender and jelly-like.

Albumin cooked at boiling temperature becomes hard and dense.

Intense heat shrinks albumin and makes it very hard and dry. Continued heating at high temperature renders albumin tough and horny.

NOTE.—By the use of a chemical thermometer more definite data may be obtained, as follows:

Fill a test tube one-third full with raw egg white and immerse in a beaker of cold water. Suspend thermometer in the egg white and heat slowly to 212° F. or 100° C. Continue heating for 3 to 5 minutes. Observe carefully changes in the egg white and note temperature at which they occur.

NOTE.—Careful experiments have shown that albumin begins to coagulate at a temperature of 134° F. and becomes jelly-like at 160° F. When cooked at a temperature between 160° and 185° F., the albumin is tender and readily digestible. When prepared for invalids or others with weak digestion, eggs should be cooked by such methods as will not render the albumin tough. Soft-cooked eggs, poached and steamed eggs, and creamy eggs and custards are suitable.

The presence of protein may be shown as follows: Put into a glass beaker or a test tube the second half of the solution of egg white. Add a few drops of strong nitric acid, being careful to avoid touching the flesh, clothing, furniture, etc., with the acid, which is strongly corrosive. A white precipitate forms, which, when the liquid is heated to boiling, will turn yellow. Cool and add ammonia, which will change the yellow color to orange. These changes in color indicate the presence of a protein substance. Dilute with plenty of water before throwing mixture into the sink.

Eggs should be kept in a cool, dry place. The shells should be washed before the eggs are used.

When using several eggs, break each one separately into a cup. In this way a poor egg may be detected.

To keep an egg from drying after it is removed from the shell, mix with it a teaspoonful of water. Cover, and keep in a cool place. Whole yolks may be covered with cold water.

Eggs should be served as soon as cooked.

Eggnog

1 egg
1 tb. sugar
1 c. milk
A few grains of salt
Grating of nutmeg

Scald the milk or use cold milk. Beat the egg thoroughly, add sugar and salt; add milk and beat again. Strain and add nutmeg. The egg may be separated, if preferred, and the beaten white added at the last. Water is sometimes used instead of milk, and 1 tb. of cream added. The egg white only may be used with the milk, making *albuminized milk*. Less milk may be used, if desired.

Egg Lemonade

1 egg
2 tb. sugar
2 tb. lemon juice
1 c. water

Beat the egg thoroughly and add the sugar and lemon juice; add the water slowly, stirring until smooth and well mixed. Strain and serve; a little grated nutmeg may be added, if liked.

Soft Cooked Eggs No. 1

In general, allow 1 pt. of water for 2 eggs, and an extra cupful for each additional egg. Water should cover the eggs. If eggs are very cold, pour warm water over them before the boiling water, to prevent shells from breaking. Place the eggs in the water with a spoon, and cover pan. Remove at once from the fire and let stand 6 to 8 minutes, according to size of eggs or their temperature when put into the boiling water. Serve in heated cups.

Soft Cooked Eggs No. 2

Put boiling water into the upper and lower parts of a double boiler. Place upper boiler over the lower one. Put eggs into the upper boiler, cover, and let stand 5 to 6 minutes.

Soft Cooked Eggs No. 3

Put eggs into a saucepan and cover with cold water. Place over heat and cook until fine bubbles appear all through the water. Remove from water and serve.

Hard Cooked Eggs

Put eggs into a saucepan, with enough boiling water to cover them; place saucepan where the water will keep very hot, but not boil, for 30 to 45 minutes.

When taken from the hot water, if the eggs are put into cold water for a few minutes the shells can be taken off more readily.

Poached Eggs

Have ready a slice of hot, buttered toast for each egg. Put into a shallow pan sufficient boiling, salted water to cover the eggs, using 1 t. of salt to each pint of water. Break each egg separately into a saucer and slip egg carefully into the water. Place pan where the water will be kept hot, but will not boil. Cook 6 to 8 minutes, or until a film forms over the yolk and the white is firm. If water should not cover the eggs, use a spoon to pour it very gently over the yolks. Use a griddle-cake turner or a skimmer to remove the cooked eggs; trim off rough edges and place each egg on toast. Sprinkle salt and pepper over each egg and serve immediately.

Egg poachers or buttered muffin rings are often used to keep the eggs in shape.

Eggs may be poached in milk or thin cream, which is then poured over the toast.

Egg Vermicelli or Goldenrod Eggs

3 hard-cooked eggs	$\frac{1}{4}$ ssp. pepper
$\frac{1}{2}$ t. salt	4 or 5 slices of toast

Make 1 c. thin white sauce, according to directions. Separate yolks from whites of cooked eggs. Chop whites fine, add to the white sauce, and pour over the toast arranged on a hot platter. Press the yolks through a coarse strainer over the white sauce. Cover, place in a moderate oven 5 minutes, and serve hot. Hot cooked rice or macaroni may be used instead of toast. The dish may be garnished with "toast points," made by cutting slices of toast into pieces about 1$\frac{1}{2}$ inches square, and dividing each square diagonally.

Baked or Steamed Custard

2 c. milk	$\frac{1}{4}$ c. sugar
2 eggs or 3 egg yolks	$\frac{1}{8}$ t. salt

Spk. nutmeg

Scald milk. Beat egg until whites and yolks are thoroughly mixed; add sugar, salt, and nutmeg, and mix well. Add the scalded milk slowly, stirring all the time. Strain the mixture into a buttered pudding dish or into cups. Place dish or cups in a pan of hot water. Bake in a moderate oven until a knife put into center will not look milky when taken out. If cooked too long, the custard will separate or "whey." Custard is *steamed* by placing dish or cups containing it in a steamer over a saucepan of boiling water. Cover, and cook until custard is firm in the center. To test, pierce the custard with the point of a knife. If "done," no milky appearance will be seen—the "knife comes out clean."

Steamed Egg

Separate white and yolk of the egg. Beat white to a stiff froth and put into a buttered cup. Put the yolk (whole) into the center. Place cup in a steamer, or in a saucepan containing enough boiling water to reach half-way to the top of cup. Cover, remove saucepan from fire, and let stand 5 to 10 minutes. Serve at once; season to taste. If preferred, the yolk may be beaten and mixed lightly with the beaten white before cooking.

Creamy Eggs

4 eggs	1 tb. butter
1 c. milk	$\frac{1}{4}$ t. salt

Pepper to taste

Scald the milk; beat eggs until thoroughly mixed, but not frothy; add seasoning. Pour the milk on slowly, and when well mixed cook in the top of double boiler, stirring until mixture becomes thick and creamy. Add butter and pour over slices of toast. Serve hot. The butter may be omitted.

Scrambled Eggs

5 eggs	$\frac{1}{2}$ t. salt
$\frac{1}{2}$ c. milk	$\frac{1}{4}$ ssp. pepper

2 tb. butter

Beat eggs slightly, and add salt, pepper, and milk. Melt the butter in a frying pan, pour in the egg mixture, and cook slowly, continually scraping from bottom of pan. Lift pan from the fire occasionally, if heat is too great. When creamy, turn upon a hot dish and serve at once. Fine-chopped cooked ham may be added, using 1 tb. for each egg. If ham is used, omit salt and season to taste.

MEAT

Meat includes the flesh of all animals used for food. Commonly, however, the term *meat* is applied to the muscular tissue, or lean, with the fat, etc., of three classes of animals, which supply (1) beef, veal, mutton, lamb, and pork; (2) poultry, as chickens, turkeys, geese, ducks, etc.; (3) game, including wild fowl and other wild animals, as partridges, grouse, quail, rabbits, deer, etc.

Structure. Meat in general consists of the muscular tissue (muscles), or lean, with varying quantities of fat, bone, connective tissue, as gristle, etc.

Lean meat or muscular tissue consists of bundles of fibers which can be divided into smaller and smaller bundles until finally the individual muscle fibers are reached. These are elongated cells, which when viewed under a microscope are seen to have the form of tubes.

These fibers, or tubes, are tender in young animals and in those parts of older animals which are used but little, as the back, for example; while in old animals and in the muscles of any animal which have been much exercised, as the neck and legs, the muscle fibers become thickened and tough.

The separate bundles or muscles, the ends of which may be seen when a piece of raw meat is cut "across the grain," are made up of hundreds of muscle tubes. These are held together in bundles by means of a thin, transparent membrane called "connective tissue," which can be seen as delicate, shiny membrane when a piece of raw meat is pulled or stretched apart. The more of this connective tissue there is and the thicker it is, the tougher is the meat. Connective tissue can, however, be softened by heat and moisture, which change it into gelatin. Meat which has been boiled a long time can be readily separated into stringy, thread-like fibers, because the gelatin-yielding connective tissue has been dissolved by the action of the boiling water. Connective tissue is also soluble in the acid of vinegar, and therefore soaking tough meat in vinegar will make it more tender.

Each muscle tube or fiber consists of a wall or outer covering, or "sheath," of delicate elastic membrane, with its contents, the cell substance. Cell substance consists mainly of a jelly-like, albuminous material (myosin), which forms the chief protein of meat; the myosin is combined with water having dissolved in it the mineral matter and the substances which give *flavor* and *color* to the meat. This albuminous liquid, together with that between and around the fibers and the bundles of fibers, constitutes the "juice" of meat, and consequently there is a decided difference between meat which is juicy and that which is merely watery. Juicy meat more nearly retains its substance and shape when cooked, owing to the coagulation of the albuminous material present; while watery meat, such as veal, or other immature or very lean meat, shrinks greatly, owing to the loss of water.

The walls of the muscle tubes in the flesh of young and well-fed animals are thin and delicate, and the connective tissue is small in amount. As animals grow older and are made to work, especially if they are poorly fed, the walls of the muscle tubes become thick and hard and the connective tissue increases in amount. The flesh becomes coarse-grained and darker in color, and the bones hard and white. The fat also may become less.

The flesh of animals recently killed is soft, tender, and juicy, but soon becomes hard and tough; if kept in the cooler for a certain period to "age" or "ripen"—from a few days to a week or longer, according to the circumstances—other changes take place by which acids are formed within the meat which soften the connective tissue and improve the firmness, tenderness, and flavor of meat, provided it is sufficiently fat. Very lean meat deteriorates rapidly after a few days in the chill room.

Meat which has been frozen sometimes develops a "flabby" condition after thawing, due to the separation of water from the tissues of the meat. This renders it tough and detracts greatly from its flavor.

Fat. All meat, however lean it may appear, contains more or less fat. Besides that which is visible, there is always a certain proportion of "invisible fat" stored in and around the muscle fibers, in particles too small to be distinguished from the lean which surrounds it. In the flesh of some animals, as in rabbits and veal and in the breast of chicken, there is little or no visible fat. In very fat beef and mutton cuts, in ducks and geese, and especially in pork, the proportion of fat is large, being sometimes one-fourth the entire weight of the beef; while pork may be fully nine-tenths fat.

The amount of fat in different kinds and cuts of meat varies greatly; for example, the shank of beef may contain only about 8 per cent and pork chops about 32 per cent, while the highest priced cuts, loins and ribs of beef, contain 20 to 25 per cent.

Meat contains large amounts of *water*, varying from about one-half to more than three-quarters its entire weight. The greater the amount of fat, the smaller the amount of water; and the younger the animal, the more water its flesh contains.

Flavor. The flavor of meat is due mainly to nitrogenous substances called *extractives*, because they can be readily "extracted" or drawn out by soaking meat in cold water; the variety in the flavor of meats is due to the differences in the kind and amount of extractives present. Flavor is closely associated with the juiciness of meat, and develops with the growth of the animal. The flesh of older and also of well-fed animals, therefore, is in general richer in flavor than that of young or ill-fed animals, while an intermingling of fat with the flesh gives a distinctive flavor and richness to meat when cooked. With the exception of fish, the flesh of animals which feed upon fish or flesh only has a strong, disagreeable flavor. The extractives, or the flavor they give, are supposed by many to be best in the most expensive cuts of meat; in reality, investigation would seem to indicate that less choice portions are often of better flavor than tender cuts, but their toughness prevents appreciation of their good flavor.

Food Value of Meat:

The value of meat as food lies chiefly in the protein or nitrogenous compounds, and second, in the fat; while the mineral matter of meat includes substances, particularly the phosphorus compounds, which are of especial importance to the body.

Fat is a valuable constituent of food, being especially important as a source of energy. It is the most concentrated form in which the fuel ingredients of food are found. The fats of animal foods could be so supplied that, together with animal protein, all the needs of the body could be met. An excessive amount of fat tends to render digestion more difficult, apparently by forming a waterproof coating around the fibers, which prevents the gastric juice from acting on them readily; while the absence of fat causes meat to shrink and become dry, hard, and flavorless when cooked.

NOTE.—Not a scrap of fat should be wasted. Both fat and bone are weighed with the meat when purchased, and charged for at the same rate per pound; therefore the buyer should request that the bones and "trimmings" cut from the meat after weighing should be delivered with the meat, instead of being kept by the butcher, to be sold by him later. What is not used at the table should be utilized in some way, as in making gravies, in drippings, or for other purposes in which it will serve as well or better than butter. The *fat* unfit for food can be made into soap.

Bones from most meats can be used in soup-making, and coarse ends of porterhouse steaks or chops can be put through the meat grinder for Hamburg steak, or meat balls, etc., or used in various other ways.

The extractives of meat have little or no value in themselves as food, being similar in their nature to the *thein* and *caffein* of tea and coffee, which stimulate, but can neither build tissue nor yield energy. Meat extractives are of value, however, in other ways, as without them meat would be tasteless and insipid. Their great importance lies chiefly in the fact that they cause "the secretion of digestive juices at the proper time, in the right amount, and of the right chemical character. The digestive tract may be likened to a piece of machinery which is beautifully built and adjusted, and is ready to run and turn out its product as soon as the lever is moved which sets it in motion. The flavoring bodies of food, and especially those contained in meat, can be likened to the lever which sets the machinery in motion. Excitants to normal digestion are supplied by other foods as well; but meats, so physiologists believe, are especially important for the purpose. It is this quality of exciting to digestion which justifies the taking of soup at the beginning of a meal, and the giving of broths, meat extracts, etc., to invalids and weak persons. These foods have little nutritive value in themselves, but they are great aids to the digestion of other foods."—*Farmers' Bulletin 391.*

With meat may be included various organs which are used as food; for example, the heart, the liver, kidneys, stomach, tongue, etc. These organs are of rather close, solid texture, and are therefore considered somewhat difficult of digestion.

Composition. The composition of meat varies greatly, according to the cut, the amount of fat, etc. The following table gives the average composition of a piece of lean beef without visible fat:

	Per cent
Protein	18.36
Gelatin	1.64
Extractives	1.90
Fat	.90
Mineral matter	1.30
Water	75.90
	100.00

MARKETING[1]

Quality in Meat. Meat should be *uniform* in color and should have little or no odor; the flesh should be firm, and when touched should scarcely moisten the fingers; on keeping, it should become dry rather than wet.

Quality in beef refers particularly to the *grain* and *firmness* of the lean, to the "*marbling*" or the distribution of fat through the lean, and to the proportion of bone and other waste in the cut.

The *grain* of meat refers to its fineness of texture. The cut surface should be glossy, smooth, or "velvety" in appearance and touch, as opposed to stringiness or coarseness.

Firmness in this connection means "substance" or "body," as distinguished from a soft, gluey, or "washy" consistency of the flesh, and is an indication of tenderness, juiciness, and maturity. On the other hand, firmness due to a dry, stringy condition of the flesh is objectionable.

Marbling is of special importance in ribs and loins of the higher grades of beef, but is not usually evident in other cuts

[1] Compiled mainly from University of Illinois Agricultural Experiment Station Bulletin No. 147.

except the best quality of rounds and chucks. The importance of marbling consists mainly in its influence on tenderness. When fat is deposited in the connective tissue cells throughout the lean, the elasticity of the connective tissues is diminished, and the meat is improved in tenderness and juiciness.

Tenderness. While no infallible rule for indications of tenderness can be given, careful observation of certain points will be of assistance. Tender meat is, as a rule, fine-grained and smooth in texture, showing little connective tissue. Such meat is pliable, and the flesh may be penetrated with the finger or easily cut with a knife; yet it is firm, rather than soft and flabby. With some exceptions, the fatness of meat and the degree of marbling are indications of tenderness; light-colored flesh usually shows that the cut is from a young animal, and should consequently be tender. Cutting meat *across*, instead of *with* the grain makes much difference in its apparent coarseness of fiber, and this must be considered in judging of tenderness, as even the tenderloin looks stringy when cut lengthwise. The texture and color of the bone is another indication of tenderness. Bones of a comparatively soft, spongy texture and of a reddish color indicate that the cut is from a young animal, while hard, dense, white bones are characteristic of old animals.

The *proportion of bone* directly affects the amount of edible meat in a cut.

Color is of great importance in grading beef cuts, as it is an indication of the age and quality.

Good beef, when first cut, is a deep bluish red, which usually turns bright red when exposed to the air a few minutes, although the bluish tinge sometimes remains for a longer period.

Dark-colored flesh, in general, is characteristic of older animals, though exposure to a warm atmosphere will produce a dark color in the surface of any grade. A very pale or pinkish tinge, on the other hand, usually indicates immaturity.

The *fat* of all animals should be as white as possible, free from blood clots or spots, and of a firm, clear consistency. That of the highest grade beef is clear white, and varies in lower grades from white to yellow, though the outer fat of choice beef cuts may be quite yellow.

Beef from animals under fifteen to eighteen months old is not generally mature enough to be classed as "prime" or first grade, as the flesh is lacking in firmness or "substance" and "marbling," and has a high percentage of water; while that from animals three or four years old is usually too coarse in bone or grain of meat, though there are, of course, individual exceptions.

In short, besides being sound and of proper color, etc., a tempting appearance in meat requires a good shape—full, thick, and plump, according to the cut—even, smoothly cut surfaces, firm condition, and absence of all indications of coarseness in the flesh and bone—for example, careful attention to the size and shape of the "eye" or lean in a rib roast; the amount, character, and color of the bone, as well as the meat, in a pork chop; the smoothness, thinness, and quality of rind on a strip of breakfast bacon. An exception to the rule is the unattractive appearance of certain kinds of cured and ripened meats, such as Virginia hams, etc., the excellent flavor of which justifies their extremely high price.

Beef Cuts

The methods of cutting up animals for meat vary in different localities. The line of division between the cuts varies slightly, according to the usage of the local markets. The names of the same cuts vary also in different parts of the country.

The first method given here is that followed in the wholesale markets of the Union Stock Yards, Chicago, the largest establishments of the kind in the world; and since most of the American wholesale markets are supplied from these centers, the general divisions as given, according to the Illinois Experiment Station Bulletin No. 147, may be regarded as standard.

Note.—Since these lessons were prepared originally for the Boston Public Schools of Cookery, the diagram reprinted from the Boston Cook Book of Mrs. Lincoln is retained to show some of the points of difference in methods of cutting and in the names given to the subdivisions.

The body or "carcass" of beef is divided into halves or "*sides.*" Sides are divided into *quarters*, "*fores,*" and "*hinds.*" Sides are "quartered" between the twelfth and thirteenth ribs, except for export and for the Boston Market, for which they are cut between the tenth and eleventh ribs. It is customary to number the ribs from the neck backward. Beef carcasses contain thirteen pairs of ribs.

Quarters are divided into seven so-called "straight" cuts, the "straight" cuts handled in Chicago wholesale markets being loins, ribs, rounds, chucks, plates, flanks, and shanks. Four secondary cuts are also made: the hind-shank, rump, clod, and neck.

The *loin* is separated from the rump at the hip joint. The *flank* is cut from about the middle of the thirteenth rib to the opposite lower corner of the loin.

The *shank* is sawed off just below the second knuckle (shoulder joint).

The *plate* is cut off on a line extending from about the middle of the twelfth rib through the point at which the shank is removed.

The *rib* and *chuck* are separated between the fifth and sixth ribs.

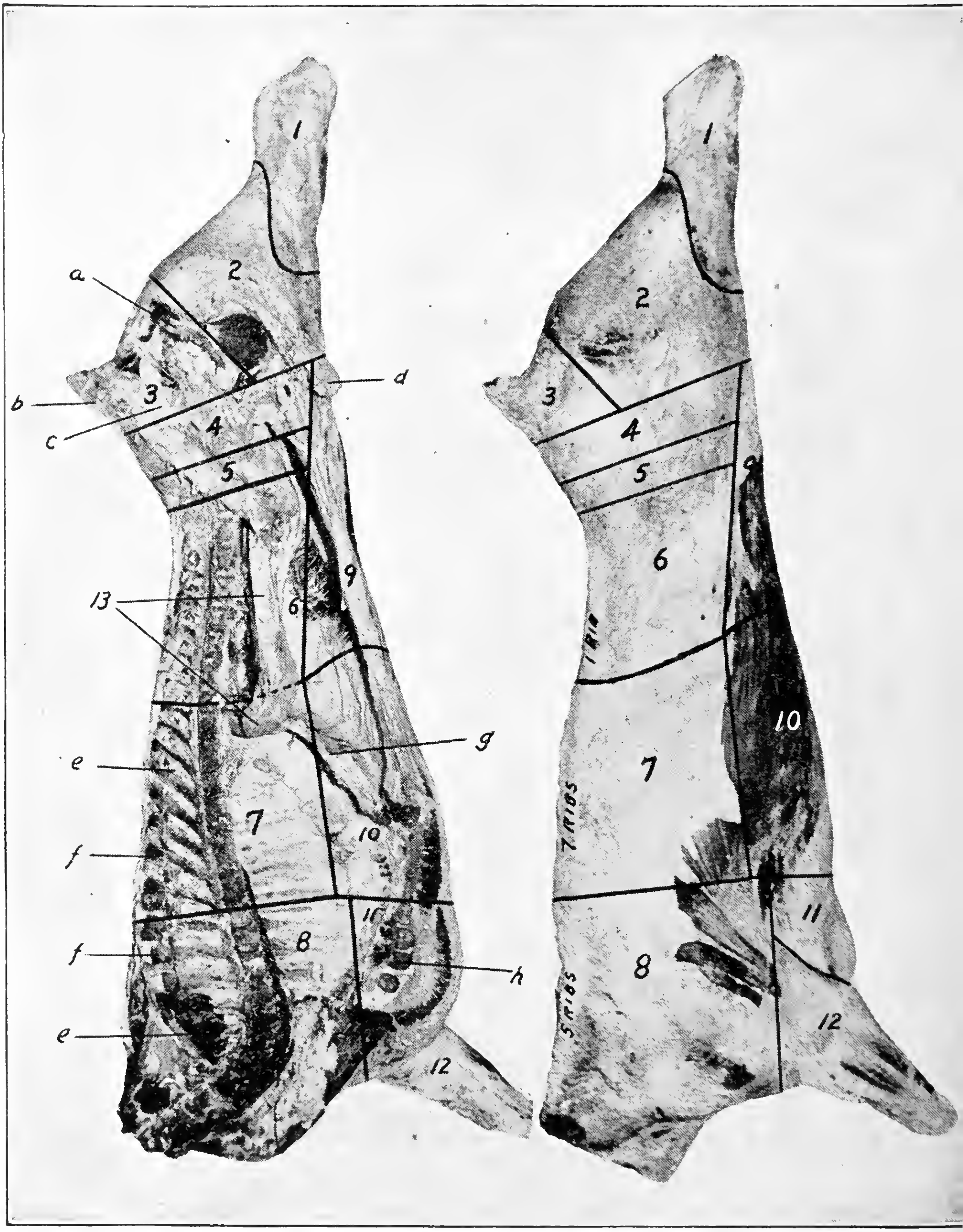

FIG. 1. BEEF CUTS — CHICAGO METHOD
Courtesy of University of Illinois Agricultural Experiment Station
(*See explanation on opposite page*)

Fig. 1. Beef Cuts — Chicago Method

(Illustration on opposite page)

I. Hind Quarter (1, 2, 3, 4, 5, 6, 9)	Full round (1, 2, 3)	1. Hind shank 2. Round (rump and shank off) 3. Rump	*a.* Aitch-bone *b.* Rump bone
	Loin (4, 5, 6)	4, 5. Loin end 6. Pinbone loin 5, 6. Flatbone loin 13. Suet	
	Flank (9)		
II. Fore Quarter (7, 8, 10, 11, 12)	7. Rib 8. Chuck		*c.* Chine-bones *f.* "Buttons"[1]
	10, 11. Plate	10. Navel 11. Brisket	*g.* "Skirt" (diaphragm)
	12. Shank		*h.* Breastbone

[1] Button-like knobs on the ends of the chine-bones. Their condition is an indication of quality, being white, soft, and cartilaginous in choice young animals.

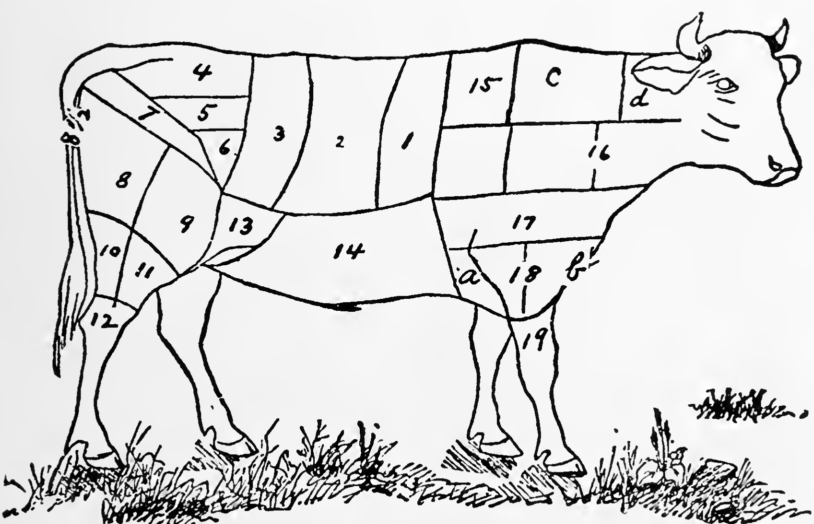

Fig. 2. Diagram of Ox — Boston Method

Reprinted, by Mrs. Lincoln's permission, from the Boston Cook Book

1. Tip of sirloin
2. Middle of sirloin
3. First cut of sirloin
4. Back of rump
5. Middle of rump
6. Face of rump
7. Aitch-bone
8. Bottom of round

8½. Top of round
9. Vein
10. Poorer part of round
11. Poorer part of vein
12. Hind shin
13. Boneless flank
14. Thick flank with bone
15. First cut of ribs

c. Chuck ribs
d. Neck
16. First cut of rattle-rand
17. Second cut of rattle-rand
18. Brisket (*a*, the navel end; *b*, the butt end)
19. Fore shin

Loin. The loin is the highest priced cut of the carcass, because of the tenderness and quality of the lean.

Several different cuts of the loin are used extensively as wholesale cuts, particularly in loins below the first grade. The regular or "pinbone" short loin is the portion between the thirteenth rib and hip bone (pinbone) inclusive, and includes about half of the full loin. It contains porterhouse or T-bone, and club or short steaks, and is valued at 40 to 60 per cent more per pound than the full loin. This cut is made in three grades.

The remainder of the full loin is called the "loin end" or "butt end," and is valued at about one-third less per pound than the full loin. It is used for sirloin steaks.

If the short loin is cut off midway between the pinbone and the butt end of the loin, it is known as a flatbone short loin. It sells lower than the pinbone loin.

The tenderloin ("beef tender" or "fillet of beef") is a long muscle lying between the kidney fat and backbone, and extending from the thirteenth rib to the butt end of the loin. As the name implies, it is a very tender piece; and the great demand for it, notwithstanding its lack of juiciness and flavor as compared with other parts of the loin and the rib, is a striking example of the importance of tenderness in the esteem of buyers. Tenderloins sold separately are taken principally from the lower grades of cattle. Loins from which the tenderloin has been removed are called *"strip loins"* or *"strips."* Strips are usually cut into the *sirloin strip,* or stripped short loin, and the *sirloin butt,* which is virtually a stripped loin end.

The lowest grades of strips and butts are often boned out, in which case they are known as *boneless strips* and *boneless butts,* respectively. They are almost entirely used for restaurant and hotel trade, to be cut into small steaks. Large quantities are frozen during the cutting season.

The names applied to different portions of the loin vary considerably in different localities. The part nearest the ribs is frequently called "small end of loin" or "short steak." The other end of the loin is called "hip sirloin" or "sirloin." The portion between the short steak and the sirloin is quite generally called the "tenderloin," for the reason that the real tenderloin, the very tender strip of meat lying inside the loin, is found most fully developed in this cut.

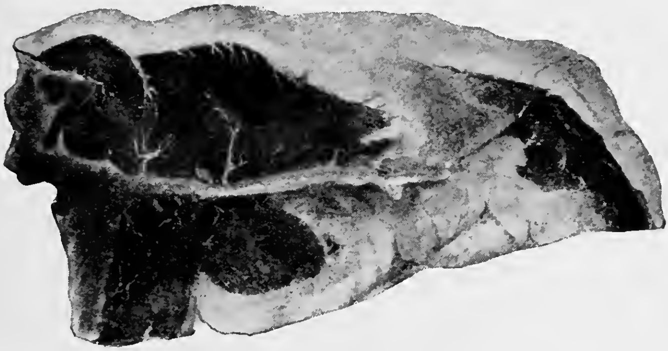

FIG. 3. PORTERHOUSE STEAK (flank trimmed off)

From this portion of the loin are cut the porterhouse or T-bone steaks, which include the choicest part of the tenderloin or fillet. Short or club steak, lying between the porterhouse and ribs, contains no tenderloin and has less flank and more bone than sirloin. Porterhouse from which the tenderloin has been removed is also called short steak. It is sometimes called "Delmonico" steak in and near New York, because, it is said, the custom at that hotel was to remove the entire tenderloin from the whole porterhouse cut and serve the top as small steaks, the tenderloin being then used for large fillets or tenderloin steaks.

Rib. This cut includes the portion between the loin and the chuck, and is also known as the prime or standing rib. As the loin contains the choicest steaks, the rib contains the best roasts.

The rib is frequently divided into first, second, and third cuts. The last lies nearest the chuck and is slightly less desir-

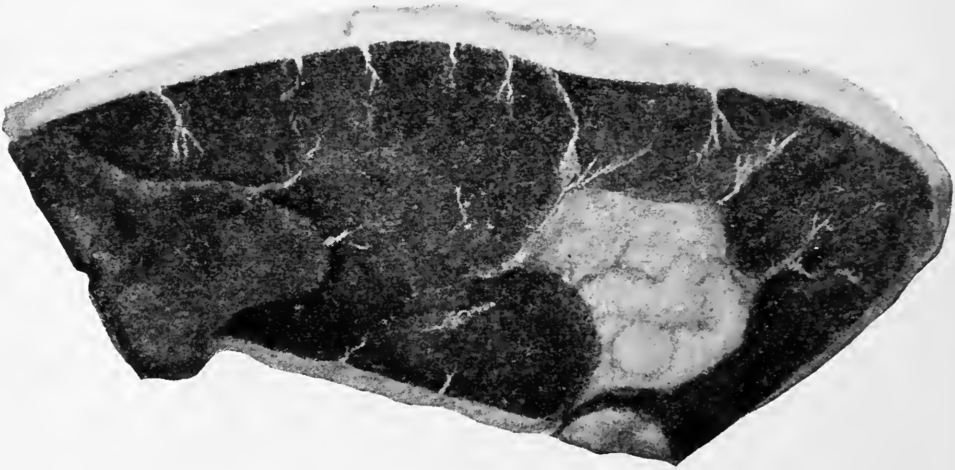

FIG. 4. FLAT-BONE SIRLOIN STEAK

FIG. 5. ROUND-BONE SIRLOIN STEAK

able than the former. The greater degree of tenderness and general quality in the first cut makes it the most popular and therefore the highest priced of the rib roasts; but as beef roasts are valuable primarily for the lean meat they contain, the sixth rib is the leanest and consequently is the most economical at a given price. The rib cut may be roasted as it stands ("standing rib"), or it may be made into a short rib roast by cutting off part of the bone; or the bone may be removed and the meat rolled up and tied. A rolled rib roast is easier to cook, but loses somewhat in flavor.

Rounds. The full round (1, 2, 3, Fig. 1) is subdivided into three cuts: rump, round (or buttock), and shank—the buttock

FIG. 6. ROUND STEAK

being the round proper after removing the rump and shank. The cut surface of the full round being identical with the butt end of the corresponding loin, the conditions as to grain, marbling, color, etc., at that point determine the grade in each case alike. The shape of rounds varies considerably, and upon this depends the proportion of steaks which can be cut. The buttock is wholly suited to cut as round steaks, those nearest the rump being of best quality because containing larger muscles and less waste. The portion of the round on the inner side of the leg is more tender than that of the outer. As the leg lies on the butcher's block, this inner side of the round is usually on the upper or top side, and is therefore called "top round." It consists of one large section or muscle, with a thick edge of fat; while the under part, or bottom round, has two sections, with little fat and thin skin.

The rump, when used fresh, is usually sold as *rump butt,* or *boneless rump.* This is made by cutting out the aitch-bone (hip bone) and trimming off square at the loin end, leaving a boneless cut (except the "tail-bone"). It is used mainly for corned beef. In some markets, as Boston and Philadelphia, the rump is cut so as to include a portion of the loin (hip or thick sirloin), and is then sold as rump steak. Rump steaks cut parallel to the backbone and with the grain of the meat are tough, and as steaks cut at right angles to these—"cross cut of rump"—are generally juicy and tender and include a portion of tenderloin, they therefore command a higher price. For roasting, the rump is sometimes divided into back, middle, and face (see *Boston diagram*). The back is the best cut for this purpose, the most tender portion being that nearest to the loin.

The hind shank consists of about equal parts of bone and boiling meat. The latter, as a retail cut, is known as the "heel of the round" or "horseshoe piece." Shank meat is principally used, however, for Hamburger steak, sausage trimmings, and similar purposes.

Chucks. Nearly equal parts of the chuck are retailed as shoulder steaks and boiling pieces, and a roast may be cut from the last two or three ribs of the first quality chucks.

Pot roasts are cut from the lower or shank side, and stew and soup meat from the neck. The proportions of the chuck which are suitable for roasts, steaks, and boiling vary greatly, according to the thickness and shape.

The style of cutting shown in Figure 1 is known as the square chuck, and is the style most used in Chicago wholesale markets. Chucks are sometimes cut "knuckle out" by removing the shank with a knife to the second knuckle (the upper or shoulder joint), instead of sawing off below the joint.

The lower grades of chucks are often further divided, in order to make the cut more salable. Such cuts are the *shoulder clod* and *boneless chuck*. (See Beef Retail Cuts.)

The shoulder clod is a wedge-shaped piece cut from the fleshy part of the chuck just back of the shoulder blade, and extending from the elbow of the shank nearly or quite to the backbone. It is used for steaks and roasts, especially in restaurants and small hotels. In some cases it is smoked and sold as "dried beef clod."

Boneless chucks are cut "knuckle out" and have the shoulder blade and ribs removed. They are used principally for sausage. Necks and neck trimmings are also used for sausage meat, and are used to some extent fresh, for soup, hash, and mincemeat.

Plates. Briskets and navel ends are wholesale cuts made from plates by cutting them in two between the sixth and seventh ribs, the navel containing about three-fifths the weight of the plate. Corned briskets and navels are sold in most retail markets, and the latter when boned are called "beef rolls." Briskets, during recent years, have become more generally used, and now command a price one-third higher than navels. The thick end of the brisket—"fancy brisket"—is considered superior to the thinner end.

Flank. The flank is a boneless cut, and its quality and grade depend entirely upon the thickness and quality of the lean and fat. Flanks are principally corned, some, however, being retailed in the form of flank rolls, either fresh or corned. The flank contains a cut known as "flank steak," which forms about

10 per cent of the flank weight. In other words, flank steak may vary from about two pounds to less than one pound in weight.

Shanks. Except when otherwise specified, this term refers in the market to fore shanks, or "shins." The hind shanks have been described in connection with rounds. A large percentage of the supply of shanks are boned in the packing house, the meat being known as "shank meat," and is used for sausage. Shanks that are sold fresh are sold for soup meat and stews, especially in winter. They sell about one-third higher than hind shanks.

VEAL[1]

Calf carcasses weighing less than three hundred pounds, with comparatively light-colored, fine-grained flesh, are classed as *veal.*

Veal may weigh anywhere from fifty to three hundred pounds, the average weight varying greatly with the season, being lighter in April or May and becoming heavier as the season advances.

Calves under three weeks old, weighing fifty pounds or less, are usually condemned by the food inspectors as unfit for food; such calves are termed "bob veal." The choicest veal is from calves from four to six or eight weeks' old which have been fattened on milk, well sheltered, and which have had very little exercise. These are known as "Natives," having been raised and dressed for veal in the country at no great distance from the markets, and may weigh from eighty to one hundred twenty pounds. The calves termed "Westerns" have had less care and nourishment and much exercise and exposure, being often shipped on foot from long distances. They are consequently less choice. "Westerns" are best at eight or ten

[1] University of Illinois Agricultural Experiment Station Bulletin No. 147.

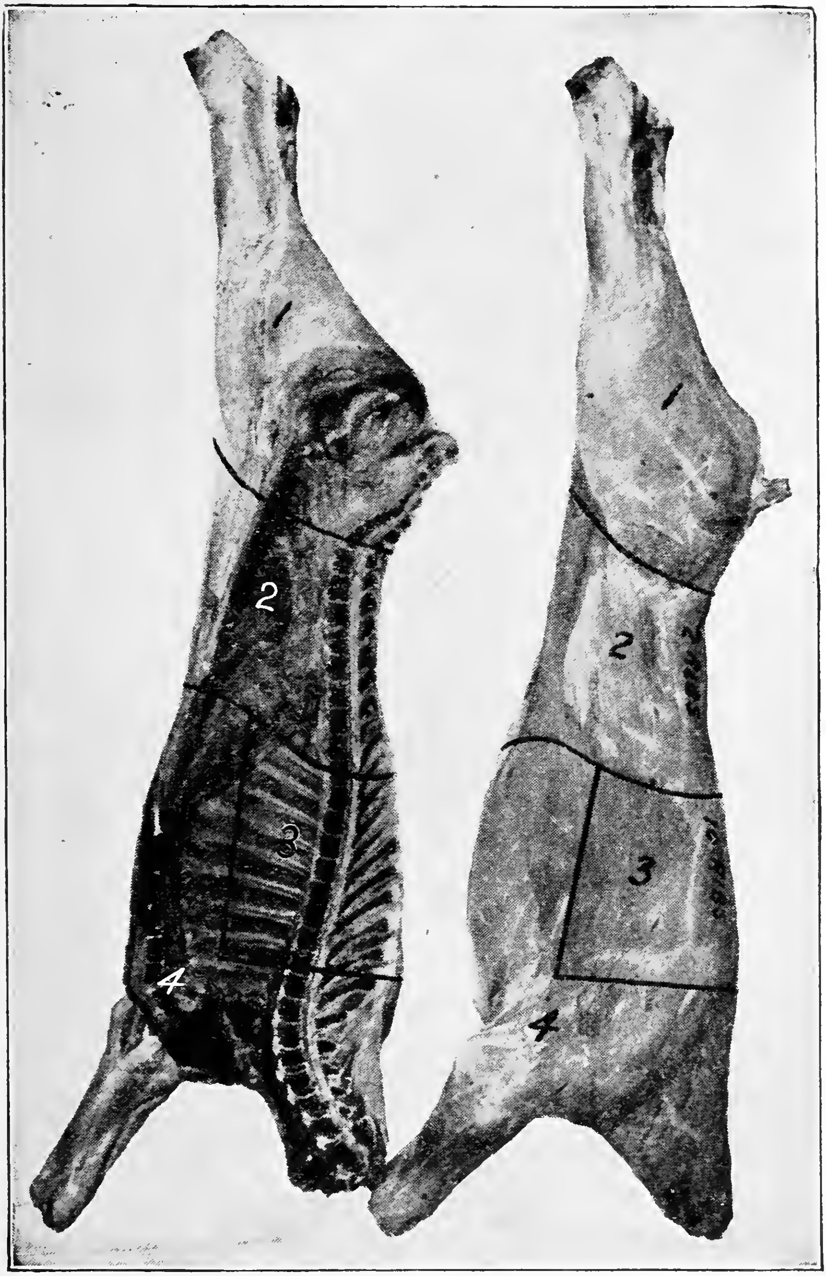

FIG. 7. WHOLESALE VEAL CUTS

Courtesy of the University of Illinois Agricultural Experiment Station

1, 2.	Saddle (2 hind quarters)	1. Leg	3. Ribs
3, 4.	Rack (2 fore quarters)	2. Loin	4. Stew

weeks. A large proportion of Western calves are frozen during the summer and fall and held for winter trade, those weighing from one hundred to one hundred seventy-five pounds being most used for this purpose.

The skin of calves is often left on in order to preserve the color and moisture of the flesh, as veal dries out and turns dark much more rapidly than beef when exposed to the air.

Quality in Veal. The flesh of veal varies in color from almost white to light red. The best veal is a light pink, as nearly white as possible; it should be firm in consistency rather than soft and flabby, smooth and velvety in appearance, and should have an abundance of "baby fat." Dark-colored, coarse-grained flesh and white, hard bones indicate advanced age, insufficient nourishment, or too much coarse feed.

The shank bones should be small, and the backbone and breastbone soft or spongy and red; the ribs of choice young calves are also red with blood. Soft cartilages, or "buttons," on the chine bones and brisket or breastbone also indicate desirable quality.

Fat. No marbling of fat is found in veal as in beef. The outside fat consists only of the "fell" (a thin membrane which covers the carcass) and more or less "baby fat" at the flanks, brisket, and rump.

Veal, being from immature animals, is lacking in flavor; and being deficient in fat, contains a high proportion of water, and for that reason easily dries in cooking. It is less nutritious and also less readily digestible than beef or mutton, and should be very thoroughly cooked. Little veal is canned or cured, owing to the demand for fresh veal and the difficulty of curing it satisfactorily.

Veal Cuts. Skinned carcasses are either split through the backbone, making two equal sides, or, for convenience in handling, divided crosswise into two sections of nearly equal weight, which are known as "saddles" and "racks." The two hindquarters together constitute the "saddle" and the two fore-quarters the "rack," the line of division being in some markets between the eleventh and twelfth and in others between the tenth and eleventh ribs. The value of a saddle depends upon the quality and size of the loin chops and leg roasts or cutlets which can be cut from it. The two loins are often sold in one piece. Racks are judged by the thickness, quality, and color of the flesh, the softness and color of the backbone, and shortness of shank and neck. The part of the rack most valuable to the retailer is the rib-cut or "hotel rack," used for chops. The remainder of the rack, including the breast, shank, and shoulder in one piece, is known as the "stew" or chuck.

Sides are divided into fore and hind quarters. The main fore quarter cuts are neck, shoulder, ribs, and breast, and those of the hind quarter, leg and loin. The most valuable part of veal is the leg. The thick portion which in mature beef is the comparatively tough round is in veal the choicest portion. This when cut into one round, solid piece is known as the *fillet;* when cut into slices, these are termed *cutlets* or *steaks*. The choicest part of the fillet is termed the *fricandeau*. The lower part of the leg at about the knee is called the *knuckle*. Below this is the *shank*. Other portions of the calf used as food are the head, brain, tongue, sweetbreads,[1] heart, liver, and feet. The bones from veal yield a considerable proportion of gelatin, that obtained from the feet being especially valued for making "calf's-foot jelly."

[1] Sweetbreads include two distinct organs, the pancreas and the thymus glands of the calf or lamb. The thymus glands are found in the back of the throat, and are therefore termed "neck-" or "throat-sweetbreads," while the pancreas lies in the breast, and is known as the "heart-" or "stomach-sweetbread."

MUTTON AND LAMB[1]

The terms "mutton" and "lamb" are used somewhat loosely to designate the meat from the older and younger sheep. In some localities the term "mutton" is applied to all but young animals; in others, its use is limited to the flesh of full-grown sheep, the latter being perhaps the commonest usage in this country. The flesh of sheep under one year is called lamb. The term "yearling" is applied to the class intermediate between sheep and lambs, which are not mature enough to be classed with sheep, but are too old and usually too heavy to be classed with lambs. Dressed lambs seldom exceed fifty pounds in weight, the minimum weight being fifteen or twenty pounds, while yearlings average forty to fifty pounds. No distinct line, however, can be drawn between the two, either in weight or in degree of maturity.

Mutton and lamb are sold almost entirely as fresh or frozen meats, and the bulk of the supply, except those which are frozen, is disposed of a week or ten days after killing. A few fat, heavy sheep, only, are held in the chill rooms for ripening. Only a small percentage, and that of the lowest grades, is canned, and practically none is cured. The demand for lamb is large in comparison with mutton, owing to the superiority in tenderness and flavor of the former.

Good mutton should be covered evenly with firm, white fat. The amount of fat covering the carcass varies more or less with the grades of mutton, from choice to common, the lowest grades having practically no outside fat. The kidney fat is an important indication of quality. This should be well developed, but not excessive. Both the covering and kidney fat should be firm, white, brittle, and flaky. The marbling of the flesh with

[1] University of Illinois Agricultural Experiment Station Bulletin No. 147.

fat is less developed and is considered of less importance in judging mutton than beef,

The flavor of mutton is influenced by the age, sex, and food of the animal. Mutton absorbs bad odors readily, and for this reason special care must be exercised in preparing it for market and also in storing it.

The flesh should be firm and fine-grained, with no appearance of the coarseness or stringiness due to age or inferiority. The color of the flesh varies from light pink in lambs to dull red in mature mutton, and is less variable than in beef.

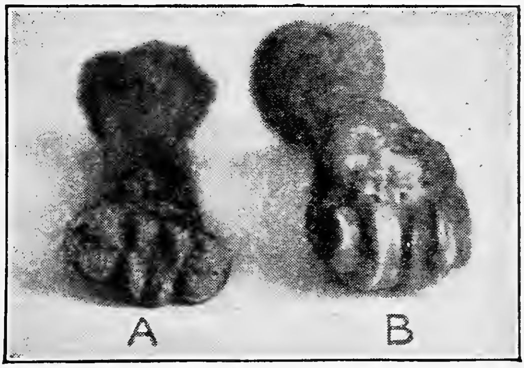

Fig. 8
A. Break or Lamb Joint. B. Mutton or Round Joint
Courtesy of the University of Minnesota, Department of Agriculture

The bones are an important indication of the maturity of the carcass. In lambs the bones of the breast, or brisket, are soft and red, and the ribs and shank bones are colored by blood vessels. The shoulder blade in young, well-fed sheep is a white, soft cartilage, which gradually changes to bone, according to the age of the animal. In mature sheep the bones are white and hard.

The "break-joint" distinguishes lambs and yearlings from mature sheep. The "break-joint," or "lamb-joint," is a temporary cartilage which forms a toothed seam or joint in the head of the shank or shin bone, immediately above the ankle. In lambs and some yearlings the foot can be broken off at this cartilage, giving the end of the shank a saw-tooth shape; in lambs the broken surface is smooth and moist, and in yearlings it becomes more porous and dry. The shanks of mature sheep will not "break" because the cartilage has knit and hardened into bone. The foot is therefore taken off at the ankle instead, making what is called a "round-joint."

The majority of dressed lambs are known as "spring lambs" from June to December; after August, however, they are frequently quoted as lambs. Frozen lambs are sold regularly, though in small numbers, during the winter and spring. The terms "yearling lambs" and "fall lambs" are frequently used during the spring and summer with reference to lambs approaching yearlings in age, but somewhat similar to spring lambs in size and shape. These terms, however, are used somewhat loosely, and do not denote distinct sub-classes.

The term *genuine* spring lambs is used during April, May, and June to differentiate early spring lambs from other lambs which resemble spring lambs in quality and weight, such as frozen lambs stored since the previous summer and light "yearling lambs." It is gradually dropped after the regular supply of spring lambs in May and June, the beginning of the season being about April. The earliest are known as Easter lambs, a large proportion of which are consumed by the local Jewish and Greek population, who use them in connection with religious customs. Winter ("hothouse" or "incubator") lambs are light-weight young lambs which precede spring lambs in the market by two or three months, being in season from January till May, a small number being available at Christmas. They are similar to early spring lambs, but are of lighter average weights and show better development in proportion to their age. Being marketed in advance of the spring lamb season, they sell at the highest prices. Few of these pass through the wholesale markets, being usually shipped to commission firms or direct to hotels, clubs, etc. The few that are sold in retail markets are sold by the quarter and not by the pound.

Choice lambs are short, compact, and thick, with flesh of the lightest color and finest grain, small bones, and an even covering of white fat. Short, broad, plump legs and full, thick backs and loins contribute most to the desired form, since these are the highest priced cuts.

The mutton carcass, like that of veal, is usually divided into two pieces of nearly equal weight, the saddle and the rack. When separated lengthwise, a saddle gives two hind quarters and a rack two fore quarters.

Mutton and lamb carcasses are also sometimes split lengthwise into halves, and the halves divided into quarters.

The wholesale cuts as given are standard in Chicago markets. (See p. 204.)

Only a small percentage of mutton saddles and still fewer lamb saddles are cut up in wholesale markets. When divided, the saddle is separated at the hip bone into leg and loin. About one-fourth inch depth of fat over the loin is considered the most desirable for choice mutton saddles of medium weight, and about one-eighth inch for choice lambs. The term "saddle" as used in cookery refers to the two loins cut from the carcass in one piece. In judging mutton cuts, thickness and quality of flesh and depth of fat covering are especially important; and the degree of each may be readily determined by examining the "eye" of mutton, that is, the lean flesh covering the ribs and near the backbone. It should be deep and well-rounded rather than flat.

The color of the lean varies from a dull brick red to a dark red, the former being preferable. Fine fiber or grain, smooth, velvety surface, and firm consistency of flesh are characteristic of choice mutton cuts. The regular or "market rack" is divided into the "short rack," or ribs, and the "stew."

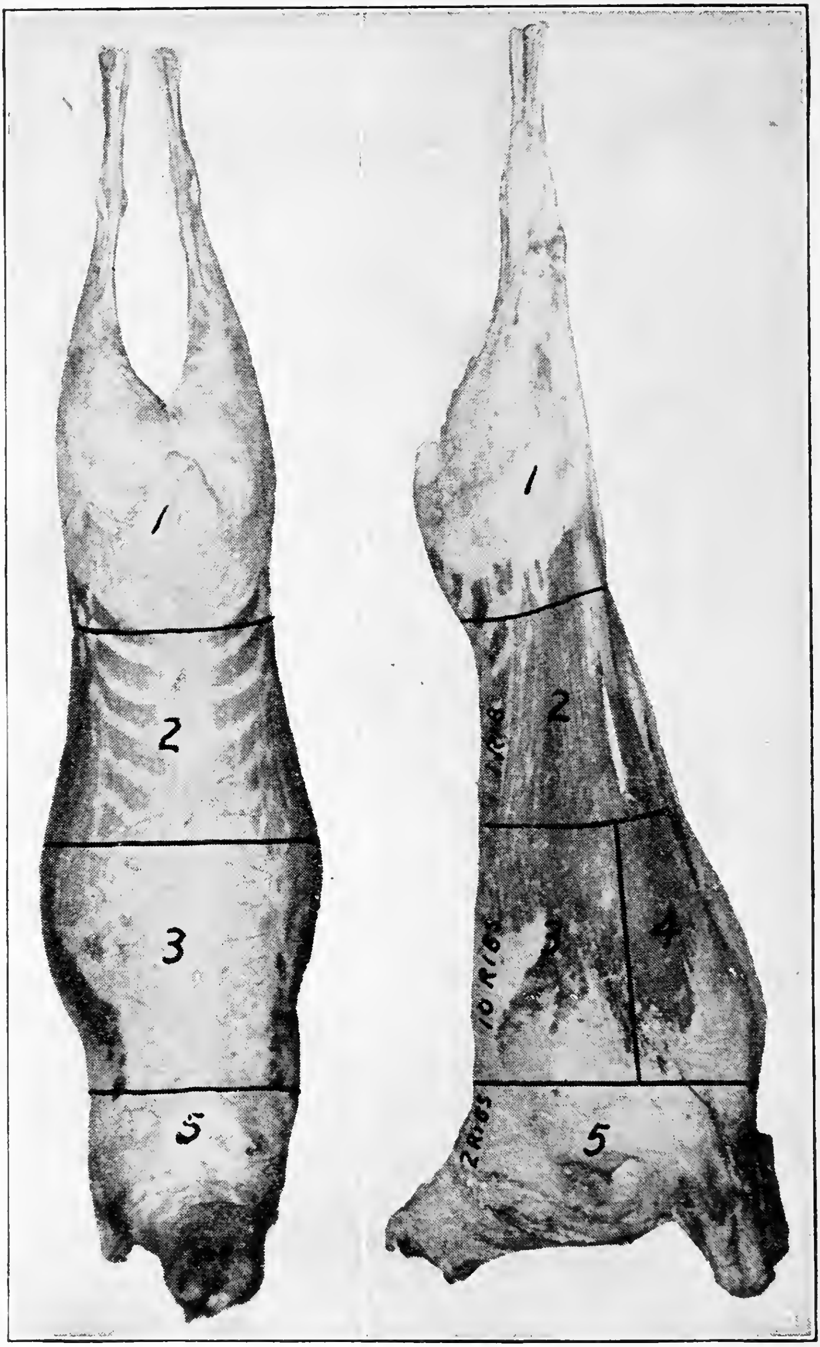

FIG. 9. MUTTON AND LAMB CUTS

Courtesy of University of Illinois Agricultural Experiment Station

A. Whole carcass

1, 2. Saddle (2 hind quarters)

3, 4, 5. Rack (2 fore quarters)

B. Side

1. Leg
2. Loin

3. Ribs or Short Rack
4. Breast[1] } Stew
5. Chuck }

[1] Breast of lamb is also called the plate.

The "short" or "hotel" rack usually consists of the ribs—the third to the twelfth, inclusive—but is cut variously in different markets so as to include from eight to twelve ribs. The short rack brings the highest price per pound of the whole carcass, the legs, loin, and "stew" following in the order named. Legs were formerly in greater demand than ribs, but the retail demand for ribs now exceeds that of all other cuts.

A "long rack," or "back," consists of loin and short rack cut in one piece. This can be cut entirely into chops, and is consequently in demand for hotels, restaurants, etc., and by high-class retail city markets.

A mutton "stew" consists of the shoulder, breast, and shank in one piece. This is the cheapest portion of the carcass, but with proper treatment may be one of the most economical and satisfactory. It frequently sells at less than one-third the price of short racks and one-half that of legs of the same grade.

Lambs are more largely sold in the carcass than sheep, owing both to their smaller size and to the relatively greater demand for the cheaper cuts of lamb.

Unlike beef, a half or quarter of a mutton carcass can be often conveniently used in many households, especially in cold weather, and will supply a variety of cuts; and when bought in this way the cost per pound is generally less. By cutting from the half or quarter as needed, less surface will be exposed, the meat will keep better, and there is less waste by evaporation.

Method of Dividing a Side of Mutton for Household Use:[1]

In cutting, the leg of mutton is separated from the loin at the hip bone, but may be cut farther back if a small leg is wanted, or farther forward if a larger leg is desired.

[1] Extension Bulletin No. 45, the University of Minnesota, Department of Agriculture.

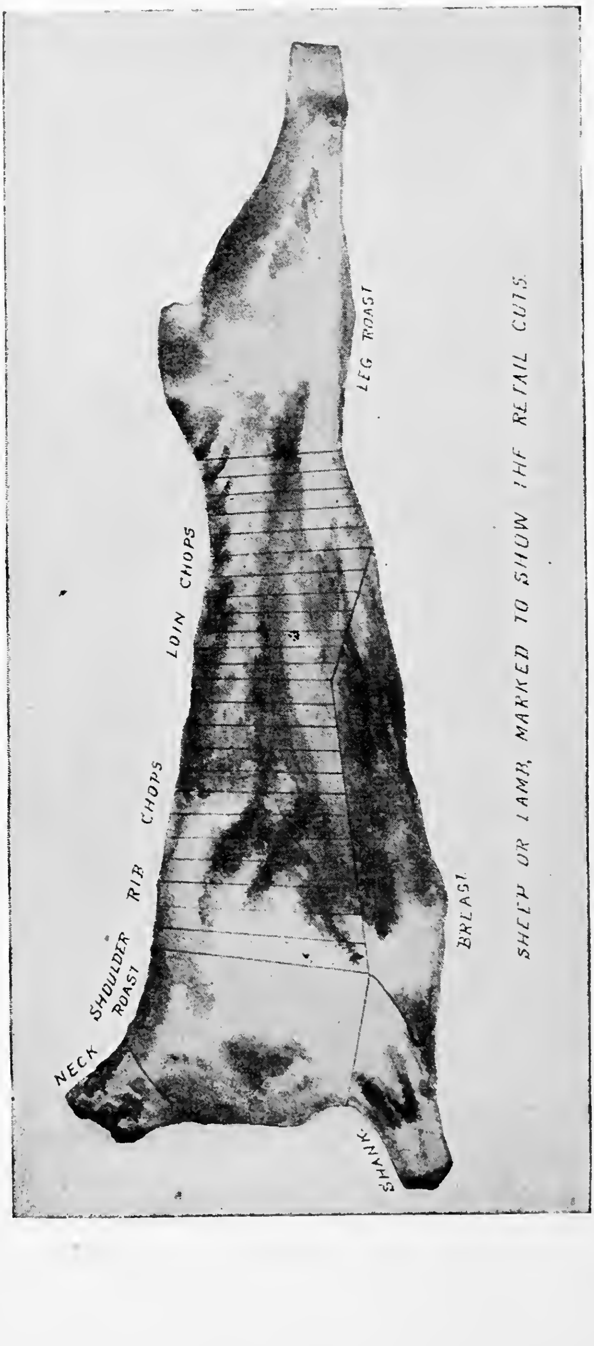

FIG. 10

Courtesy of Louis D. Hall: "Better Meat for Less Money," in *Good Housekeeping*, December, 1912

Legs are used for roasting and for boiling and for cutlets or steaks. Steaks should be cut from the loin end or front of the leg, this part corresponding to the "top-round" in beef. If a leg makes too large a roast, a few steaks may be cut from it. A leg from an old, thin animal should be boiled rather than roasted.

The leg, although one of the high priced cuts, compares favorably from the economical standpoint with some of the cheaper cuts because it is thick and "meaty," and a trimmed leg has a relatively small proportion of bone. In trimming a leg, be careful not to expose or cut into the lean meat, as it will then shrink more in cooking and be less juicy than if the meat were covered with fat.

The sheep carcass is covered by a thin membrane termed the "fell," the removal of which before cooking the meat will lessen the strong flavor.

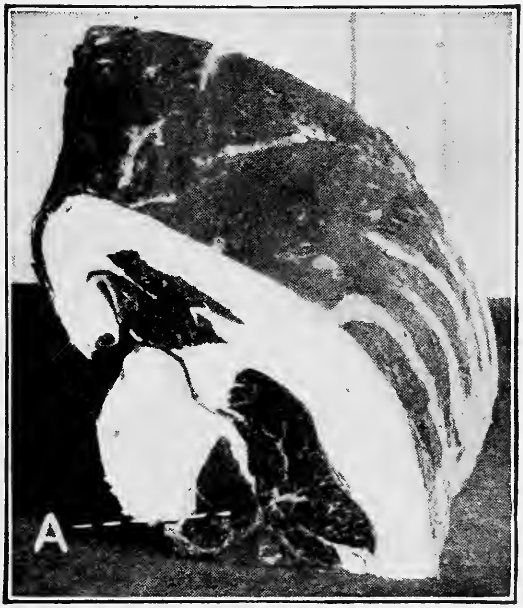

FIG. 11. THE LOIN
A. The tenderloin
Courtesy of the University of Minnesota, Department of Agriculture

Loin. The loin gives the best chops and one of the best roasts. It can always be recognized by the tenderloin, which is the small muscle situated under the projecting spines, or "spinous processes," of the backbone of this region. (See Fig. 11, A.)

To prepare a loin for roasting, cut it in pieces of suitable size, then cut through the joints along the backbone with a cleaver, to aid in carving the meat when cooked; avoid cutting

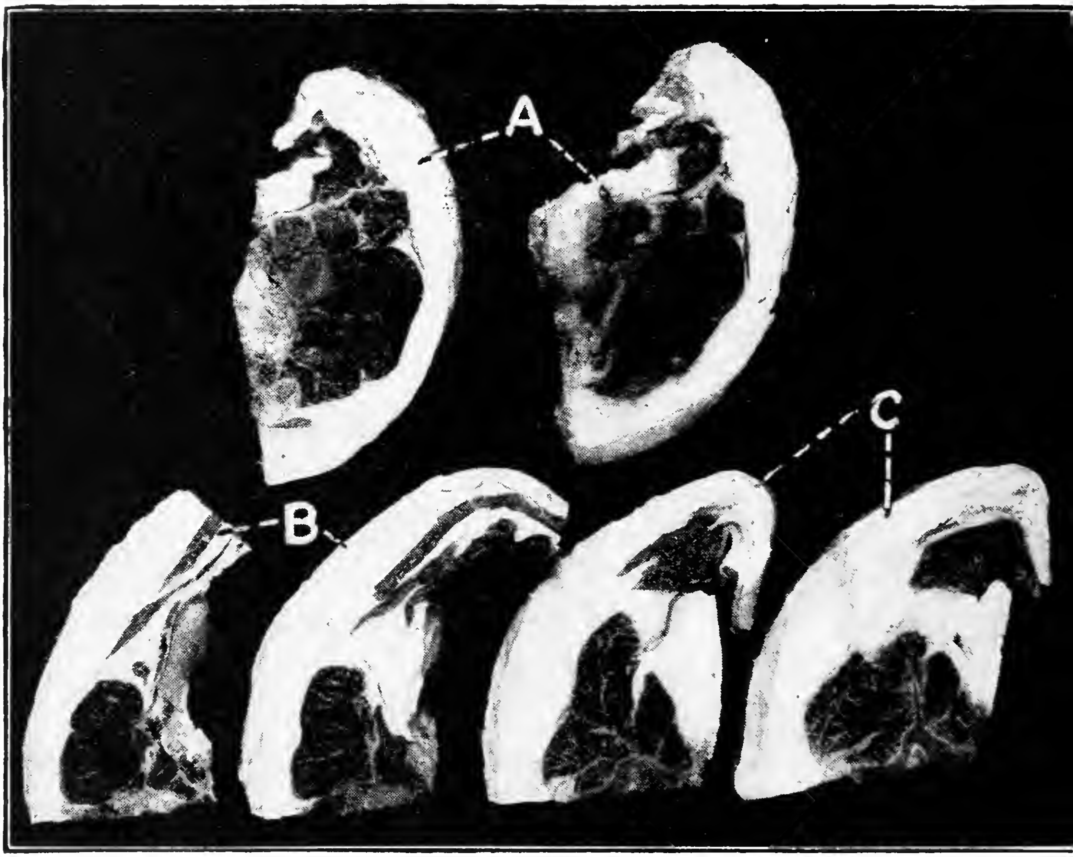

FIG. 12. LOIN CHOPS
A. Chops from rear end of loin. B. Chops from rib end. C. Best chops from middle
Courtesy of the University of Minnesota, Department of Agriculture

too deeply into the flesh, and thus causing more waste in cooking.

Loin Chops. Loin chops are also called "kidney" or "English" chops. Chops, to be juicy when cooked, should not be cut less than three-fourths of an inch thick.

Loin chops vary in quality, those from the rear end and from the rib end being less desirable than chops cut from the middle of the loin (which corresponds to the porterhouse or "T-bone" in beef), because they have more of the tough flank muscle and less of the tenderloin. (See Fig. 12.)

Rack or Ribs. The rack or rib cut is used for the same purposes as the loin, that is, for roasts and chops.

Rib Chops. Rib chops are ordinarily cut one chop for each rib. If too thick, one chop may be cut with the rib and one between, but such chops are too thin to grade as first-quality chops.

Rolled Chops. Rib chops are often boned, rolled, and fastened together with small skewers, thinner chops being generally chosen for this purpose.

"French chops" consist of rib chops with the end of the rib trimmed clean of flesh and fat, leaving only the "eye" of lean with its bone and covering of fat; the latter is also sometimes removed, leaving only the lean attached to the bone. (See Fig. 13, C.)

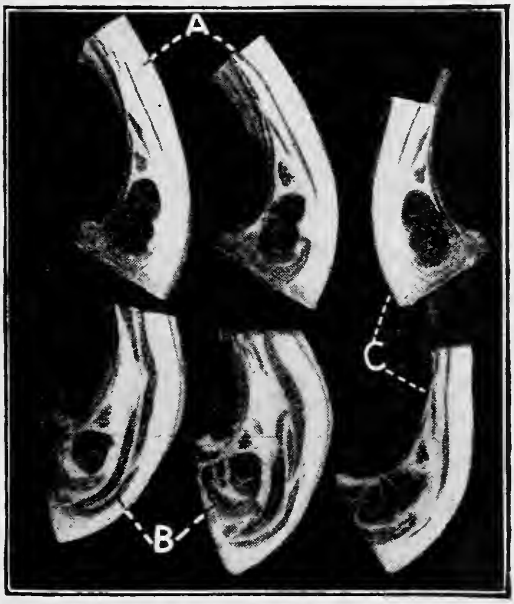

FIG. 13. RIB CHOPS
A. Chops from 10th, 11th and 12th ribs. B. Chops from the shoulder end of ribs. C. French chops
Courtesy of the University of Minnesota, Department of Agriculture

Chops from the tenth, eleventh, and twelfth ribs are the best, as the lean portion consists of one large muscle; chops cut near the shoulder (Fig. 13, B) contain more muscles, which are apt to be tough. When the *amount* of lean is considered, however, chops from the shoulder end of the rib are more economical than those cut from the loin end. The outside skin, or "fell," should be removed from all chops before cooking. (See Fig. 14.)

As a roast, the rib is used either as a plain rib roast or as a crown roast. To prepare for roasting, have joints cut through along backbone and sawed once across the rib. A roast will be neater and of better quality if the lower, thinner portion of the ribs is cut off. These may be used for broth or stew.

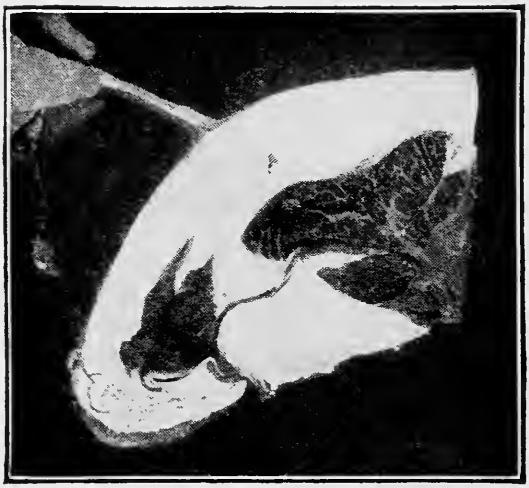

Fig. 14. Removing "Fell" from Chop

For a crown roast the same number of ribs from both sides of a rack of mutton or lamb, having ribs from each side which correspond to each other, are required. Have joints in the backbone split open, and roll back the flesh or scrape it from the bones between the ribs as far down as the lean meat (as in French Chops). Bend back and shape each piece in a semicircle, having ribs on the outside, and trim the ends of the bones evenly and rather short. Place the two corresponding ends together and tie or sew them to form a circle, or crown. (See Fig. 16.) In roasting, protect the ends of the bones from the intense heat by covering them with cubes or strips of fat salt pork or bacon, which are removed before serving. A cup is sometimes pressed into the center to preserve the shape, and after roasting the cavity may be filled with cooked green peas or with cubes of turnip.

Shoulder. The shoulder is a useful cut, as it may be roasted, stewed, or cut into steaks, depending upon the skill with which it is cooked, for the flavor of a choice shoulder is equal or superior to the loin and only half as expensive. The shoulder is usually removed by cutting between the third and fourth ribs, but it may be made longer or shorter, according to the use to be made of it. Two kinds of steak are cut from the shoulder: the *shoulder-blade* steak, which is cut with the rib; and the *shoulder* or *arm* steak, cut across the lower part of the shoulder. These steaks should not be cut as thick as loin chops or rib chops, because the muscles of the shoulder are tougher and somewhat "stringy." The front leg or front shank is tough and contains a large proportion of bone. It is generally used for broths and stews.

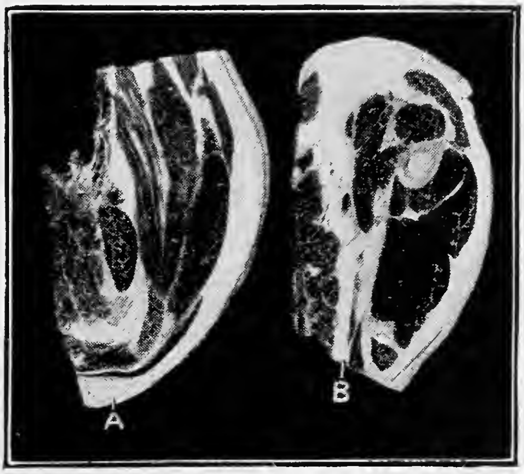

FIG. 15. SHOULDER STEAKS
A. Shoulder-blade Steak. B. Shoulder or Arm Steak
Courtesy of the University of Minnesota, Department of Agriculture

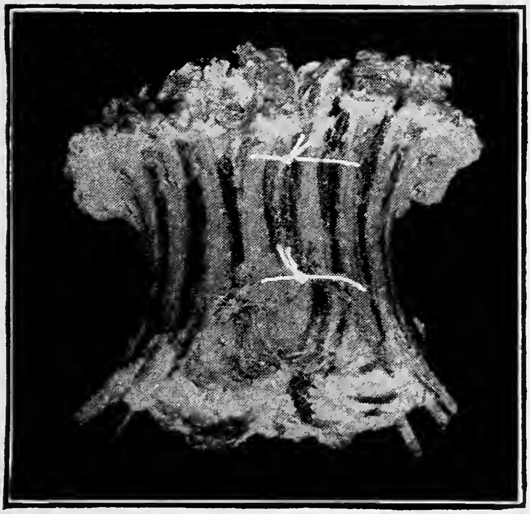

FIG. 16. CROWN ROAST
Courtesy of the University of Minnesota, Department of Agriculture

Flank, and *Plate* or *Breast*. These are ordinarily cut up into small pieces, which are used for stewing. The *plate* is often called the breast. It is used sometimes for a "pocket of lamb" by separating the muscles so as to form "pockets" to hold dressing.

In trimming the flank and plate, or breast, cut a narrow strip along the inside edge (Fig. 17, C) as far as the breastbone, then

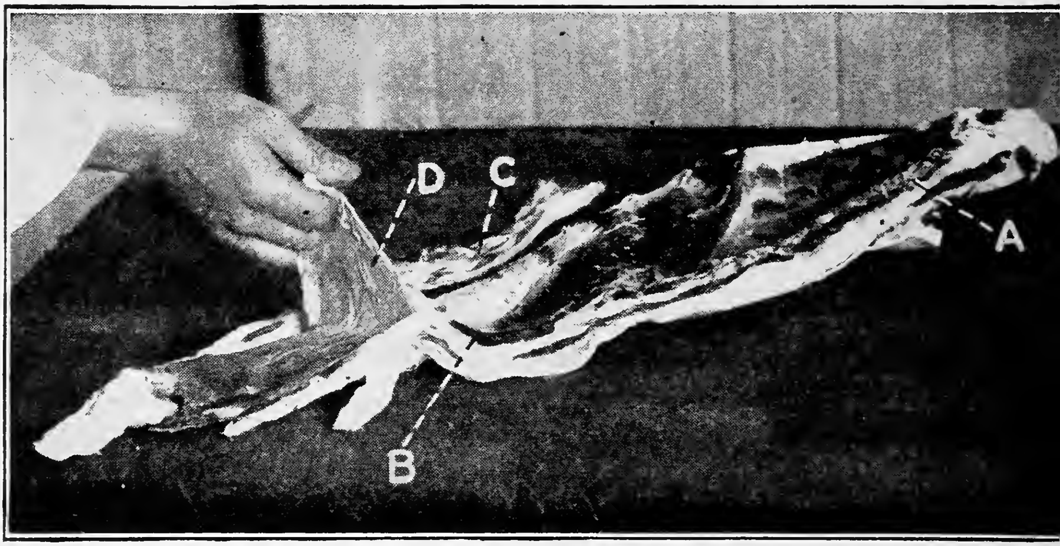

FIG. 17
A. The Plate. B. The Flank
Courtesy of the University of Minnesota, Department of Agriculture

pull the tough membrane from the flank. To do this, start just back of the diaphragm, or "skirt," and pull back the membrane until a heavier, whiter membrane is reached. Cut across this membrane and pull it off, as it is very tough. (See D, Fig. 17.)

NOTE.—Flanks and plates can sometimes be bought very cheaply, especially at markets which have a large chop and roast trade.

The *neck* is used entirely for *stews* and *broths*. The quality of the stew is improved by removing some of the large bones from the neck. The neck is removed by turning the shoulder front side downward and cutting the neck off squarely level with the back. This leaves a square shoulder.

Trimmings. All the lean, clean trimmings obtained in the preparation for cooking of different cuts may be used for stew. The kidneys, the heart, tongue, head, brain, and sometimes the feet are used for food.

Concerning their food value, *Farmers' Bulletin 526* states that mutton and beef have nearly the same composition. The percentage of waste differs very slightly in the two, being on an average a little less than 20 per cent in each. In the edible portion the percentage of protein is practically the same, averaging about 18 per cent in the beef and 16 per cent in the mutton. It is only when the fat is considered that any considerable difference is noted. The percentage of fat differs very slightly in the two, averaging about 20 per cent of the edible portion in medium fat beef and a little over 30 per cent in the corresponding kind of mutton. Water is correspondingly low in the mutton and high in the beef, being about six-tenths, or 60 per cent, of the total weight in beef and about five-tenths, or 50 per cent, of mutton. As stated in this Bulletin, these figures refer to the average of many samples of the two kinds of meat, and as the variations in different samples of either meat are wider than the differences between the average values, the custom of classing beef and mutton together in nutritive value may be considered fair.

With regard to digestibility, there is no practical difference between beef and mutton, both being very thoroughly assimilated. The whole question is one of taste. So far as wholesomeness is concerned, the inspection work of the Department of Agriculture shows that it is relatively seldom that mutton has to be rejected as unfit for food; and since the ways in which it can be prepared are very numerous, the ability to make many dishes with any given foodstuff is an easy way to secure the variety so desirable in a diet.

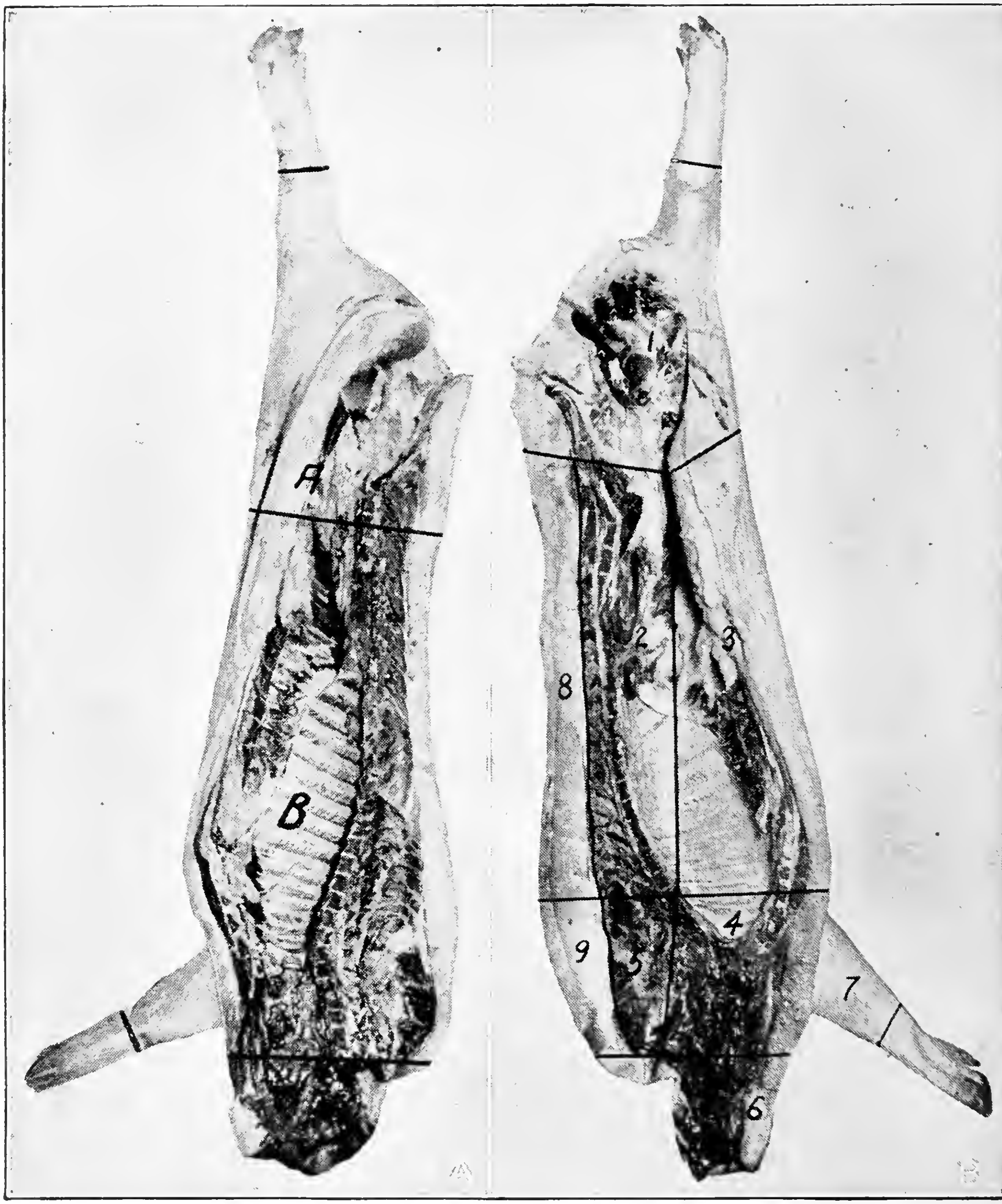

Fig. 18. Wholesale Pork Cuts

Courtesy of the University of Illinois Agricultural Experiment Station

A. English Cuts

A. Long-cut ham
B. Long side or middle

B. Domestic Cuts

1. Short-cut ham
2. Loin
3. Belly (or flank)
4. Picnic butt
5. Boston butt

6. Jowl
7. Hock
8. Back fat
9. Clear plate

2, 8. Back

2, 3, 8. Side
4, 7. Picnic shoulder
5, 9. Shoulder butt
8, 9. Long fat back
4, 5, 7, 9. Rough shoulder

PORK[1]

Pork is obtained from the carcasses of hogs and pigs.

About three-fourths of the pork products consist of various cured meats (salted, smoked, etc.) and fresh cuts; the remainder consist principally of lard and a small portion of sausage and canned meats. Only about one-fifth of the pork products, other than lard, consists of fresh meat, and therefore the classification of pork is quite complex, owing to the number and variety of cured and manufactured products.

Hog carcasses may weigh from about one hundred seventy-five or two hundred to four hundred pounds. Most of them are split down through the center of the backbone and flank, in order that loins may be cut from the sides, but the method of splitting and trimming varies according to the use to be made of them. The heaviest are called "loin hogs," being used for cutting loins, hams, etc.; while hogs averaging about one hundred sixty pounds in weight, and pigs or young swine that are comparatively lean and weigh from twenty to one hundred pounds, are marketed as dressed hogs. These are not split, the head is left on, and the leaf fat is left in (see *Fats and Oils*, p. 245). They are used chiefly for fresh pork in retail markets where the heavier grades are cut into chops, pork steaks, hams, and other fresh cuts. Roasting pigs are suckling pigs. They have white skin and flesh, and are dressed with the head left on. The most desirable size is from fifteen to twenty pounds, but those weighing from ten to thirty pounds are also used.

Quality in pork. The flesh of pork should be firm and smooth-grained and bright pink in color; the fat firm and white and evenly distributed over the carcass; the skin smooth and soft, and free from wrinkles, blotches, or bruises; and the bones

[1] The University of Illinois Agricultural Experiment Station Bulletin No. 147.

not coarse. The flesh of pigs is lighter in color than that of hogs, the skin is thinner, and the bones red and soft.

Flavor. Pork is deficient in extractives, and the flavor it possesses is due largely to the fat it contains.

Digestibility. Fresh pork is believed to be less readily digestible than either beef or mutton, owing probably to the large proportion of fat between the muscle fibers. The fat of bacon, on the other hand, seems to be in a granular form, and is regarded as being, next to butter, one of the most easily digested fats.

Because of the possibility of the presence of parasites in pork, it should always be thoroughly cooked or cured. Either of these processes, if thoroughly done, will destroy any harmful organisms present.

Pork Cuts:

The method of cutting pork differs considerably from that employed with beef and mutton. A large proportion of the hog carcass consists of almost clear fat, which furnishes the cuts used for "salt pork," etc.

The various pork cuts may be divided into the following general classes: hams, sides, bellies (or flanks), backs, loins, shoulders, butts, plates, and miscellaneous. There are many varieties of each of these cuts, some of which are given below.

Hams are of two general kinds, short-cut and long-cut. Short-cut or American cut hams are made from comparatively fat, plump hams, trimmed short and round. The long-cut ham was formerly much used for export trade, but is no longer in extensive demand. Boneless rolled hams are made from sweet-pickled short-cut hams by removing the surplus fat and the bone and pressing or tying in the form of a roll, usually with the skin left on, though it is sometimes removed. These are sold as boiled meats.

Sides. Sides are middles of hogs from which short-cut hams and shoulders have been removed. Sides include the loin and most of the ribs, with the backbone and tenderloin removed. Sides may be cut lengthwise into three even-sized strips: the upper one-third being the back-fat, which is used for salt pork or for lard, and the lower two-thirds for bacon; or they may be cut into two pieces, if to be cured and smoked. Sides are often made into various other cuts, as "short rib sides," "long rib sides," backs, "English" bacon sides, etc.

Bellies or *Flanks* are usually made into bacon, or otherwise cured by salting, smoking, pickling, etc.

Backs are cut variously and are made from short-rib sides by cutting off the flank; they therefore contain the loins, back-fat, and back ribs, but not the backbone or the tenderloin.

Long fat backs consist of the upper half of the side, cut through the center of ribs from the ham to the shoulder, which it includes, with loin and shoulder-blade bone taken out.

Loins. Pork loins are made from the sides of hogs, with the flank and the back-fat cut off. They contain the backbone, back ribs, and tenderloin, and only about one-fourth to one-half inch of fat is left on the outside. The loin is the leading fresh pork cut and is used entirely for roasts and chops. The loin is sometimes called the *chine*.

Loin rolls are made from heavy loins by boning completely, tying three boneless rolls together lengthwise in the form of a roll. They are cured by sweet pickling and smoking, and then boiled. These rolls weigh from fifteen to twenty-two pounds, and are used for restaurant and delicatessen trade.

Tenderloins consist of short, round muscles lying underneath and on each side of the backbone; they are attached to the "slip bone" (which is the portion of the hip bone that lies in contact with the backbone near the end of the loin) and extend from the loin butt almost to the last rib. They weigh from one-fourth to one pound each, but those weighing three-fourths of a pound or over are most extensively used. These are cut from hogs that are too heavy to cut into regular pork loins. Tenderloins are sold only as a fresh cut.

Shoulders. Rough shoulders are untrimmed shoulders as cut from the carcass, separated from the side between the first and second ribs, and with jowl (lower part of the cheek and neck) cut off square. They are used fresh, but more generally trimmed and smoked.

Shoulder Butts. Butts are cut from the end or top of the shoulder and from the jowl.

Picnic shoulders (formerly termed California hams) are cut two and one-half ribs wide. The shank is cut off above the knee joint, trimmed on the lean surface as full as possible; the butt is taken off close to the shoulder blade, trimmed close and smooth, and well rounded in the shape of a ham. These are now called "picnics."

Picnic butts are *picnics* from which the surplus fat and the skin are removed and the shank cut off close to the breast. They are not trimmed as closely as regular picnics.

Boston butts are the ends or top pieces cut from heavy shoulders when making *picnics.* The neck bone, ribs, and surplus fat are removed and the piece trimmed smooth. They include the end of the shoulder blade, and average from three to seven pounds in weight. These may be used fresh, but are generally salted for export trade.

Boneless butts, or lean butts, consist of lean, boneless portions of Boston butts between the blade bone and the neck.

Plates are made from shoulder butts. Regular plates are made from shoulder butts by removing a boneless butt, thus making a fat piece with a facing of lean, containing the end of the blade bone. *Clear plates* are clear fat cuts made by removing the lean portion of a Boston butt. They weigh four to eight pounds.

Butts and plates are generally cured by salting, smoking, or pickling, although some cuts are used fresh.

Spare ribs consist of the ribs trimmed from the side, with as little lean as possible. They are generally sold fresh, but are sometimes cured.

Backbones, neck bones, and shoulder-blade bones are sometimes sold fresh like spareribs. Hocks consist of the shank or foreleg cut from the shoulder, including the portion between the breast and the knee. Pigs' feet, cleaned and boiled or pickled, are also used. The *head* is used for headcheese. Other portions of the animal, as liver, etc., are also used as food. Trimmings are almost entirely utilized in sausage manufacture.

Lard. From one-third to one-tenth of the hog carcass is made into lard in the large packing houses. The grades differ according to the kinds of fat they contain, methods of rendering, color, flavor, and grain.

The standard grades of lard: *Kettle-Rendered Leaf, Kettle-Rendered, Neutral, Prime Steam, Refined,* and *Compound Lard.*

Kettle-Rendered Leaf Lard consists of leaf fat only. It is the whitest in color, and finest in grain and flavor of all the grades of lard. It is distinguished from the other kinds of lard by the wavy or fluffy appearance of the surface, known as "crinkly top," a characteristic specially peculiar to leaf lard. For retail trade it is sold chiefly in pails of various sizes.

Kettle-Rendered Lard is made from back fat with or without a proportion of leaf lard (seldom more than 20 per cent) and not over 5 per cent of lard stearin, which is the residue after pressing the oil from lard. It is excelled in whiteness, grain, and crinkly appearance of the surface only by the genuine leaf lard.

Neutral Lard is made from leaf or back fat melted in water-jacketed open kettles, at about 128° F., at which temperature the fat partially liquefies without cooking. No. 1 Neutral is made from leaf fat only. When drawn off and strained, the melted fat is tasteless, free of acids and impurities, and smooth-grained; it also remains unchanged in odor and color. This is used principally in the manufacture of butterine and oleomargarine. No. 2 Neutral is made from back fat melted in the same manner as No. 1 grade, but is neither so white in color nor so fine in grain.

Prime Steam Lard is made from the fat trimmings from all parts of the hog, rendered in closed tanks under about 40 pounds' direct steam pressure (240° F.) without refining, stirring, or bleaching.

Refined Lard is made from the Prime Steam Lard by a bleaching and stirring process.

Compound Lard, or Lard Compound, is a mixture of lard, stearin, and other animal fat, and vegetable oil, usually cottonseed oil. All the ingredients must be named on the label, and the proportion of lard must equal or exceed that of any of the other ingredients.

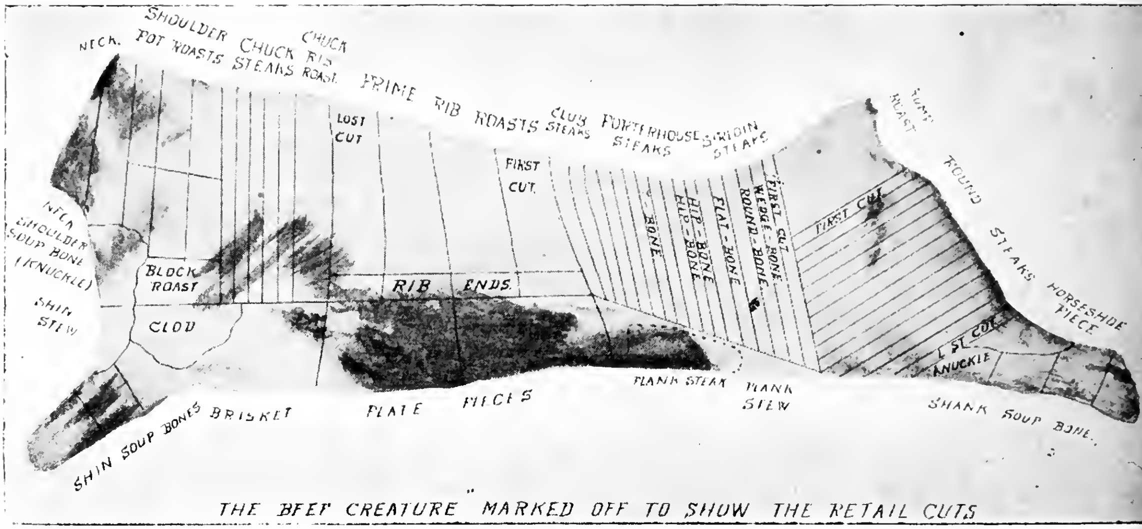

FIG. 19

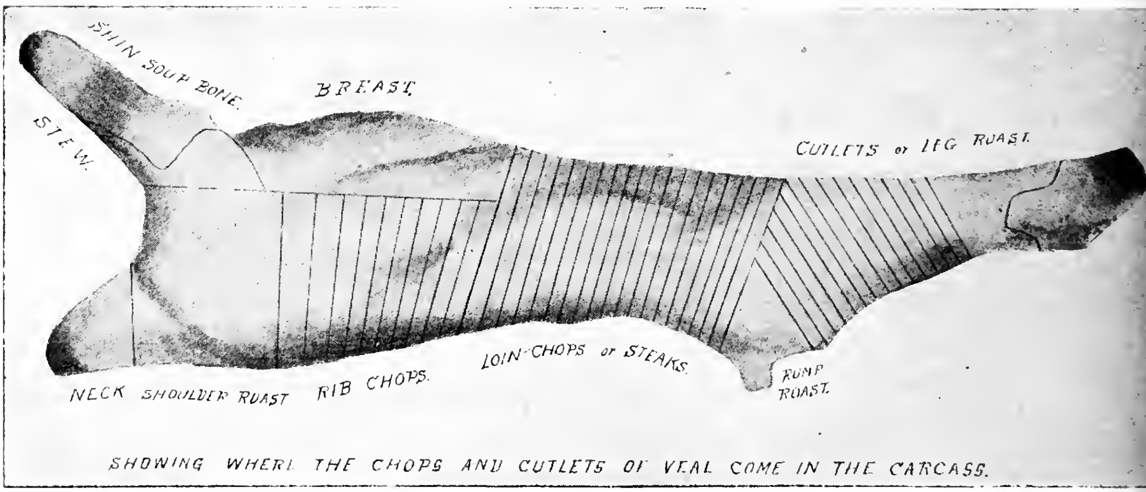

FIG. 20

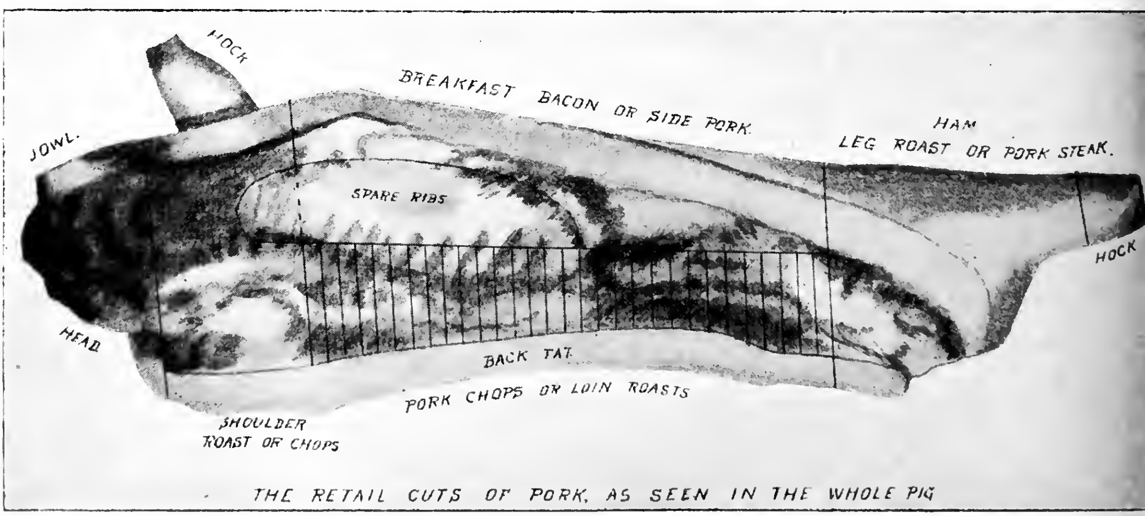

FIG. 21

QUICK-COOKING CUTS

	Weight Pounds		Weight Pounds
Porterhouse steak	$1\frac{1}{2}$ to 3	Mutton chops	$\frac{1}{2}$ to $\frac{3}{4}$
Club steak	1 to 2	Lamb chops	$\frac{1}{5}$ to $\frac{1}{3}$
Sirloin steak	2 to 5	Veal chops	$\frac{1}{4}$ to $\frac{3}{4}$
Round steak	2 to 5	Veal cutlets	$\frac{3}{4}$ to $1\frac{1}{2}$
Top round steak	$1\frac{1}{2}$ to 3	Pork chops	$\frac{1}{4}$ to $\frac{1}{2}$
Chuck steak	2 to 4	Salt pork	1 to 3
Flank steak	1 to 2	Fancy breakfast bacon	$\frac{1}{16}$ to $\frac{1}{8}$
Veal steak	1 to 2	Medium to fat bacon	$\frac{1}{8}$ to $\frac{1}{4}$
Pork steak	1 to $1\frac{1}{2}$		

MODERATELY QUICK-COOKING MEATS

	Weight Pounds		Weight Pounds
Prime ribs of beef (first cut)	4 to 12	Shoulder of lamb	3 to 4
		Crown lamb roast	$3\frac{1}{2}$ to 6
Prime ribs of beef (last cut)	4 to 12	Hindquart'r (spring lamb)	5 to 8
		Forequart'r (spring lamb)	5 to 8
Shoulder block roast	4 to 8	Pork loin	2 to 8
Chuck rib roast	4 to 10	Leg of pork	3 to 12
Beef rump	4 to 12	Ham (smoked)	3 to 12
Beef tenderloin (fillet)	2 to 6	Pork tenderloin	$\frac{1}{2}$ to $\frac{3}{4}$
Leg of mutton	6 to 9	Pork shoulder	2 to 5
Loin of mutton	3 to 6	Spare ribs	$\frac{1}{2}$ to 1
Shoulder of mutton	3 to 6	Veal loin	3 to 6
Leg of lamb	$3\frac{1}{2}$ to 6	Veal leg (fillet)	3 to 12
Loin of lamb	2 to 4	Veal shoulder	3 to 8

SLOW-COOKING MEATS

Boiling Meats—	Weight Pounds		Weight Pounds
Beef horseshoe piece (end round)	4 to 8	Leg of mutton	6 to 9
		Shoulder of mutton	3 to 6
Beef shoulder clod	3 to 6	Shoulder of lamb	3 to 4
Rib ends of beef	2 to 6	Leg of pork	3 to 12
Cross ribs of beef	2 to 5	Ham, smoked	3 to 12
Beef brisket	3 to 8	Pork shoulder, fresh	3 to 8
Corned beef, rump, flank, plate or brisket	2 to 8	Pork shoulder, smoked	3 to 8
		Pork hocks	$1\frac{1}{2}$ to $2\frac{1}{2}$
Beef tongue, fresh	3 to 5	Back bones and neck bones	2 to 8
Beef tongue, smoked	2 to 3		

Stewing Meats—	Weight *Pounds*		Weight *Pounds*
Beef plate	3 to 6	Beef shin	2 to 5
Beef flank	2 to 6	Breast of mutton	2 to 4
Drop tenderloin[1]	1 to 2	Breast of lamb	1 to 2½
Beef skirts[1]	1 to 2	Veal breast	2 to 5
Beef neck	1 to 3	Veal neck	1 to 2
Soup and Broth Meats—			
Shin soup bones	1 to 4	Beef shoulder clod	1 to 2
Hind shank soup bones	1 to 5	Beef round	1 to 2
Knuckle soup bones	3 to 7	Mutton shoulder	1 to 2
Oxtail	1 to 2	Mutton neck	1 to 2
Beef neck	1 to 3	Mutton shanks	1 to 1½

The Retail Cuts as given are the cuts generally made in the Middle West. In many places, particularly in small towns, the chuck, shoulders, and leg cuts are used still more largely for steaks and chops than is shown here. In the East, roasts are more popular, and the style of cutting is adapted to the use of larger cuts. Variations of the methods of cutting illustrated apply chiefly to the shoulder and leg cuts. (From *Better Meat for Less Money*, by Louis D. Hall, Assistant Professor of Animal Husbandry, University of Illinois. Used by his kind permission and that of *Good Housekeeping*, in which the article appeared, December, 1912.)

[1] The term "Beef Skirts," in wholesale market parlance, generally refers to the thin portion of the diaphragm which is trimmed from along the ribs on the inner portion of the carcass. The "drop tenderloin," or "hanging tenderloin," is a fleshy piece formed by an extension of the diaphragm muscle at the point where it joins the vertebræ; and it is so called because it seems to form an extension of the tenderloin proper. "Beef Skirts" are not commonly used in family trade, but are more generally utilized for the manufacture of sausage and similar products.

CHAPTER XIII

Meat — Continued

COOKING

Meat is cooked chiefly to improve its flavor and appearance. Cooking also kills parasites or other organisms which may be present. The methods of cooking meat vary according to the object in view, which may be (1) to extract the juice, as in soups, broths, and beef tea; (2) to retain the juice, as in boiling, roasting, broiling, frying, etc.; (3) through a combination of both these methods, as in stewing, to retain part of the juice in the meat and to extract part of it to enrich the gravy.

Methods of cooking meat will vary also, according to the size and texture, as well as the tenderness or toughness of the cut, the length of time required in its preparation and cooking, and the temperature most favorable for the result desired.

Methods covering these points may be thus grouped:

1. Quick cooking, requiring a hot fire; medium or thin cuts of tender meat—broiled or pan-broiled; sauté.

2. Moderately quick cooking, requiring hot fire; large or thick cuts of tender meat, suitable for roasting.

3. Slow cooking at comparatively low temperature; object, to soften, without disintegrating, the tissues of tough meats, as in boiling, stewing, "fireless cooking," or to extract the nutritive and flavoring substances, as in broths and soups.

4. Searing quickly the surface of the meat to seal in the juices, and then subjecting the meat to prolonged cooking at low temperature, as in pot-roasting and braising.

Extracting Juice. The following simple experiments will show the best way to extract the juice:

Experiments with meat: 1. Cut a small piece of lean beef into three equal parts. Put one piece into a glass half filled with cold water; let it stand 15 minutes or longer.

2. Scrape or cut very fine the second piece of beef. Put it into a glass half filled with water; let it stand 15 minutes or longer. Compare with No. 1.

3. Scrape or chop fine the third piece of beef and put it into a glass half filled with cold water to which has been added $\frac{1}{8}$ t. salt. Let it stand 15 minutes or longer. Compare with No. 2.

4. (*a*) Strain through cheesecloth a portion of the water in which meat in Experiment 2 has been soaking. Heat the water in a small saucepan and *boil* 5 minutes without stirring.

(*b*) Repeat, using a portion of the water from *Experiment 3* to which salt was added before soaking meat.

5. Put meat with second portion of liquid remaining from *Experiment 2* into a cup. Place cup on a rest in a saucepan containing cold water, and put saucepan over heat. Cook, and stir constantly until the liquid turns reddish brown. Remove from heat at once and strain. Compare with No. 4.

Inference from experiments: (1 and 2) Cold water softens and loosens the fibers and extracts the juices of meat; (the smaller the pieces the larger the amount of juice extracted in a given time). Meat should not, therefore, be washed in cold water to cleanse it; it should be *wiped* with a damp cloth.

(3) A small quantity of salt added to the water in which meat is soaked extracts more juice in a given time.

NOTE.—Certain of the protein substances in meat are insoluble in water, but are soluble in water containing a small proporton of salt.

(4 *a* and *b*) Boiling the water containing the juice of meat coagulates the dissolved albumin, causing it to separate from the liquid portion, which becomes clear and colorless.

(5) Heating the water and meat together slowly dissolves more of the soluble materials of the meat, as shown by the

deepened color of the water. The change in color from that of raw beef, bright red, to that of beef cooked "rare," without heating enough to cause the separation of the coagulated albumin, shows the correct method of cooking beef tea.

The clear liquid which remains when the coagulated albumin is strained out of beef tea contains only the extractives or flavoring substances, with the soluble mineral matter of the meat. Even in "strong" beef tea which is carefully made, the amount of protein present has been found to be less than 2 per cent.

Note.—The extractives give the "meaty" flavor to beef tea, beef extracts, etc., and since the true dietary value of these and of commercial meat preparations, such as bouillon cubes, fluid and semi-solid meat extracts, bottled meat juices, and similar preparations, seems to be greatly misunderstood, these have been made the subject of investigation by the United States Department of Agriculture. *Bulletin 27*, Bureau of Chemistry, says in this connection that "Most of these cubes have no advertised claim to be highly concentrated beef broth or essence. Many people, however, believe them to be highly concentrated meat, and therefore to possess high nutritive value, especially for invalids, but this is not true." Complete analysis of ten of the leading brands of bouillon cubes showed that "common salt is the greatest constituent, being from 49 to 72 per cent of the total weight of the cubes. The amount of meat extract ranges from 8 per cent in the poorest brands to but 28 in the best brands. The third important ingredient is plant or vegetable extract, which constitutes from 3 to 30 per cent. This plant extract is useful because of its flavoring properties, although it has but slight, if any, nutritive value."

The Bulletin thus summarizes the result of the investigations:

A comparison of *bouillon cubes* and other *commercial meat preparations* and *homemade broths and soups* shows that while bouillon cubes are valuable stimulants or flavoring agents, they have little or no real food value; that is, they can neither build tissue nor yield energy, and are therefore relatively expensive. Also that semi-solid meat extracts have only a slight food value, owing to a small amount of protein which they contain. They also are stimulants and flavoring adjuncts, and are more expensive than homemade soups; while fluid meat extracts are dilute solutions of semi-solid meat extracts, and are more expensive because they contain more water. *Commercial meat juices* are largely deprived of their most valuable constituent, the coagulable protein, or muscle-building food. They are similar to fluid meat extracts, and some makes cost more. *Homemade meat broth* and *vegetable soups* contain more meat *extractives, protein,* and *fat,* and are less expensive than the commercial preparations.

The meat which is strained from beef tea, broth, etc., has little or no flavor, according to the size of the pieces and the length of time it has soaked in the water. The chief muscle-protein remains in the meat after the soluble albumin, etc., has been extracted; therefore this meat, although lacking in flavor, still contains considerable nutriment. If combined with meat which has not had the flavor extracted, or with vegetables, and well seasoned with salt, pepper, etc., this tasteless meat may be made palatable as well as nutritious.

Meat should be removed from the paper in which it is wrapped as soon as brought in from the store, as the paper will absorb the juice and may impart an unpleasant flavor to the meat.

Beef Tea

1 lb. lean beef — 1 pt. cold water

$\frac{1}{4}$ t. salt

Scrape or chop the meat fine, and put it with the cold water and salt into the top of a double boiler or into a bowl or glass jar; cover and let stand 30 minutes or longer. Place top of double boiler over lower part, which should be one-third full of *cold* water. Heat slowly; stir frequently and cook until the liquid turns reddish brown. Strain at once through a coarse strainer into a heated cup. If any fat is present, it may be removed by laying a piece of soft paper or bread on the top. Repeat if necessary. Season to taste and serve immediately. If a glass jar or a bowl be used, place it upon a rest in a saucepan partly filled with cold water. Cook as directed in using double boiler.

Mutton Broth

3 lb. neck or fore quarter	$\frac{1}{4}$ c. rice or barley
1 large onion	2 qt. cold water

Salt and pepper

Wipe meat with a damp cloth. Remove all fat and cut meat into small pieces. Put meat and bones into a kettle containing the cold water, and let stand 30 minutes; add the onion, sliced, and the washed rice or barley. Cook slowly 3 hours; remove bones and meat, and season to taste with salt and pepper. Serve hot.

If the meat is to be served with the broth, cut the meat into large pieces; use only enough water to cover, and do not allow the meat to stand in the water before heating. Tapioca or sago may be used instead of rice or barley. Chicken or other meat broth may be made in the same manner as mutton broth.

Celery seed or the coarse, green leaves of celery (fresh or dried) give an agreeable flavor to the broth.

Meat Cooked in Water

The less choice cuts of meat are best when cooked by some method in which water is used, as in so-called boiling, steaming, stewing, etc., the object being to soften without disintegrating the tissues. Meat cooked in water will have less flavor than if roasted or broiled, therefore it should be well seasoned.

Flavors may be added when preparing the meat for cooking, or they may be supplied by means of gravies or sauces. Salt is generally added to the water in which meat is cooked, to improve the flavor of the meat, one teaspoonful being allowed for each quart of water.

When the juice of meat is to be retained, salt should not be added to the water until meat is nearly cooked, as experiments have shown that more of the soluble material of meat is extracted in slightly salted than in clear water.

Red or dark meats, as beef, mutton, venison, etc., are frequently cooked rare; while white meats, as lamb, veal, chicken, etc., are better when well done. Pork should always be cooked thoroughly, as dangerous parasites, sometimes present, will be thus destroyed. Tough fowl may be cooked in water or steamed over water until tender; the meat may then be used in the same manner as chicken.

Experiment 1. Cut two 1-inch cubes of lean raw beef. Wipe the meat with a damp cloth. Heat 1 c. of water in a small saucepan. When boiling, put into it a cube of meat. Remove saucepan at once from the heat and place on table. Let stand 8 to 10 minutes. Cut and examine; note appearance of exterior and interior. Press out juice.

Experiment 2. Heat 1 c. of water in a small saucepan. When boiling, put into it the other cube of raw beef. Boil 6 minutes. Cut and compare with No. 1.

Inference from Experiments: (1) Plunging meat into boiling water coagulates the albumin and hardens and shrinks the fibers on the surface, forming a coating which helps to keep the juice inside the meat, as the water is not colored. If the cooking is continued at a temperature several degrees below boiling, a longer time will be required, but the meat will be tender and juicy.

NOTE.—Long-continued cooking in water at a moderate temperature will make tough meat tender. The temperature most favorable for cooking the albumin of meat is the same as for the albumin of eggs—between 160° and 180° F.

The "simmering" burner of a gas stove will usually maintain the temperature high enough for cooking the meat below boiling point, and the double boiler is also useful for small pieces, as a temperature as high as 200° F. can be reached and nothing will burn while water remains in the lower part. A fireless cooker also may be used.

(2) Continued cooking in boiling water coagulates the albumin and shrinks the fibers all through the meat, which becomes hard and dry inside as well as on the surface. If the meat is cut, no juice can be pressed out.

General rules for cooking meat in water to retain the juice:

Prepare the meat. Remove extra fat and wipe the meat with a damp cloth. Remove loose ends or secure by tying, to form one piece, so that the meat will cook evenly. Plunge the meat into enough boiling water to cover. As the meat cools the water somewhat, reheat to boiling point and boil from 5 to 10 minutes, to harden the outside of the meat; then lower the temperature to about 180°, and keep it there during the time required for cooking the meat.

The time required will vary according to the size, the shape, and the tenderness or toughness of the meat. More time will be required for a thick, cubical piece than for a thin piece of the same weight. In cooking tough meat, allow 30 minutes or longer for each pound of meat. In cooking tender meat, allow from 15 to 20 minutes per pound. As some time will be required for the heat to reach the center of the meat, it is usual to allow 20 to 30 minutes extra for this purpose.

As some of the flavoring substances (extractives) will be dissolved in the water, however carefully the meat is cooked, the water should be saved and used in making soup, broth, gravy, etc.

NOTE.—With meat cooked in water, or so-called "boiled meat," the best results are obtained by using a large piece of meat, because the loss of flavoring material is less than in a small piece, a larger proportion of surface being exposed.

The length of time the cooking is continued also influences the percentage of such loss, and experiments have shown that the amount of material escaping from meat into the water after cooking several hours is practically the same whether the meat was placed in cold water and slowly brought to the boiling point or put into boiling water at the start.—*Office of Experiment Station, Bulletin No. 141.*

The material thus removed from the meat is not really lost if the water is utilized for making soup, etc., or for cooking vegetables, although the flavor of the meat is lessened.

Mutton or Lamb Cooked in Hot Water

The leg, shoulder, or a piece from the neck may be used. Remove the membrane and any extra fat, and wipe the meat with a damp cloth. Put into a kettle enough boiling water to cover the meat. Place the meat in the boiling water, cover the kettle, and boil 10 minutes. Add the salt and lower the temperature of the water by moving the kettle to the back of range or by turning down the gas. The water should not boil again during the cooking of the meat, neither should it be allowed to get too cool. Cook slowly according to directions. A leg of mutton weighing 12 pounds will take about 3 hours. When cooked, put the meat on a hot platter and keep hot while the gravy is made. The water in which the meat has been cooked may be used in making the gravy. Mint sauce is often served with lamb.

Gravy for Mutton

2 c. hot water from meat	$\frac{1}{4}$ c. cold water
4 tb. flour	Salt and pepper to taste

Add the cold water to the flour gradually, and stir until the mixture is smooth. Add the 2 c. hot water slowly, and stir constantly. Put mixture into a saucepan, place over the heat and boil 5 minutes, stirring all the time. Add seasoning and serve hot. For caper sauce, add ¼ c. of capers to the gravy, and a little vinegar or lemon juice if desired.

Mint Sauce

¼ c. mint leaves chopped fine	½ c. vinegar
	1 tb. sugar

Wash the mint leaves, drain, and chop very fine. Mix sugar and vinegar, and add the mint leaves. Let stand 15 to 20 minutes in a warm place before serving.

Rolled Beef

Use 2 or 3 pounds from the flank, or the bottom of the round. Wipe the meat, remove any membrane or extra fat, and trim meat until of uniform thickness. If very tough, the meat may be allowed to stand in vinegar several hours before cooking. Spread the meat with a savory dressing; roll the meat so that ends may be securely closed, to prevent dressing from escaping, and tie with buttered string. Wrap in cheesecloth or a towel, and plunge the roll into boiling water. Boil 5 minutes, then lower the temperature and cook slowly 3 or 4 hours, or until tender. Remove strings and cloth, and place meat on a hot platter. Serve hot with gravy, or cold, cut in slices.

Dressing for Rolled Beef

½ c. cracker crumbs	1 tb. fine-chopped bacon
¼ t. salt	¼ t. mixed sweet herbs or
¼ ssp. pepper	1 t. chopped parsley
1 tb. fine-chopped onion	2 tb. beaten egg

Hot water to moisten

Mix all but the last two ingredients, then add the beaten egg and enough hot water to moisten sufficiently to spread.

Gravy

4 tb. beef fat	2 c. water from meat
2 tb. chopped onion	$\frac{1}{2}$ t. salt
4 tb. flour	$\frac{1}{8}$ t. pepper

Cook chopped onion in the fat until slightly browned, but not burned. Mix salt and pepper with the flour, and add to onion; cook until mixture begins to brown, then add the water gradually and stir constantly. Let boil 5 minutes and strain. Pour around the meat, or serve from a sauce boat. Cooked tomatoes may be used with the water from the meat, and less onion, if preferred.

NOTE.—Of the two methods of making gravy commonly employed, that of thickening a liquid containing fat with a mixture of flour and water, and that of heating flour in the fat and then adding the liquid, the latter is to be preferred in the case of mutton, because of the fact that some mutton fats solidify easily. If, however, the fat is intimately associated with the flour, its hardening is not so noticeable. It should be added, however, that the argument for this method is chiefly based on its greater palatability; and the fact should not be overlooked that some persons consider gravy so made to be unwholesome even when the fat has not been heated sufficiently to be decomposed, a belief which apparently has not been tested in the laboratory.—*Farmers' Bulletin 526, Mutton and Its Value in the Diet.*

Stewing Meat

Stewing is cooking slowly or gently for a long time in a small quantity of water.

In stews, the meat and the broth (that is, the water in which the meat has been cooked) are served together, with or without the addition of vegetables.

In making a stew, the object is to cook the meat in such a way that part of the juice will remain in the meat and part be extracted in order to flavor the gravy or broth. This is accomplished by dividing the meat into two portions, after cutting into pieces suitable for serving. To extract the juice from the first portion, cover with cold water and heat slowly to the boiling point. Brown the second portion of meat in hot fat and add to the first portion when the water boils, or add it without browning. Cook slowly 2 to 3 hours, or until meat is tender.

A second method is to put the meat, cut into suitable pieces, into a stewpan, with or without previously browning in fat. Add boiling water to cover meat. Cook 2 to 3 hours below boiling temperature.

Tough meat is suitable for stews because it is juicy and because, by this long, slow cooking in water, it can be made tender. The tougher portions of beef, mutton, lamb, or veal may be used. Meat with some bone and fat makes a richer stew than one made only of lean meat. Pieces of cold cooked meat may also be used.

Browning in smoking hot fat helps to keep the juice in the meat, and also gives a richer flavor and color to the stew. For the same reason the vegetables also are sometimes browned before adding to the stew. The pieces of meat are usually rolled in flour before cooking in the hot fat, to dry the surface, and thus make them brown more quickly. The flour also helps to thicken the stew.

The *vegetables* commonly used in stews are onions, carrots, turnips, and potatoes. Tomatoes also are sometimes used, as well as string beans and green peas.

The usual *seasonings* are salt and pepper. Sweet herbs, celery, parsley, a piece of bay leaf, one or two cloves, or a little catsup may be used for variety, but care must be taken to use only enough of these materials to give a delicate flavor.

Dumplings are often served with stews.

The materials for a stew may be put into a covered pan, an earthenware dish, or a bean pot, and cooked for the same length of time in a moderate oven instead of on the stove. This method is called braising. Besides braising, other varieties of stewing are the fricassee, smothering, pot-roasting, etc.

Beef Stew

2 lb. beef	1 carrot
3 tb. flour	4 potatoes
2 onions, sliced	Water
1 turnip	Salt and pepper

Beef from the neck, shoulder, or lower part of the round may be used. Wipe meat with a damp cloth and cut meat into $1\frac{1}{2}$-inch or 2-inch cubes. Extra fat may be removed and part of it heated to brown the meat. Put the poorer meat, as ragged, bony, gristly pieces, into a kettle, cover with cold water, and heat to boiling point. Heat the fat in a frying pan until smoking hot. Roll the more choice pieces of meat in the flour. Put them into the hot fat and turn them until the surface is slightly browned. Brown the onions also, and put into the frying pan the rest of the flour, if any remains after meat has been rolled. Put the meat and onions into the kettle when water reaches the boiling point; rinse out the frying pan with a little of this water, and then pour it back into the kettle, which should be placed where the water will be kept very hot, but below boiling point. Cook slowly 2 or 3 hours, or until meat is tender. Prepare turnip and carrot, and cut into thin slices or $\frac{1}{2}$-inch cubes. Three-quarters of an hour before stew is to be served, move kettle where water will boil, and add turnip and carrot. Wash and pare the potatoes, cut into quarters, parboil 5 minutes, drain, and add to stew 20 minutes before serving. Season to taste with salt and pepper, and add boiling water if necessary.

There should be enough liquid to come nearly to the top, but not to cover the vegetables. The stew may be thickened with flour if desired. Dumplings, if used, should be added 12 minutes before stew is to be served. Place them so that they will rest on the top of the meat and vegetables. The stew should boil steadily during the time required to cook the dumplings.

Dumplings

2 c. sifted flour	½ t. salt
4 t. baking powder	¾ c. water or milk

Sift dry ingredients together; add liquid gradually. Drop the mixture by the spoonful on top of the boiling stew. Boil 12 to 15 minutes without lifting cover.

Veal or Lamb Stew

Pieces from the neck, the ends of the ribs, the shoulder, or the leg may be used. Before cooking, remove the tough membrane and fat surrounding the meat. Wipe the meat with a damp cloth and cut into pieces suitable for serving. Put meat and a sliced onion into a kettle, cover with boiling water, and reheat quickly to boiling point. Reduce heat and cook slowly until the meat is tender. Remove meat to a hot platter, cover, and keep hot. Thicken part of the water to make a sauce, pour over the meat, and serve at once. To vary the flavor, one-half a small carrot and turnip may be cut into cubes, browned in fat, and added before meat is cooked; and ½ c. of barley or rice may also be cooked with the meat. The broth may also be varied by flavoring with 1 tb. of fine-chopped parsley, or ½ t. of celery seeds, or the green celery leaves. Thicken the stew with flour, or use the following sauce.

Sauce for Veal or Lamb

4 tb. butter or fat from the meat	2 c. meat broth, or 1 c. broth and 1 c. milk
3 to 4 tb. flour	Salt and pepper to taste

Combine materials as directed for White Sauce.

Broiling Meat

Broiling, in the strict sense, is cooking by direct exposure to heat over red-hot coals. The cooking done by means of the flame in the "broiling oven" of a gas range is also called broiling, and cooking with little or no fat, in a very hot frying pan, is termed "pan-broiling."

In broiling, as in cooking in hot water, the object is to retain the juice of the meat, and the principle governing the cooking is the same—that is, the meat should be exposed to intense heat long enough to coagulate the albumin and to shrink the fibers on the surface, thus forming a coating to keep the juice inside the meat. The heat should then be reduced, that the inside may be cooked more slowly, and so be kept juicy instead of becoming dry.

In cooking in hot water, the heat is carried to the meat by the water; while in broiling, the meat is cooked by means of the heat which radiates from the hot coals through the air to the meat. Broiling, if properly done, causes changes in the surface of the food which produce savory substances in addition to those giving the natural flavor.

Experiment 1. Cut a small piece of raw beef, about half an inch thick, into three pieces of equal size. Put one on the end of a metal skewer, and hold it as close as possible to a fire of red-hot coals or the flame of a gas stove for 2 minutes. Cut and examine.

Experiment 2. Put a second piece of the beef into a double wire broiler. Hold the broiler 2 or 3 inches above the heat for 2 minutes, and watch closely; remove from heat and examine.

Experiment 3. Put the third piece of meat into the broiler. Hold it close to the heat while counting ten; turn and repeat until twenty has been counted for each side. Raise broiler 4 or 5 inches from the heat; count ten and turn. Repeat. Cut and compare with meat of Experiments 1 and 2.

Inference from Experiments: (1) Meat which is held close to hot coals or a gas flame will be cooked very quickly, but will be hard and dry; therefore, only meat which is already tender should be broiled, as long-continued cooking in water, at a moderate temperature, is necessary to make tough meat tender.

(2 and 3) In broiling, one side at a time is exposed to the heat. As the meat is heated the juice begins to flow, and soon rises to the upper surface, where it appears in drops. If the meat is then turned to cook this surface (as in Experiment 2), the juice will drop into the fire and be lost. Therefore, in broiling, to prevent the juice from escaping, the meat should be held close to the heat and be turned frequently, so that both surfaces may be seared as quickly as possible, and thus form a coating which will keep the juice in the meat. As soon as the meat is seared on both sides, it should be held farther away from the heat, that the inside may be cooked at a lower temperature and thus be kept juicy. Meat for broiling should not be too thick, as the intense heat required would burn the outside before the inside could be cooked.

NOTE.—Meat appears to become thicker as it broils. This is due to the changing of the water in the meat to steam, which expands and causes the meat to become plump. If even moderate cooking is continued too long, the fibers will shrink and thus allow the steam to escape, and cause the meat to shrivel and dry. Meat should therefore be removed from the heat while plump, and before it begins to shrivel.

Tender portions of beef, mutton, and lamb, and some kinds of game, are suitable for broiling. Tripe, bacon, and small birds, as young chickens, etc., small fish, lobsters, and oysters may also be broiled. Pork and veal should not be broiled, as they need very thorough cooking.

Meat for steak should be cut "across the grain," when possible, in slices from three-fourths of an inch to an inch and a half in thickness. Each slice should be of uniform thickness, in order that it may be evenly cooked.

Very lean meat will be improved in flavor and will be more juicy if rubbed with melted fat before cooking. Fat from the meat, butter, or salad oil may be used for this purpose.

The *fire* for broiling should be very hot. There should be a bed of clear, red-hot coals; therefore the fire should be prepared some time before it will be needed. A small quantity of charcoal or coke added to a dull fire will soon kindle to redness, and will make an excellent fire for broiling. The dampers of the stove should be open during the broiling, in order that the smoke, etc., may be carried to the chimney.

The *time* for broiling will vary, according to the heat of the fire, the thickness and the temperature of the meat. Steak an inch thick will usually require about 6 to 8 minutes; if thoroughly chilled, more time will be needed.

If meat is in danger of burning on the outside before the center is cooked, it will be better to complete the cooking by placing it on a dish in a moderate oven for a few minutes.

Broiled meat, etc., should be served as soon as cooked, therefore everything to be served with it should be prepared beforehand. The platter and plates should be warmed and the seasoning at hand, that there may be no delay.

Broiled Steak

Heat the broiler, and grease it to keep the meat from sticking. Remove extra fat and wipe meat with a damp cloth. Place meat in the broiler with the fat edge, if any, nearer to the handle. Hold broiler as close to the fire as possible. Turn it every 10 seconds until both sides are seared, then raise broiler a few inches above the fire. Turn occasionally until the meat is cooked. Place on a hot platter, season with pepper and salt, and serve immediately. If butter is used, it may be rubbed to a cream and the salt and pepper mixed with it before adding to the steak. A few drops of lemon juice or vinegar and a little fine-chopped parsley added to the creamed butter, etc., will make an agreeable variety.

NOTE.—When broiled under gas, meat need not be turned every 10 seconds; complete the cooking of one side before turning meat. When meat is broiled under gas, a smaller pan placed in the large oven pan will catch any melted fat and be easier to wash.

The heat for cooking steak in the broiling oven can be utilized for baking in the upper oven at the same time.

To make Baking Powder Biscuit: Sift together 2 c. flour, 4 t. baking powder, and ½ t. salt. Add 1 tb. lard or other fat, using a fork to mix ingredients thoroughly. Add milk or water to make a dough soft as can be handled—about ¾ c. Turn mixture on a well-floured board until floured on all sides. Pat lightly until ½ inch thick. Dip biscuit cutter into flour each time before cutting biscuit. Place biscuit close together on a floured or greased pan and bake in a hot oven 10 to 15 minutes.

Pan-Broiled Chops

Heat the frying pan very hot. Trim the chops, remove fat, and wipe the meat with a damp cloth. Put chops in the frying pan. When one side is seared, turn and sear the other; then cook the inside more slowly. Turn the chops frequently, but do not pierce them with a fork when turning. Cook from 6 to 10 minutes, according to thickness of chops. If necessary, stand the chops in the pan so that the edges may be cooked. Season with salt and pepper, arrange on hot dishes, and serve at once.

Chopped Meat

Chopping meat is one of the principal methods of making tough meat tender, since chopping divides it finely and thus cuts the connective tissue. Chopped meats may be cooked quickly and made into many palatable dishes. For example, chopped raw meat may be cooked with water or milk for a short time, then thickened with flour and butter, or fat of the meat, and different seasonings added. This may be served on toast, or with a border of cooked rice, macaroni, or mashed potatoes. If preferred, the chopped meat may be formed into one flat piece an inch thick, and broiled and served as steak.

Hamburg Steak

Use lean beef from the round and a very little fat. Chop the meat fine, or run twice through a meat chopper, and season with salt and pepper and a few drops of onion juice, if liked. Form the meat into small cakes about ¾ inch thick by pressing together *gently*. Cook in a well-greased broiler or a hot frying pan, and sear on both sides as quickly as possible to prevent juice from escaping; then lower the heat and cook until brown on both sides. Put them on a warm platter and place in a moderate oven for 5 minutes. A piece of bacon rind used to grease the pan will give the meat additional flavor. If prepared for an invalid, the meat may be scraped instead of chopped. A few slices of bacon chopped with beef adds to the flavor. Neck pieces, flank, and tough ends from steaks are often used instead of round.

Beef Juice

Use round steak, about 1 inch thick. Prepare only as much juice as will be required for immediate use. Heat the broiler. Wipe the meat and place in the broiler. Hold the broiler a few inches from the fire and turn frequently until the meat is heated through, not cooked. Cut through the meat two or three times with a sharp knife, and press out the juice with a meat press or a lemon squeezer into a heated cup. Serve at once with or without salt. All utensils employed in making beef juice should be scrupulously clean, and when possible the parts which come in contact with the meat should be allowed to stand in boiling water 10 minutes or more before using. When pressed out by means of a screw press, this beef juice is a very concentrated liquid food.

Reheating Meat

Care should be taken not to overheat meat which has been already cooked. Cook only long enough to heat it thoroughly, as further cooking will harden the meat and render it less readily digestible. Meat which has been underdone may be cooked longer when warmed over. Cold cooked meat may be reheated by itself, or in combination with vegetables, as potatoes, tomatoes, etc.; rice, macaroni, bread or cracker crumbs, etc., may also be used.

To prepare for *reheating*, remove tough membrane, gristle, skin, bones, and *extra* fat. Chop the meat, or cut it into thin slices or small pieces, that it may be heated through more quickly. Different kinds of meat may be used together. Meat which has been strained from beef tea or soup may also be used, combined with meat which has not had the flavor extracted, or with vegetables.

Cover the gristle, bones, etc., with cold water and cook slowly for several hours, as they contain nutritive material which can be extracted in no other way. Additional flavor may be given by adding onions or other vegetables. The strained liquid may be used in making gravies, sauces, etc. As more or less seasoning has usually been added to cooked meat, no exact rule can be given; therefore it is better to season it to taste when reheated.

Minced Meat on Toast

Prepare the toast, arrange on a hot platter, and keep hot. Remove gristle, fat, etc., from cold cooked meat. Chop the meat fine, measure it, and put it into a saucepan; add $\frac{1}{2}$ c. of gravy for each cup of meat. Season to taste with salt, pepper, and, if liked, with chopped or grated onion, a few drops of onion juice, or a little Worcestershire sauce. Grated nutmeg may be added to lamb or mutton, if liked. Place saucepan over the heat and stir until meat is heated. Pour over the hot toast and serve at once. The toast may be buttered or not, as preferred. A double boiler is useful when a small quantity of meat is to be reheated.

French Hash or Cottage Pie

Prepare the meat as directed for Minced Meat on Toast, and put it into a baking dish with a layer of mashed potatoes or bread crumbs in the bottom; then add meat, gravy, and seasoning. Cover the top with a thick layer of well-seasoned mashed potatoes. Use a fork to form the potatoes into a mound, with the highest point in the center. If the fork is first dipped into melted fat, the potato will brown more quickly. Bake on the grate of a hot oven, or under the flame of broiling oven, until the potatoes are slightly browned on top. More gravy will be needed than for the meat on toast, as part of it will be absorbed by the potatoes. Cooked rice or macaroni may be substituted for mashed potatoes.

Hash

Prepare meat as for Cottage Pie. Use equal parts of mashed or fine-chopped potatoes and meat; mix together and moisten with gravy, water, or milk. Allow from 1 t. to 1 tb. of liquid for each cup of hash. Use more liquid if the hash is very dry. Season to taste. Other vegetables besides potatoes may be added. Heat the fat in a frying pan until smoking hot. Use from 1 t. to 1 tb. or more, according to the quantity of hash. Spread the hash evenly over the bottom of the pan, cover, and place where the hash will heat slowly until a brown crust is formed on the bottom. Slip a knife under the hash, fold over double, and turn out on a warm platter. The hash may be formed into small cakes, rubbed over the top with melted butter, or other fat, placed on a buttered baking pan, and heated on the grate of a rather hot oven until slightly browned on the top. The materials used in making hash may also be heated in a saucepan, with enough milk or gravy to keep from burning. Stir until heated thoroughly and serve at once.

Meat Turnover

Chopped cooked meat, either alone or combined with cooked potato or rice, may be used. Season well with salt, pepper, onion juice, etc. Roll biscuit dough thin and cut into circles about the size of a saucer. Place 2 tb. or more of the mixture in the center of one-half the circle of dough, fold over the other half, first moistening the edges with milk or water, and pinch edges closely together. If desired, tops may be brushed over with egg yolk before cooking. Bake 20 to 30 minutes in a hot oven. A brown or tomato sauce may be served with the turnovers. (For biscuit dough, see p. 239.)

Scalloped Meat

Cut lean meat into thin slices or small pieces. Use bread or cracker crumbs for the middle layers, or cooked rice or macaroni. Arrange as directed for Scalloped Dishes (p. 166). Gravy, water, milk, or tomato sauce may be used to moisten. Season to taste and bake until top is brown. Beef or ham or bacon fat may be used with crumbs instead of butter. Scalloped meat is attractive served in ramekins, or other such small dishes, for individual service.

Meat Warmed in Gravy

Prepare meat as for Scalloped Meat. Use meat gravy, white sauce, or tomato sauce. Put gravy into a saucepan or double boiler to heat. Add the meat, season to taste, and serve as soon as thoroughly heated. To give variety, a little curry powder may be used to season. Garnish dish with toast cut into points.

Meat Pie

2 c. cold meat cut in small pieces
2 or 3 boiled potatoes cut into cubes
$\frac{1}{4}$ c. each of cooked carrot and onion sliced
Salt and pepper to taste
Soup stock, or water, or gravy to moisten

Crust

1 c. mashed potato
$\frac{1}{2}$ to $\frac{3}{4}$ c. flour
1 tb. butter, or other fat
Salt and pepper
1 t. baking powder, if desired

Put meat and vegetables into a baking dish; add gravy, stock, or water, and seasoning. Mix salt, pepper, and fat with the mashed potatoes, then work in the flour gradually until stiff enough to be rolled. Shape to cover dish, and bake 20 to 30 minutes in a hot oven.

CHAPTER XIV

Fats and Oils

Fats are solid at ordinary temperature, while oils are liquid. Though differing more or less in appearance and flavor, the fats and oils used as food do practically the same work in the body, their chief use being to serve as fuel for supplying energy.

The carbohydrates (starch, sugar) also yield energy, but fat will produce more than twice as much as the same weight of starch or sugar. The carbohydrates, however, yield their energy more quickly, and are a less expensive source than fats.

The fats of food are obtained from various sources, both animal and vegetable. Meat, fish, milk, and eggs are the principal sources of animal fats. The vegetable fats are obtained chiefly from fruits, nuts, and seeds.

The fats commonly used are butter, lard, dripping, suet, marrow, and chicken fat; combinations of different fats in cottolene, oleomargarine, butterine, and other commercial preparations, etc.; vegetable fats and oils, as cocoanut butter, sweet or olive oil, cottonseed oil, corn oil, etc.

It is believed that the fats which melt readily are the most digestible.

Butter is the most digestible as well as the most costly fat. It will spoil quickly unless kept cold and out of contact with light and air. It also absorbs odors readily, and should therefore be covered closely and kept in the refrigerator away from strong-smelling foods. When clarified and thus freed from the traces of casein and the water it usually contains, butter can be kept indefinitely.

Lard is the semi-solid fat obtained by melting and straining the fat from various portions of the body of a hog. The best, or "leaf lard," is obtained from the layers or folds of fat within the body called "leaves." These are nearly pure fat, with a very small amount of membrane. (See grades of lard, p. 219.)

Beef suet is the hard fat which lies about the kidneys and loins. Freed from membrane and chopped fine, it is used as "shortening" in puddings, etc.

Marrow is the soft fat found in the cavities of bones, especially the shin bones. Its flavor is more delicate than that of suet, while flank fat is more delicate than either.

Dripping originally was the name applied to the fat which dripped from meat when roasting before an open fire, a "dripping pan" being placed beneath to catch the fat as it fell. As used at present, dripping means the clear fat which is obtained when beef fat alone, or mixed with other fats, cooked or uncooked, has been melted and strained, and thus freed from impurities. It is also called *clarified fat*.

Remnants of fat from meat, or the fat skimmed from soups, gravies, or the water in which meat has been cooked, may be clarified. Fat which has a decided flavor, as that from ham, etc., should be clarified and kept by itself, and used only with food in which the flavor will be agreeable. Dripping may be used for frying, for basting meat, for greasing pans, etc., also as shortening in bread, pastry, etc. Fat from fried sausages, ham, bacon, and from roasted meats may be used with vegetables.

The fat for dripping is usually cut or chopped into small pieces, to allow the fat to separate more readily from the membrane which incloses it. Water added keeps the fat from burning. *As the water becomes hot*, the steam carries off gaseous impurities, and thus aids in clarifying. Slices of raw potato are sometimes heated with the fat. As the particles of solid material present cling to the slices of potato, they are therefore thought to aid the clarifying process. The mixture should be stirred occasionally, to allow any water entangled among the scraps of fat to evaporate. Since fat can reach a temperature much higher than that of boiling water, a drop of water which comes in contact with very hot fat will be changed into steam so suddenly that the fat will spatter in all directions. The heating should be continued until the bubbling has ceased, showing that the water has all evaporated.

When the scraps are light brown and crisp, the kettle should be removed from the heat. The fat should not be strained until slightly cooled, as the heat of very hot fat is sufficient to melt the solder on tins and is liable to crack dishes.

Fat may be clarified in the oven. The oven door should be left open, to avoid accident should the fat be forgotten, as the fat may burst into flame if the oven becomes very hot.

NOTE.—The characteristic flavor and odor of mutton are said to have their origin in the fat, being due to a mixture of well-known fatty acids. If this characteristic mutton flavor is due to volatile fatty acids, we can understand why it is lessened by cooking with water, since such acids are volatile in steam, says *Farmers' Bulletin 526*. Cooking the fat with a little vinegar or stronger acids seems to lessen the characteristic flavor somewhat, though perhaps it is only masked.

The rather general belief that all kinds of mutton fat are unsuitable for cooking purposes, and the consequent wastefulness entailed, led to investigations in the United States Office of Experiment Stations, the results of which seem to show that fats taken from different parts of the mutton carcass cannot be thus classed indiscriminately, any more than fats from different animals can be so classed. For example, the melting point of mutton tallow is usually given as between 111° and 122° F., and the corresponding pork fat as between 97° and 115° F.; while that of beef tallow or suet is given as between 107° and 120° F. The melting point of fat from different parts of the same animal differs also. The melting point of mutton kidney fat or tallow was found to be 122° F.; that of fat from the "covering" of the leg, 114° F.; and that of fat from the interior of the lean portion of the leg which was obtained from the liquid in which a leg of mutton was boiled, 107° F. As a matter of fact, the fat from the leg was found to be satisfactory for many purposes, such as in the preparation of vegetables and to sauté. The kidney fat being too hard for ordinary purposes, it was mixed with soft fats, such as lard and beef fat, and also vegetable oils. "When economy as well as flavor is taken into consideration, the best results may be said to have been obtained from the mixture of two parts of mutton suet with one of lard; . . . it was used satisfactorily for deep fat frying, for 'shortening' foods with distinctive flavor, and for many other purposes. It gave fair results even in the preparation of baking powder biscuits."—*Farmers' Bulletin 526.*

Dripping or Clarified Fat (1)

Chop or cut fat into small pieces and put into a saucepan or a kettle half filled with cold water. Heat slowly. Stir occasionally, and cook until the scraps are light brown and the fat has ceased to bubble. Remove saucepan from the heat. Let stand 5 minutes, then strain. Place strainer over a tin pail or dish. Spread cheesecloth over the strainer and pour in the fat. The dripping will be fine-grained if the fat is cooled quickly and when nearly solid is beaten with a fork until white and creamy. A double boiler is useful if only a small amount of fat is to be clarified, as there is no danger of burning unless water in the lower part boils away.

German Method (2)

Cut beef suet in small pieces, cover with cold water, and let stand several hours, changing the water once. Drain and put fat into an iron or agate kettle, adding ½ c. milk for each pound of suet. Cook very slowly until the sound of boiling ceases. When partly cooled, strain. This may be substituted in many recipes for a portion of the butter required in cooking.

Method 3

Two parts of uncooked mutton fat and one part leaf lard may be put through a meat grinder and heated in a double boiler with milk until the fat is thoroughly melted. Strain and cool, then remove cake of fat and keep in a cool place; may be used alone or with butter in preparing vegetables, etc.

Clarified Butter

Heat the butter slowly in a thick pan, to prevent burning. When it ceases to bubble, strain through double cheesecloth into a bottle or jar. If kept tightly corked, in a cool place, it will remain sweet for an indefinite period.

Leaf Lard

Remove tough membrane and cut the fat into small pieces. Heat slowly in an iron or agate kettle, or in double boiler. When melted, strain, and keep in a cool place, covered.

Clarifying Fat from Cooked Meat

Pour boiling water over the fat, boil thoroughly, then set it away to cool. When cold, remove the solid layer of fat and scrape off any impurity from the bottom. If necessary, repeat process two or three times, or until a cake of clean, white fat is obtained.

Savory Drippings

Add to 2 c. of drippings from fat meat a small onion (left whole), a few leaves of summer savory and thyme, a teaspoonful of salt, and a little pepper. Strain and keep covered, and in a cool place.

CHAPTER XV

Fish

Fish is similar in composition to meat, the chief nutritive ingredients being protein and fat. Fish may, therefore, be used as a substitute for meat. In general, the flesh of fish contains less fat and more water than meat; salmon, however, is more similar in composition to meat than any other fish. There is also a smaller proportion of extractives or flavoring substances in fish than in meat, while the amount of gelatin-yielding material is larger. Fish also contains mineral matter.

Fish may be classed, according to the amount of fat contained, as "fat" or "lean." In general, the fish having dark-colored flesh are fat or oily, as salmon, herring, shad, mackerel, eels, etc.; the fish with white flesh, as the cod, haddock, halibut, etc., have little fat except in the liver.

Fish containing a large proportion of fat is less digestible than the lean varieties; the latter, therefore, are more suitable for invalids. Drying, salting, smoking, and pickling harden the fibers and render fish less readily digestible.

The distinctive flavor of salted and smoked fishes will often make palatable dishes which contain only small quantities of the fish, such as creamed smoked halibut, creamed codfish, or scalloped fish, etc.

While the appetizing flavor of salted or smoked fish like codfish, smoked herrings, or finnan haddie is liked by many, the nutritive value is not always appreciated. In this connection, the *Year-Book of the Department of Agriculture for 1910* states: "A quart of milk thickened with flour and mixed with one-half pound dried fish (codfish or finnan haddie) makes a compound which contains more protein than a pound of round steak and as much as one and one-half pounds sirloin steak. The addition of hard-boiled egg, which is a common practice, still further increases the protein value. Two eggs would bring the food value up to that of about one and one-fourth pounds round steak or about one and one-half pounds sirloin steak. The fish dish would serve more persons than the steak and cost less."

Canned fish should be removed from the can as soon as opened, because there is reason to believe that harmful compounds are formed by the combined action of the oxygen of the air and the contents of the can with the coating of tin.

Canned fish, also fish which has been frozen and then thawed, should be used as soon afterwards as possible, being particularly liable to spoil.

In *fresh fish* the gills are red, the flesh firm, the eyes bright and full, and there is no unpleasant odor. When the flesh of fish can be crushed by gentle pressure between the fingers, or when the scales are dry or easily loosened, it should not be eaten, as poisonous substances are sometimes formed in fish which is no longer fresh. Another test is made by putting the fish into water: if the fish sinks, it is fresh; if it floats, it is not fresh, and should not be used.

The *methods of cooking fish* are similar to those used in cooking meat, some slight variations being necessary, owing to differences in the form, the texture, etc. The muscle fibers of fish are shorter and coarser, and there is less connective tissue, which, being more readily dissolved than that of meat, causes fish to break very easily.

Cold water will extract the juice of fish as well as of meat. The juice of fish may also, to a certain extent, be retained by plunging the fish into boiling water. The water should be just below the boiling point when the fish is put in, as the motion of boiling water tends to break the fish. The temperature of the water should then be lowered, and the fish cooked until the flesh will separate easily from the bone. From 10 to 12 minutes should be allowed for each pound, and a longer time for thick pieces. Fish should always be thoroughly cooked, as dangerous parasites are sometimes present, which are destroyed by cooking.

Fish Cooked in Water

Thick pieces of salmon or halibut or a whole haddock may be used. Remove head and tail. Wipe inside and outside of fish thoroughly with a cloth wrung out of cold water. Have ready a large kettle or saucepan containing salted, boiling water, to which one tablespoonful of vinegar may be added. Tie fish in cheesecloth and lower it into the water. Place kettle where water will keep very hot, but will not boil. Cook until the flesh will separate easily from the bones. Lift the cloth carefully, drain, and place fish on a hot platter. The skin may be removed. Serve hot with a sauce.

To improve the flavor, one-half cup chopped or sliced carrot and onion, and a stalk of celery or a few celery leaves, one or two cloves and a few peppercorns may be added to the water in which fish is to be cooked.

Drawn Butter Sauce

(*For Boiled Fish*)

2 tb. butter	$\frac{1}{2}$ t. salt
3 tb. flour	$\frac{1}{4}$ ssp. pepper

$1\frac{1}{2}$ c. water from fish

Combine ingredients as in making white sauce. For egg sauce, chop or slice one hard-cooked egg and add to sauce.

Creamed Fish

Separate bones and skin from cooked fish. Heat the fish in thick white sauce. When fish is hot stir into the sauce an egg beaten with one tablespoonful of milk, and let stand one minute before turning it into the serving dish. Serve plain or on toast.

Fish Hash

Combine equal parts of mashed potato and cooked fish. Season to taste and brown in smoking hot fat, as directed for Meat Hash.

Fish Cakes

Make as directed for hash; form into flattened cakes or balls; roll in flour and brown on both sides in hot fat.

Scalloped Fish

Prepare according to directions for scalloped dishes, using thin white sauce to moisten. Bake until crumbs on the top are brown.

Fish Chowder

2 lb. cod or haddock
1 qt. cold water
2 slices salt pork
1 onion, sliced
4 potatoes
2 c. hot milk
2 tb. butter
Salt and pepper
Crackers

Wipe fish inside and outside with cloth wrung out of cold water. Remove head, skin, and bones; put them into a saucepan, cover with cold water, and heat to boiling point. Wash, pare, and slice the potatoes, and parboil 5 minutes. Fry the pork in the kettle in which chowder is to be cooked. When crisp, remove scraps and add the onion to the fat and cook until light brown. Drain the potatoes and add them to the onions. Strain the water from the head and bones into the kettle and boil 15 minutes. Cut fish into two-inch pieces, add to chowder, and cook 10 minutes. Add the hot milk, butter, and seasoning, and crackers if desired. Heat to boiling point and serve. Water may be used instead of milk, and more pork instead of butter.

Broiled Fish

Small fish may be cleaned and broiled whole, or they may be split down the back, the halves being separated or not, as preferred. Large fish are cut into slices for broiling.

For broiling, all fish should be wiped as dry as possible and sprinkled with salt and pepper. Lean fish should be rubbed with melted butter or other fat, and the broiler should be well greased.

The general rules for broiling fish are similar to those for broiling meat. The outside should be seared as quickly as possible by holding the broiler close to the heat, and the inside should then be cooked more slowly by holding the broiler farther away. Fish should be broiled on the flesh side first, then turned and cooked on the skin side long enough to make it crisp. Slices of fish should be turned frequently while broiling, and all fish should be well done and served as soon as cooked.

Butter Dressing for Fish

2 tb. butter	Few grains of cayenne
¼ t. salt	1 t. fine-chopped parsley
¼ ssp. pepper	1 t. lemon juice

Put the butter into a bowl and rub it until creamy. Add salt, pepper, and parsley, then the lemon juice very slowly. The parsley may be omitted. Serve with broiled fish.

CHAPTER XVI

Milk, Milk Products, and Legumes

Milk

The two great sources of the food of man are the animal and vegetable kingdoms.

We have seen that in foods of vegetable origin the nutrients most abundant are carbohydrates—starches and sugars. The amount of protein in vegetable foods is small, as a rule, the chief exception being the legumes, and to a certain extent the cereals also.

The principal foods of animal origin—meat, fish, eggs, milk, and cheese—are the substantial or the so-called "hearty" foods, the word "hearty" being used in the sense of strength-giving, nourishing, or satisfying foods. In fact, generally speaking, these foods, or some combination of them, form the substantial dish, or, as we might say, the "nucleus," of an ordinary meal, the bulk of the meal consisting of some form of starchy food, such as bread, potatoes, etc.

If a piece of ordinary meat be examined, it will be evident that the lean (muscular tissue or flesh) and the fat are the chief edible portions; and since we have learned that the basis or foundation of all muscular tissue or flesh is protein, it is plain that protein and fat are the chief nutrients of meat. The same is true of animal foods in general, of which meat may be regarded as a type.

Milk, however, occupies a position almost alone among animal foods, as it contains, in addition to the protein and fat, an appreciable amount of carbohydrate also. The value of milk as food will be better understood if the ingredients of which it is composed are shown by means of a few simple experiments.

Experiments to show the ingredients of milk:

(1) Allow milk to stand until thick and sour; remove the layer of cream which will be found on the top. Place a drop of cream on a piece of paper. The grease spot on the paper will show that the cream is *fat.*

(2) After removing the cream, strain the milk through double cheesecloth placed in a strainer over a bowl, and let stand until well drained. The thick, white solid portion, or *curd,* left in the cloth is *casein,* the chief protein of milk, and the liquid which drains through is *whey.* Whey consists principally of *water,* having dissolved in it the soluble ingredients of the milk, which can be separated from it by suitable treatment.

Comparing the amount of curd with the amount of whey, it is evident that *water* is the most abundant constituent of milk.

Reserve the curd and whey for further experiment.

(3) Strain a portion of the whey through a piece of fine cloth or filter paper until perfectly clear; divide it into two parts. Heat one part to the boiling point, and when cool pour it into a glass; examine and compare with the unheated portion. The portion that has been heated will be full of fine, white solid particles, which will soon sink to the bottom of the liquid. This white solid is *albumin,* another protein, which resembles in its properties the albumin of an egg. The amount of albumin in milk is, however, very small in proportion to the casein. Albumin differs from casein in not curdling when the milk sours and in remaining in solution (or dissolved) in the whey until it is heated.

(4) Strain the whey which has been heated until perfectly clear and free from particles of albumin. Pour the clear liquid into a double boiler containing water in the lower part, and heat until the whey evaporates, leaving a solid sugary mass.

(5) Place a small portion of the sugary substance on an old spoon or on a piece of sheet iron, and heat until the *sugar* is burned, leaving a black charred mass. Notice the odor of burned sugar. Milk sugar, or *lactose,* occurs only in milk; it is less sweet and less soluble than ordinary sugar.

(6) Place the spoon or sheet iron containing the charred sugar directly over the gas flame, and heat until nothing remains but a very small amount of grayish white powder which the most intense heat will not consume. This powder is the *mineral matter,* or "ash," of the milk.

We find milk, then, to consist principally of water combined with other substances which can be separated in solid form from the liquid or watery portion. These substances are, therefore, sometimes called "milk solids." Milk solids consist of (1) casein and a very little albumin; (2) fat or cream; (3) sugar; and (4) mineral matter. The proportion of solids in the milk from different cows varies greatly, but the average composition is as follows:

	Per cent
Protein (casein and a small amount of albumin)	3.3
Fat (cream)	4.0
Carbohydrate (sugar of milk or lactose)	5.0
Mineral matter or ash	0.7
Water	87.0

Milk is the sole food for the young of many animals because it contains all the elements needed for the complete nourishment of the young of the animals which produce it: *protein,* which furnishes material for building up the body and keeping it in repair; *fat* and *carbohydrate,* to supply fuel to keep it warm and give it energy or the power to do its work; *mineral matter,* to build up the bones and for various other purposes; and *water.*

The mineral matter of milk, though small in amount, is more abundant in comparison with the other nutrients than in any other common food, and it is easy to see why this should be the case in a food designed for young animals.

Milk is often called a "perfect food," but there are three reasons why it cannot be so considered, at least for healthy adults, although life can be supported for a long time on milk alone. First, the proportion of water is so large that great quantities of milk (four or five quarts a day) would have to be taken in order to obtain a sufficient amount of the other ingredients. Second, these ingredients are not present in the proper proportions; the protein, for example, being in rather large quantities as compared with the fats and carbohydrates. A third reason is that a certain amount of waste or bulky material in the food seems necessary to assist the action of the digestive organs, and this milk alone would not supply. Milk, however, forms a valuable addition to the diet, and for persons in ill health and for children it may be safely said that no other single food is of so much value.

Although milk is commonly believed to be a nutritious food, it seems generally to be regarded merely as a beverage similar to tea or coffee, rather than as being in itself an important food. This is owing partly, no doubt, to the fact that it is a liquid rather than a solid. For example, milk is frequently used as a beverage without lessening the amount of meat or other protein food served at a meal; whereas when milk is used plentifully, whether as a beverage or in custards, white sauce, etc., a smaller allowance of meat or eggs is required.

Milk is one of our most valuable foods as regards both its food value and its comparative cost. Few of our common foods furnish a given amount of nourishment so cheaply as does milk. Its "food elements" being in solution, they are more easily and completely digested by both children and adults, while a considerable portion of other foods is not digestible and cannot, therefore, be made use of by the body.

That milk could often be used as a substitute for meat or for eggs is evident from the fact that a quart of milk supplies practically as much of both protein and energy as three-fourths of a pound of beef of average composition or eight eggs, and can usually be bought for less money; or to state it in smaller amounts, a cup of milk is equal in total nourishment to three ounces of lean beef or two eggs. (*Farmers' Bulletin 413.*)

Milk from which none of the ingredients have been separated is known as *"whole milk,"* while that from which the cream has been removed or "skimmed" is called *"skimmed milk."*

Skimmed milk contains nearly all the protein and other nutritive ingredients of "whole milk" except the cream or fat. It might, therefore, often be substituted for whole milk in cooking, and less expensive fats added in place of the cream. If skimmed milk is bought as such, it should be thoroughly cooked, unless it is known to have been produced and handled in a cleanly manner. Milk which has been received from dealers and allowed to stand long enough for the cream to rise should probably never be given to children under two years of age, for reasons which will be mentioned later; but for older people, the mere fact of its being old need not be taken into consideration. So far as its nutritive value is concerned, skimmed milk has a trifle more protein, *volume for volume,* than whole milk.

If skimmed milk is allowed to stand until sour and is then churned or beaten until the curd is broken into small particles, it makes a wholesome drink similar to buttermilk. Much of the commercial buttermilk is thus made, a little cream being sometimes added.

The fat of milk is present in the form of minute globules, and being the lightest part, the fat tends to rise to the top when milk is allowed to stand. The fat, or cream, when removed, carries with it usually more or less of the milk. When cream is churned or shaken vigorously, the fat globules cling together and form little masses of *butter,* which separate from the liquid portion, which is then called "buttermilk."

Butter is sometimes made from fresh, sweet cream, but more frequently from cream which has been allowed to sour or "ripen"—that is, to undergo changes by which a different flavor or aroma is given to the butter produced from the cream. This ripening process is now known to be due to the action of certain kinds of bacteria. Formerly the cream was left to itself to ripen, but the flavor of the butter varied greatly, and the delicious flavor of "June butter" was possible only when the cows fed upon the tender grass at that season. At present, the desired flavor can be given to butter at any time, because the bacteria producing this aroma have been separated and cultivated by themselves, forming what is known as a "pure culture." These bacteria are kept growing under favorable conditions, and under the name of "butter cultures" are sold for the purpose of ripening cream.

Souring of Milk. The *souring* of milk is caused by the presence in it of a group of organisms known as the *lactic acid bacteria.* If these special kinds of bacteria could be kept out of milk, it would never sour. The lactic acid bacteria act upon the sugar of milk (lactose) and produce lactic (or milk) acid. When enough of the milk sugar has been broken down and sufficient acid has been formed, the milk tastes acid or sour, and later curdles. The action of these bacteria is hastened by gentle heat, and therefore milk will sour quickly if kept in a warm place. It is also due to this fact that milk apparently sweet curdles when heated.

The *curdling* of milk is due to the precipitation of the casein by the action of the lactic acid upon it. Other acids, vinegar, for example, added to milk will also precipitate the casein.

Rennet, a substance prepared from the lining of the calf's stomach, will cause the casein of milk to coagulate in the form of a solid curd without souring. Coagulated casein, or curd of milk, is used for making cheese.

NOTE.—The question is likely to arise why sour milk and its products are considered safe foods to be eaten raw, while stale sweet milk is looked upon with some suspicion unless it has been cooked. The reason is that for a long time after the milk is drawn, all the bacteria which enter into it increase in number, the increase being more or less rapid, depending chiefly on the temperature at which the milk is kept. Some of these bacteria may be of the species that produce disease. Finally, however, when milk sours, the harmless lactic-acid bacteria and the lactic acid which they produce tend to destroy other microörganisms, including the disease-producing bacteria, so that the time comes when the harmful bacteria decrease rapidly and the lactic-acid bacteria increase rapidly. By the time the milk is sour, it is practically free from bacteria, except those of the lactic-acid type.—*Farmers' Bulletin 413, The Care of Milk and Its Use in the Home.*

The Care of Milk in the Home

Milk should be kept *clean, cold,* and *covered.* If the milk when delivered is clean and unadulterated, by improper treatment in the home it may become unfit for food, especially for babies. This bad treatment consists (1) in placing it in unclean vessels; (2) in exposing it unnecessarily to the air; (3) in failing to keep it cold up to the time of using it; and (4) in exposing it to flies.

As milk absorbs odors and collects bacteria whenever it is exposed to the air or placed in unclean vessels, the amount of contamination will depend largely upon the condition of the utensils and of the air with which the milk comes in contact. Milk should, therefore, be kept covered, as the air of even a so-called clean room contains many impurities, and especial care should be given to the washing of all utensils used for holding milk.

The following are selected from directions for the care of milk issued by Committees, Commissions, and Health Boards of various cities:

Have the dealer leave the bottles in a cool place, protected from the sun and from flies.

Take in the bottle as soon as possible after it is delivered.

Wash cap and outside of bottle thoroughly with clean cold water, then place on ice.

Keep the ice-box clean; do not put onions, fish, or other strong-smelling foods in the same compartment with milk.

Do not take milk from ice-box till you are ready to use it.

If you have no ice, wrap a cloth wrung out of cold water around the bottle or pail, and wet the cloth several times a day; or make a simple ice-box. Punch holes in the bottom of a tin pail having a cover. Place the bottle of milk in the center of the pail. Pack ice around the bottle, put on the cover, and wrap the pail in a blanket, bag, or newspapers; then put it in a pan or in the sink, so it can drain.

See that all vessels for holding milk are clean; use milk bottles or milk pails for no other purpose than holding milk.

Remove cap from milk bottle with a *clean* special lifter and put milk back on ice immediately. (Any smooth, sharp-pointed instrument which can be washed answers the purpose, but should be kept for this special use.) If paper cap has been punctured, cover bottle with an inverted tumbler.

An excellent way of serving milk on the table, from the sanitary standpoint, is in the original bottle; in any case, do not pour out more than will be used at one meal; but if any should be left over, do not pour it back into the bottle.

If there is a contagious disease in the house, do not return any bottles to the milkman except with the knowledge of the attending physician and according to directions from him.

If bottled milk cannot be obtained from the milkman, do not leave out all night an uncovered vessel to collect bacteria from street dust before milk is put into it. Use a bowl covered with a plate, or a covered glass preserve jar (without rubber ring).

"Loose" milk—that is, milk which is sold from large cans, open most of the time and possibly without refrigeration—is dangerous and should be avoided. Bottled milk is cleaner, but if "loose" milk must be bought, it should be purchased from a clean milkman or at a clean store, where the milk is kept covered and thoroughly iced. Care should then be taken to keep the milk clean and cold when it reaches the home. When loose milk must be bought, wash the pail and scald it before sending it to the store. Cover the pail before and after the milk is put in, to keep out dust, dirt, and flies, and keep the clean pail upside down when not in use.

Do not leave milk on the back of the stove, or on a sunny window sill, or in any warm place.

Do not allow any one to drink milk directly from the milk bottle or pail.

Cleaning Milk Utensils

All milk vessels should be cleaned immediately after using. They should be first rinsed with cold or lukewarm water, then washed thoroughly in hot water and some cleansing material, such as washing soda or soap, added to remove the grease. A strong hot solution of washing powder not only removes the grease, but is also effective for destroying bacteria, if utensils are allowed to stand in it for at least 10 minutes. Rinse utensils in boiling water and turn upside down to dry.

All utensils with which milk comes in contact should be rinsed, washed, and scalded every time they are used. Use fresh water; do not wash them in dish water which has been used for washing other utensils or wipe them with an ordinary dish towel; it is better to boil them in clean water and set them away unwiped.

Rennet Custard or Junket

2 c. milk	2 t. liquid rennet or ½ junket tablet
2 tb. sugar	

30 drops vanilla or lemon extract

Heat milk until *lukewarm* only; add sugar and flavoring, and stir until sugar is dissolved. Add the rennet, pour into dish in which it is to be served, and keep in a warm place. Do not move the dish until junket is firm. Chill and serve with plain or whipped cream and sugar.

Whipped Cream for Junket

¾ c. thick cream	5 tb. powdered sugar
¼ c. milk	30 drops vanilla

Mix the cream and milk and beat until frothy; add the sugar and flavoring.

Whipped Cream

Thick cream or thin cream may be used for whipped cream. Thick cream usually requires thinning with from one-fourth to three-fourths its bulk of milk, according to the use to be made of it. If too thick, cream is likely to turn to butter when whipped. The sugar and flavoring may be added before or after whipping. The cream should be thoroughly chilled and kept cold by placing bowl containing it in a pan partly filled with broken ice and water, or snow. A whip-churn or a Dover egg beater may be used for whipping cream, the egg beater being better for the heavy cream and the whip-churn for thin. Place the bowl of cream in the pan of iced water and beat or whip until frothy. The first bubbles are too large, and should be stirred into the cream. Continue beating, and when a thick layer of froth is formed, skim it off and put into a strainer, placed over a bowl, as some cream drains through, which may be whipped again. When as much as possible has been whipped, it should be three times the original bulk. A bowl which is small in diameter, but deep, is better to use for beating, as less will be left in the bottom unbeaten.

Butter

½ c. cream ⅛ t. fine salt

Shake the cream in a wide-mouthed bottle or jar, or put it into a small bowl and beat with an egg beater until the butter separates from the liquid portion. Collect the particles of butter with a spoon, pressing out as much of the milk as possible. Wash the butter in very cold water, changing water until clear; put butter into a dry bowl, sprinkle with the salt, and work the salt thoroughly into the butter with a spoon. Form butter into a cake or fancy shapes. The salt may be omitted. If the cream is too cold, the butter will not separate; and in cold weather the cream should be warmed to 60° or 70° F., or even higher, and in some cases a temperature of 80° has been found necessary to make butter form.

Butter Balls

Small wooden paddles, or "butter-hands," plain or grooved, are used for forming butter into balls or other fancy shapes. Let the butter-hands stand in boiling water for 5 minutes, then put them into very cold water and chill thoroughly. Have ready a large bowl of cold water. Cut the butter into pieces three-fourths of an inch square and drop into the cold water. Roll them lightly, one at a time, between the butter-hands until of the desired shape. Arrange them on a flat dish and chill. Use a small fork or a butter pick in serving them.

CHEESE

Cheese is believed to be the oldest of the dairy products and the first form in which milk was preserved for future use. It is made chiefly from the milk of cows, though that of goats and ewes is employed in making certain kinds. Cheese may be made from whole milk, from milk to which cream has been added, or from skimmed milk. Cheese consists principally of the casein and fat of the milk. There are many varieties, the differences being due to the kind of milk used, the method of coagulation, and the germs concerned in the ripening. The milk may be coagulated by allowing it to *sour naturally,* or by adding to it an *acid,* such as *vinegar,* or by adding *rennet.* When coagulated by acids, casein carries down with it but little fat, making what is called a "lean" cheese, like some Dutch and German cheeses. The curd produced by adding *rennet* to whole milk will contain nearly all of the cream, making a rich cheese, and will contain some of the mineral matters of the milk also.

However the curd is formed, it is next *pressed to remove the whey,* the amount of pressure used determining whether the cheese will be soft or hard. The soft cheeses do not keep so well, being intended for immediate use. After pressure, the mass of curd is set aside and kept at a favorable temperature to ripen, the time required varying from a comparatively short period to three or four years. New flavors are developed and the texture of the entire mass is altered during the ripening process.

The *ripening* of cheese is due chiefly to the action of *bacteria and molds.* The bacteria are present in the milk used, or in the air of the place where the cheese is made. In making certain kinds of cheese, as Roquefort, molds are allowed to grow on bread crumbs, which are then added to the curd, to assist in the ripening and add to the flavor.

Cheese is really condensed milk minus the sugar and mineral salts, and is a highly nutritious food, which can to a certain extent replace meat. Skimmed milk cheeses are nearly one-half protein, while other cheeses average about one-third protein and one-third fat, the remaining portions of both kinds being principally water, with small amounts of mineral matter.

"Cheese has nearly twice as much protein, weight for weight, as beef of average composition as purchased, and its fuel value is more than twice as great. It contains over 25 per cent more protein than the same weight of porterhouse steak as purchased, and nearly twice as much fat. . . . An ounce of cheese roughly is equivalent to one egg, or one glass of milk, or two ounces of meat."—*Farmers' Bulletin 487.*

Digestibility. Cheese is believed to be difficult of digestion for many, owing partly to the mixture of fat and partly, also, because of substances irritating to the stomach which are developed during the ripening process. Hard cheeses are more digestible than soft ones, because more likely to be thoroughly masticated. Any cheese is made more digestible by being finely divided, or dissolved and mixed with other foods, as in cooking.

NOTE.—Experiments made by the United States Department of Nutrition (Bulletin 487) seem to show that when eaten raw, or carefully cooked, cheese is as thoroughly digested as other staple foods. The Bulletin also states that: "In common with other fatty foods, cheese which has been overheated in cooking is likely to contain burned—that is, decomposed—fats. Disturbances from this cause, however, should be laid to poor cooking, and not to the composition of this special food." It was not apparent from these experiments that the use of potassium bicarbonate renders the cheese more digestible, as was formerly supposed. It does, however, neutralize some of the free fatty acids of the cheese, to which are due many of the flavors and odors of cheese, and especially of the highly flavored kinds. To some the loss of part of the flavor may be an advantage, but to others it would be counted a disadvantage.

The fact that cheese, like fish, meat, and eggs, which it resembles in the proportion of protein and fat, contains neither starch nor cellulose, suggests that cheese also should be combined with bread, potatoes, and other starchy foods; and because of its concentrated character, the addition of juicy fruits and vegetables is desirable, when, as it so well may be, cheese is used as a substitute for meat. The large proportion of fat in cheese suggests the use of correspondingly small amounts of fat in the accompanying dishes, while the softness of cheese dishes makes it desirable to serve the harder and crisper breads with them.

The Care of Cheese in the Home

One of the best ways of keeping cheese which has been cut is to wrap it in a slightly damp cloth and then in paper, and to keep it in a cool place. To dampen the cloth, sprinkle it with water and wring it as dry as possible. It should seem hardly damp to the touch. Paraffin paper may be used in place of the cloth. When cheese is put in a covered dish, the air should never be wholly excluded; for if this is done, it molds more readily.

Cottage Cheese

Cottage Cheese is made from thick, sour milk, by heating it gently until the curd separates, then draining and seasoning. Sweet cream or butter are generally added. Or these may be omitted and sweet cream poured over the cheese when served. Nuts or olives chopped, or caraway seeds, are sometimes added. More flavor will be developed if the cheese is allowed to stand a few days before using.

French Cottage Cheese is made without heating, the thick, sour milk being poured into earthen molds which have holes in the bottom. When the whey is drained out, the cheese is chilled and eaten with sweet cream and sugar, and is often served with acid fruits, such as currants or strawberries.

In making cottage cheese, heat the sour milk very slowly until lukewarm, or even a little less—about 96° F.—and never above 100° F. The lower temperature will give a smoother, softer curd, while overheating will make the curd hard, dry, and unpalatable.

To avoid the danger of overheating, mix a small quantity of boiling water with the milk, without further heating. By the use of this method part of the acid taste is removed, making the cheese more palatable to some.

Milk for making cottage cheese should be skimmed. It is wasteful to use "whole" milk, because most of the fat drains off with the whey, especially if strained while warm. For this reason it is better, after the sour milk has been heated, to chill it thoroughly before straining. The cream skimmed from the top may be added to the cottage cheese instead of sweet cream, if desired.

Cottage Cheese No. 1

1 qt. thick sour milk	1 tb. sweet cream
$\frac{1}{8}$ t. salt	1 t. butter

Stir the milk thoroughly to break up the curd; put the milk into the upper part of a double boiler containing cold water in the lower part. Place on the back of the range or where it will heat very slowly. Stir occasionally, and heat until the curd separates and the whey looks clear; then cool. Have ready a muslin bag or a piece of cheesecloth wrung out of cold water; hang the bag, or cheesecloth with corners tied together, over a bowl or dish to drain, several hours or over night. The finer and softer the curd, the longer it needs to drain. Or place the cheesecloth in a strainer over a bowl. Let stand until the whey ceases to drip, then collect the curd, add salt and cream, or butter; add more seasoning, if desired, and mix well. Add chopped nuts, olives, etc. Serve plain or form into small balls.

Cottage Cheese No. 2

1 qt. thick sour milk	$\frac{1}{8}$ t. salt
$\frac{1}{2}$ c. boiling water	1 tb. cream or 1 t. butter

Stir the milk thoroughly, add the boiling water, and stir constantly for 2 or 3 minutes; then let stand until cold. Drain and season as in Cottage Cheese No. 1. The curd in cheese made by this method will be fine-grained, soft, and creamy, and salt alone need be added.

Cottage Cheese No. 3

Place the dish containing sour milk in a pan half-filled with *warm* water. Pour into the sour milk 1 c. of *hot,* not boiling, water (about 175° F.), and stir thoroughly until heated evenly, then proceed as in No. 1.

Sour Cream Cheese

Chill the cream and pour into a cheesecloth bag and let stand several hours in a cold place. It will drain more readily if the cloth is first wrung out of salted water. When thoroughly drained, add salt to taste. Keep in a cold place until ready to serve.

Creamed Cheese on Toast

1 tb. flour	1 t. butter
2 tb. cold milk	$\frac{1}{8}$ t. salt
$\frac{1}{2}$ c. scalded milk	Spk. cayenne
1 c. chopped cheese	1 egg

Mix the flour with the cold milk in upper part of double boiler; stir in the scalded milk and boil 1 minute, stirring all the time, then cook 5 to 10 minutes over boiling water. Add the cheese, and when melted add salt, pepper, and butter, and the beaten egg. Cook 1 minute and pour over slices of toasted bread or crackers. Serve at once.

Baked Crackers with Cheese

Split common crackers in halves and butter the inside slightly. Put them, buttered side up, on a pan, and bake in a hot oven until yellow. Remove from oven and sprinkle each half with grated cheese. Allow for each whole cracker 1 tb. of cheese, a few grains of salt, and pepper, if liked. Return to oven and heat until cheese is melted.

THE LEGUMES

The legumes, or pod-bearing plants, are, next to the cereals, the most valuable and the most extensively used of the vegetable foods. Those most commonly used are the various kinds of peas and beans. The seeds are eaten green, either alone, as green peas, or with the pod, as string beans, etc.; they are also ripened and dried, as split peas, dried beans, and lentils. Peanuts also belong to the legumes, although commonly classed with the nuts.

The dried seeds of legumes are rich in nutriment, containing on an average nearly 25 per cent of protein and 50 per cent or more of starch, with a little mineral matter. The peanut contains in addition a large proportion of fat, a nutrient in which the other legumes are deficient. "Peanut butter" (peanuts roasted and ground) is the form in which they are extensively used at the present time. Legumes constitute a valuable food supply available all the year round. They occupy small space, keep well, and can be prepared in a great many appetizing and nutritious forms. Properly cooked and eaten in reasonable quantities, beans and peas may replace a portion of the meat in the daily food.

A comparison of some of the more common fresh and dried legumes with other food materials is shown in the following table:

Material	*Water*	*Protein*	*Fat*	*Carbo-hydrates*	*Ash*	*Fuel value per pound*
Fresh legumes:	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories*
String beans	89.2	2.3	0.3	7.4	0.8	195
Shelled kidney beans	58.9	9.4	.6	29.1	2.0	740
Shelled lima beans	68.5	7.1	.7	22.0	1.7	570
Shelled peas	74.6	7.0	.5	16.9	1.0	465
Dried legumes:						
Lima beans	10.4	18.1	1.5	65.9	4.1	1,625
Navy beans	12.6	22.5	1.8	59.6	3.5	1,605
Lentils	8.4	25.7	1.0	59.2	5.7	1,620
Dried peas	9.5	24.6	.1	62.	2.9	1,655
Peanuts	9.2	25.8	38.6	24.4	.2	2,560
Potatoes	78.3	2.2	.1	18.4	1.0	385
Cabbage	91.5	1.6	.3	5.6	1.0	145
Tomatoes	94.3	.9	.4	3.9	.5	105
Rolled Oats	7.7	16.7	7.3	66.2	2.1	1,850
Wheat breakfast foods	9.6	12.1	1.8	75.2	1.3	1,700
Spring-wheat flour	12.3	11.7	1.1	74.5	.4	1,650
Lean beef	70.0	21.3	7.9	...	1.1	730
Dried beef	54.3	30.0	6.5	.4	9.1	840
Milk	87.0	3.3	4.	5.0	.7	325
Cheese	34.2	25.9	33.7	2.4	3.8	1,950
Butter	11.0	1.0	85.0	...	3.0	3,605
Eggs	73.7	14.8	10.5	...	1.0	720

—*Farmers' Bulletin 121*

NOTE.—The fuel value of any substance is the amount of heat it yields when burned or oxidized completely. The fuel value of a food is learned by burning a given weight of it in a strong steel receptacle, known as the "bomb-calorimeter." Calorimeter means literally a measurer of heat, one calorie representing the amount of heat required to raise the temperature of approximately one pint (one pound) of water four degrees Fahrenheit. The bomb is immersed in a definite amount of water in which a thermometer is placed, and the food within the closed bomb is ignited by means of an electric spark. The heat given off during its combustion is indicated by the thermometer, every four degrees rise in temperature of the water representing a fuel value of one calorie.

Vegetable protein is in general less readily digested than the protein of meat, because the nutrients of vegetable foods are inclosed in cells having walls of cellulose or woody fiber, which interfere greatly with their absorption. The tough skins of dried peas and beans are wholly indigestible. The skin is easily removed from dried and ripened peas, however, giving "split peas," and the skins of many kinds of beans are easily removed by stirring after the beans have been soaked in water for several hours, while the large Lima bean can be easily slipped out of the skin after soaking.

Removing the skins thus or straining them out after cooking will greatly increase digestibility.

Legumin, the protein found in peas, beans, and lentils, is sometimes called vegetable casein, from its resemblance in many respects to the casein of milk.

Since peas, beans, and lentils contain a very small proportion of fat, fat in some form is usually added. Dried peas or beans should be soaked in cold water several hours, then cooked a long time at a moderate temperature, in order to soften them and to develop the flavor. When possible, soft water should be used both for soaking and cooking. A very small quantity of bicarbonate of soda ("cooking soda")—one teaspoonful to one gallon of water—added while cooking, will soften them more quickly, but too much will injure the flavor.

The best dried beans are smooth and shining, with no folds of the skin, caused by poor drying. Beans should be of uniform size, not too small, and of the same variety. The larger beans are generally preferred because they have a smaller proportion of skin. There are, however, several varieties of small beans which have a thin skin and fine flavor. These varieties command a higher price.

Boston Baked Beans

1 qt. pea beans	2 tb. sugar
3 qt. cold water	2 tb. molasses
$\frac{1}{2}$ lb. fat salt pork	1 tb. salt

Boiling water

Pick over and wash beans. Cover with cold water and soak over night. In the morning drain, add fresh water, and cook gently until, when a few are blown upon, the skins will burst. Drain off the water and put the beans into an earthenware bean pot.

Scald and scrape the rind of the pork. With a sharp knife make cuts through the rind half an inch apart.

Push beans from the center and put in the pork, leaving only the rind exposed. Put the sugar, molasses, and salt into a cup and fill with boiling water. Pour this over the beans and pork, and add enough more boiling water to come nearly to the top of the beans. Cover, and bake in a *slow* oven 8 to 12 hours, adding water as needed, to keep moist. Uncover during the last hour, that the pork rind may become brown and crisp.

Less pork may be used if preferred; if pork is part lean instead of all fat, a little less salt should be used.

The *flavor* may be varied by adding 1 t. of mustard with the salt and sugar. A small onion is sometimes placed in the bean pot before the beans are put in, or tomato catsup may be added. The sugar may be omitted and $\frac{1}{4}$ c. of molasses, or even more, may be used instead, if beans are preferred sweeter and of a darker color.

Dried Lima Beans No. 1

Wash the dried beans well and soak in plenty of cold water 12 hours. Drain, cover with boiling water, and cook about 2 hours, or until tender. Let the water evaporate until there is only sufficient to moisten the beans well. Add salt, pepper, and butter to taste; let cook a few moments before serving.

Dried Lima Beans No. 2

Remove the skins after the Lima beans are soaked by pressing between the thumb and finger. Add boiling water to cover and cook until soft. Mash fine and season to taste, or use for soup or purée. (See p. 276.)

Split Pea Soup

½ c. split peas	1 tb. flour
1 qt. cold water	1 t. salt
½ small onion	Pepper
2 tb. butter	1 to 2 c. hot water or milk

Pick over and wash the peas. Soak 8 to 12 hours in cold water. Drain off the water and cook peas and onion in the quart of water until soft. Press through a strainer, and add butter and flour cooked together. Add seasoning, and thin with hot water or milk, and reheat. Peas will not soften in salted water, so salt should not be added until they are cooked. A small piece of fat salt pork or a ham bone may be cooked with the peas, and if so, the butter may be omitted. Lentil soup may be made as directed for Split Pea Soup.

Baked Bean Soup

2 c. baked beans	1½ c. tomatoes
3 c. water	1 tb. butter
¼ onion	1 tb. flour

Salt and pepper to taste

Cook beans, onion, and tomatoes in the water 15 minutes. Mash and strain, and add remaining ingredients as directed in Split Pea Soup. One teaspoonful or more of catsup or Worcestershire Sauce may be added.

Purée of Lima Beans

1 c. Lima beans	$\frac{1}{8}$ t. pepper
3 pt. cold water	1 tb. butter
1 t. salt	1 tb. flour

Soak beans 12 hours, if dried; drain, and add cold water to cover. Cook until soft, then press through a strainer. Reheat, and if necessary add more liquid, which may be water, milk, or soup. Cream butter, flour, and seasoning together and add to soup. Let boil 1 minute, and serve immediately with croûtons or crisp crackers.

A small onion or two tomatoes may be cooked with the beans, and a very little cayenne may be added if desired.

Stuffed Bean Roll

Mix together 1 c. each of fine-chopped ham, or corned beef, and potatoes, one slice of onion, 1 tb. each of celery and green pepper chopped fine. Add a few grains of cayenne, and salt if necessary.

Press through a strainer 1$\frac{1}{2}$ c. cooked navy or lima beans. Add to the pulp $\frac{1}{2}$ t. salt, a few grains of cayenne, and a beaten egg. Form the meat and potato mixture into a roll, and cover entire surface with the bean pulp. Lay the roll carefully into a buttered baking dish, brush with melted butter, and bake in a moderate oven about 30 minutes, or until thoroughly heated. Serve with tomato sauce, to which Worcestershire sauce may be added.

CHAPTER XVII

Salads

Simple salads consist of fresh vegetables which require no cooking, as lettuce, endive, cress, etc., served with a dressing. Cooked vegetables, meat, fish, fruits, etc., are also used for salads.

Salads should be prepared daintily, arranged attractively, and should be served cold.

Lettuce and other salad plants should be fresh, crisp, and clean. Wash thoroughly, leaf by leaf, without crushing; chill in very cold water until crisp, dry by patting gently with clean towel, and drain the leaves. Or fold lightly in a towel and place near the ice until serving time.

French dressing is easily prepared and is suitable for any salad. The dressing should not be added to green vegetables until just before serving, as it wilts them.

In order that the seasoning may penetrate thoroughly, salad materials like meat, fish, or vegetables, cut into suitable pieces, are mixed with a small quantity of oil, vinegar, pepper, and salt, and allowed to stand an hour or two. This flavoring mixture is termed a *"marinade,"* and the salad ingredients are said to be *"marinated."* Before serving, drain off unabsorbed liquid and add any desired salad dressing.

French Dressing

½ t. salt	2 tb. vinegar or lemon juice
¼ t. pepper	2 to 4 tb. olive oil

Mix together and stir thoroughly until well blended; or add salt and pepper to the oil and pour it over the salad material.

Toss lightly with a fork until all is seasoned, then add the vinegar, and mix gently until well distributed. Three or four drops of onion juice or a few grains of cayenne may be used to vary the flavor.

College Salad

- 2 c. cooked carrots chopped fine
- 1 or 2 tart apples cut into ½-inch cubes
- 1 stalk of celery cut into thin slices
- 1 small green pepper chopped fine
- Salt and pepper to taste

Mix all together; add French dressing and chill. For individual service, place 2 tb. on a crisp lettuce leaf, or make lettuce "cups" by putting two small leaves together, with stalk ends overlapping each other.

Cooked Salad Dressing

- 1 t. salt
- 1 t. mustard
- 1 tb. sugar
- Few grains of cayenne
- 1 egg yolk
- ½ c. scalded milk
- ¼ c. hot vinegar
- 1 tb. butter

Scald the milk. Mix salt, mustard, sugar, and cayenne together in a bowl. Add egg yolk, and mix thoroughly. Add scalded milk slowly, return to double boiler, add the hot vinegar, and cook until mixture thickens. Add the butter, stir till melted, and strain. Cool before using. If desired thicker, use another egg yolk, or mix 1 t. flour with enough of the cold milk to make a smooth mixture; add to remainder of the ½ c. milk and boil 1 minute before adding to the egg mixture.

Shredded Cabbage or Cole Slaw

Remove wilted leaves and cut a quarter from a small head of cabbage and let stand in cold water until crisp. Cut out stalk, and shred the cabbage fine. Serve with cooked salad dressing.

Water Lily Salad

Remove shells from hard-cooked eggs. Divide eggs into halves crosswise, cutting through whites in such a way that the edges will be cut into sharp points. Remove the yolks, put them in a bowl, mash and season to taste with salt, pepper, and melted butter, or moisten them with salad dressing. Refill the whites with the yolk mixture, cut a thin slice from the bottom, and arrange the halves on a bed of lettuce leaves, which have been washed, dried, and chilled. Serve with cooked salad dressing. Radishes, washed and chilled until crisp, may be used to garnish the salad. The radishes may be cut to resemble the petals of a tulip.

Rice and Tomato Salad[1]

Scald, peel, and chill a small, ripe tomato for each person to be served. Cut a cone-shaped piece from the stem end and with a silver fork carefully work in salt and pepper to season. Or remove the inside of the tomato and fill the center with chopped celery, green peppers, and nuts, mixed with salad dressing. Arrange on a bed of lettuce leaves and rice, and place a spoonful of dressing on top.

Salmon Salad with Rice[1]

Remove bones and skin from the contents of a can of salmon and mince finely. Add an equal amount of cold boiled rice and season with salt, pepper, and vinegar. Stir in plenty of salad

[1] *Cornell Bulletin:* "Rice and Rice Cookery."

dressing and set away for a while in a cold place. When ready to serve, add a little crisp celery cut fine, or chopped nasturtium stems, and shape in molds moistened with cold water. Turn out on a bed of lettuce leaves, celery tips, or finely shredded crisp cabbage, and garnish with stuffed olives cut lengthwise or with nasturtium blossoms and leaves.

(Other fish may be substituted for salmon.)

Egg Salad with Rice[1]

Arrange crisp lettuce leaves on individual plates. In the center of each place a generous spoonful of cold boiled rice and on this a spoonful of dressing. A dainty effect may be obtained by arranging on top of this slices of hard-cooked egg cut lengthwise, in imitation of an open water lily.

Sour Cream Dressing

½ t. salt	⅛ t. pepper
1 t. sugar	1 egg
¼ t. mustard	1 c. sour cream

1 t. vinegar

Mix dry ingredients, add the egg beaten slightly, and stir well. Add the cream slowly, and cook in double boiler, stirring constantly, until it thickens like soft custard. Strain, and when cool add the vinegar.

Bacon Fat Dressing

Cut ¼ lb. fat bacon or ham into small dice. Fry slowly until the scraps are crisp and the fat light brown. Take from fire and add vinegar in the proportion of one-third as much vinegar as bacon fat. Have ready the salad material, seasoned with salt, pepper, and onion, if liked. The bacon scraps may be strained out or left in.

[1] *Cornell Bulletin*: "Rice and Rice Cookery."

German Potato Salad

6 medium-sized potatoes
1 small onion
2 t. salt
¼ t. black pepper
¼ c. hot vinegar
¼ c. hot water
¼ lb. fat bacon
2 tb. salad oil, if liked

Boil the potatoes and peel; cut them into half-inch cubes while warm, put them into salad bowl, and cover with the dressing.

Cut bacon into small dice, put into a frying pan over a slow fire, and cook until the fat is light brown and the bacon crisp; then add the salad oil, if used. Slice onion very fine, put into salad bowl with the potatoes, add the salt, pepper, hot vinegar, and water, then the hot bacon fat, slowly, to avoid spattering. Mix well; garnish salad with pickled beets cut into cubes or fancy shapes. This salad is an exception to the rule; it is best served hot.

Junior Salad

½ lb. large prunes
1 stalk celery
1 green pepper
½ small onion

Wash prunes and soak in cold water till plump. Remove stones and fill prunes with the celery, pepper, and onion chopped fine and mixed with French Dressing. Garnish with Cottage Cheese Balls rolled in chopped nuts. Serve on lettuce leaves, and add more dressing if desired.

CHAPTER XVIII

Food for Invalids

The preparation and serving of food is of especial importance in illness. Food for invalids should be perfectly cooked and attractively served, and all utensils used should be scrupulously clean.

Dishes should be heated, if necessary, and the tray arranged before the food is prepared. The tray should be covered with the whitest napkin, the dishes should be the prettiest and daintiest that can be obtained, and they should shine with cleanliness. The tray should not be crowded, and the dishes should be so arranged that the person can eat with as much comfort as possible. A blossom or two, or even a few green leaves, in a slender vase will add much to the attractiveness of the whole. A pleasing color or some beauty of arrangement will often tempt one to eat when the food would otherwise remain untouched.

The quantity of food given will vary according to the condition of the person, but in general it is better to serve a little, rather than too much, at one time.

In serving a single glass or cup, use a small tray, or a plate, covered with a doily or a folded napkin. To avoid spilling, cups and glasses should be filled to within an inch of the top.

Never touch the bowls of spoons, nor the inside of plates, cups, glasses, etc., with the fingers. The hands should be washed before handling either food or dishes.

Serve hot drinks *hot,* not lukewarm; the cups or dishes for hot food should be heated also.

Cold drinks and fruit are more healthful when served cool, rather than ice-cold.

Food or drinks should not be allowed to remain in the room longer than is absolutely necessary, and should be covered when possible. The tray and all traces of a meal should be removed immediately after serving.

In contagious diseases everything used—dishes, knives, forks, spoons, the napkin, the tray, etc.—should be sterilized by boiling in water for half an hour after using. Use nothing which cannot be washed.

Among simple and digestible foods may be mentioned well-cooked cereals, gruels, rice water, etc.; the varieties of toast, crisp crackers, croûtons, milk porridge, and macaroni with white sauce; cocoa, albuminized milk, eggnog, egg lemonade, soft-cooked, poached, and creamy egg, and custards; ice cream; beef tea, meat broth, beef juice, broiled meat, etc.

In serious illness the physician in attendance should be consulted, and the directions followed *exactly*. Much unnecessary suffering, and even death, has resulted from giving articles of food which have been forbidden.

Irish Moss Blanc-Mange

$\frac{1}{4}$ c. Irish moss	$\frac{1}{8}$ t. salt
2 c. milk	$\frac{1}{2}$ t. vanilla or lemon extract

Soak the moss in cold water until soft. Wash, drain, and pick over the moss, and put it in a lace bag and cook it with the milk in the top of double boiler. Cook 30 minutes, or until a few drops will stiffen when put on a cold plate. Add the salt and flavoring, and pour into a cold, wet mold, or into small molds or cups.

Irish Moss Lemonade

Prepare 2 tb. Irish moss as for blanc-mange. Put the moss into the top of a double boiler with 2 c. cold water, and cook over boiling water 20 minutes. Strain, and add lemon juice and sugar to taste. Serve hot or cold.

Flaxseed Tea

Pick over 1 tb. flaxseed. Put into a strainer and pour cold water over it. Put the flaxseed with 2 c. cold water into a saucepan, and boil 1 hour. Add more water as it boils away. There should be two cups when the tea is cooked. Strain, add lemon juice and sugar to taste, and serve hot or cold.

To Chip Ice

Wash the ice, and place it upon a clean towel. With a thimble on the finger press a strong needle against the ice, near the edge, using a quick downward motion. Chip off as much as will be required, collect it with a spoon, and put it into a glass. Serve by itself, or with currant or other acid jelly, or with fruit juice. Ice "shavers" may be purchased.

Orange Sunflower

Wash an orange thoroughly. Press a fork firmly into the stem end, and with a sharp knife cut from the orange a paring thick enough to remove the skin and the membrane. Do not touch the fruit with the fingers. Cut as close to the membrane between the sections as possible, first on one side, then on the other, and remove the pulp, leaving the membrane. Take out any seeds, and place the sections on a small plate, and arrange them like the petals of a sunflower, with the points of the petals meeting in the center.

Peach Foam

Remove the skin from 3 or 4 perfectly ripe peaches. Cut into small pieces. For a cupful, allow ½ c. powdered sugar and the white of 1 egg. Put all together into a bowl, and beat with a silver or a wooden fork until thick and perfectly smooth. This may be served with or without cream. Stewed apricots may be used instead of the peaches. Less sugar may be used.

Apple Water, Rhubarb Water, Lemonade

Wash and wipe a sour apple. Cut into pieces, put into a saucepan with 1 c. of cold water. Cook until the apple is soft. Strain through cheesecloth or clean linen, sweeten to taste, and serve cold. A stalk of rhubarb may be used instead of the apple, for rhubarb water. Rhubarb or an apple with red skin will give a pleasing color to the water. Other acid fruits may be used in the same way. In making lemonade for an invalid use boiling instead of cold water. It may then be served hot or cold.

Milk Porridge

6 raisins, seeded and quartered	1 c. milk
	½ tb. flour
Cold water	Salt to taste

Put raisins into a small saucepan, cover with cold water, and cook until the water is nearly evaporated.

Reserve enough of the milk, cold, to make a thin batter with the flour, pour the remainder of the milk over the raisins in the pan. Stir until hot; then add the flour mixture, and stir constantly until it has boiled 5 minutes. Strain, add salt to taste, and serve hot.

To seed raisins, wet the finger tips in warm water, press raisin, and push seeds to the surface. Use a small knife to cut the skin and take out seeds. Dip knife blade into the warm water to remove seeds.

Cracker Gruel

4 tb. cracker crumbs	$\frac{1}{8}$ t. salt
1 c. cold water	1 t. butter or cream
1 c. cold milk	

Roll crackers fine, put crumbs into a small saucepan, and add the cold water. Heat until the mixture boils, stirring constantly; add the milk and salt, and reheat. Add the butter or cream, and, if desired, a little grated nutmeg.

Arrowroot Gruel

$\frac{1}{2}$ tb. arrowroot	1 c. boiling water
$\frac{1}{2}$ t. sugar	1 c. hot milk
1 tb. cold water	Spk. nutmeg or cinnamon
Salt to taste	

Mix arrowroot with sugar in upper part of double boiler; add cold water, and stir till smooth. Pour the boiling water in gradually, and place over direct heat and stir constantly until mixture has *boiled* 1 minute, then cook over boiling water 30 minutes or longer. Add the hot milk, flavoring, and salt. Mix thoroughly, and strain if not thoroughly smooth. Reheat to boiling point, but do not boil after milk is added. Serve hot.

Flour Gruel

Substitute 1 tb. of flour for the arrowroot, and proceed according to directions. A half-inch of stick cinnamon may be used instead of the ground spice.

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