

HOG KILLING AT THE CHICAGO STOCK YARDS.

According to the United States Department of Agriculture, there were, on Jan. 1, 1891, over fifty millions of swine in the United States, more than three-fifths of which were in twelve so-called packing States, four of these States, Iowa, Illinois, Missouri, and Kansas, having together 18,596,000, or nearly two-fifths of the total for the whole country. The city of Cincinnati was for many years familiarly designated as Porkopolis, as the leading center of the pork-packing business, but Chicago long ago passed the Queen City in this specialty, almost at the same time that it attained so striking a prominence in the business of beef packing. There is probably no more interesting subject to the economist and statistician, at the present time, than that presented by an investigation of the vast business carried on at the Chicago stock yards, and it is not surprising, therefore, that visitors to Chicago are always expected to make the tour of the stock yards before they can be said to have a proper appreciation of the enterprise and business ability which have made the city what it is.

In the accompanying illustrations we have endeavored to make our readers participants in the advantages of such a visit, so far as our artist has been able to represent one of the most important branches of business carried on at the stock yards, the pictures showing details of the pork-packing industry, as carried on by the house of Armour & Co., who have long stood at the head of the trade as being the largest packers and shippers. Their trade extends to all parts of the globe, and the number of hogs killed by them for the year ending April 1 last numbered 1,714,000, besides 712,000 cattle and 413,000 sheep. They have 7,900 employes, and 2,250 cars are equipped with refrigerating apparatus for the transportation of their products. The ground area covered by the buildings is 50 acres in extent, giving a floor area of 140 acres, a chill room and cold storage area of 40 acres, and a storage capacity of 130,000 tons. In addition the firm has separate glue works, with buildings covering 15 acres, where 600 hands are employed, their production last year having been 7,000,000 pounds of glue and 9,500 tons of fertilizers.

The hogs, as they arrive by train from all sections, are kept in the extensive yards and sheds adjacent to the buildings until they are wanted for slaughtering, which may be a few days or but a few hours. While they remain here, however, they are always well fed and watered, and they are selected for killing according to the various markets, their ages generally being from six to eighteen months, and the average weight being from 150 to 200 pounds.

Each lot of animals, as they are taken from the pens, is duly weighed on standard scales, after which they are driven over what is styled the "Bridge of Sighs" into an upper story of the building where the work commences, about a score being inclosed together in a catching pen. Then to one hind leg is attached a short piece of chain, having a ring at its opposite end, and into this ring the operator passes a hook on the end of a chain lowered from a roller overhead, the latter chain being steadily wound up by power. As the head of the animal is raised, another hook, suspended from a wheel, is fixed into the ring, and this wheel runs on a rail on ward through several large rooms, always at an incline, down which the animal is carried by his own gravity. As he is swung over the wall of the catching pen, the butcher, with one thrust of a sharp, short knife, always reaches to the heart, insuring almost instant death, there being no squealing and but very little muscular twitching after the thrust. The blood flows through an inclined grating into a receptacle below, and of itself is an article of considerable value, utilized for several important purposes.

Passing on beyond the butcher, the animals are unhooked and plunged into a vat of steam-heated water, where nine or ten are immersed together, and where

they are kept for about three minutes, that the hair may be readily scraped off. From the farther end of the vat, every few seconds, a curved, rake-like grid-iron, attached to a cable, lifts a steaming hog out on a table, along which passes an endless chain, to which the hog, hooked by the nose, is attached, to be drawn through a scraping machine, as shown in the lower picture in our first page illustrations. At the time of the visit of our artist, black Berkshire pigs were being slaughtered, and the white and black portions of the animal seen plainly indicate where the hair has been already removed in its passage through the machine. The accurately working spring scrapers of the machine are mounted on cylinders placed at such angles as will allow the blades to most effectually reach every portion of the animal, and in about ten seconds the hog emerges denuded of its hair. This work was done by hand some years ago, but the machine, which saves the labor of ten men, was invented and put in operation by one of the engineers of the firm in consequence of a strike of the scrapers, who did not imagine that machinery could be made which would perform their branch of the work.

The animal passes from the machine to hand scrapers, where any slight oversight is made good, after which follows a thorough washing by means of jets at the ends of rubber hose suspended over the table, to be directed as required for removing any adhering hair, dirt, or scum, perfect order and cleanliness being a marked feature of every detail. Next follows an inspection, after which the animal's throat is cut entirely across, so that the head hangs by but a slight connection, and the body is suspended by the

After the carcass has been thoroughly cooled, in rooms which are always kept at a temperature below 40° F., it is run along, still on the labor-saving rails, to the cutting-up department, where it is taken down and separated into two sides, and then a workman with a powerful chopper cuts off the haw, shoulder, and underlying ribs if necessary, separating the feet to be canned, pickled, or passed into the lard tanks. It is wonderful to what accuracy these workmen attain, never mauling the meat, and always cutting to a hair's breadth just where the separating cuts for the different parts are required.

A large portion of the product of the slaughter houses is distributed in bulk to the principal markets of this country, the number of hogs slaughtered singly by farmers for general consumption being small; but the cutting and packing of hog products, for both the home and export trade, is a business of such enormous extent that it has been made the subject of very careful and exact rules, recognized by commercial bodies generally in all the important centers of commerce. The requirements of the Chicago Board of Trade in this particular may be somewhat briefly summarized as follows:

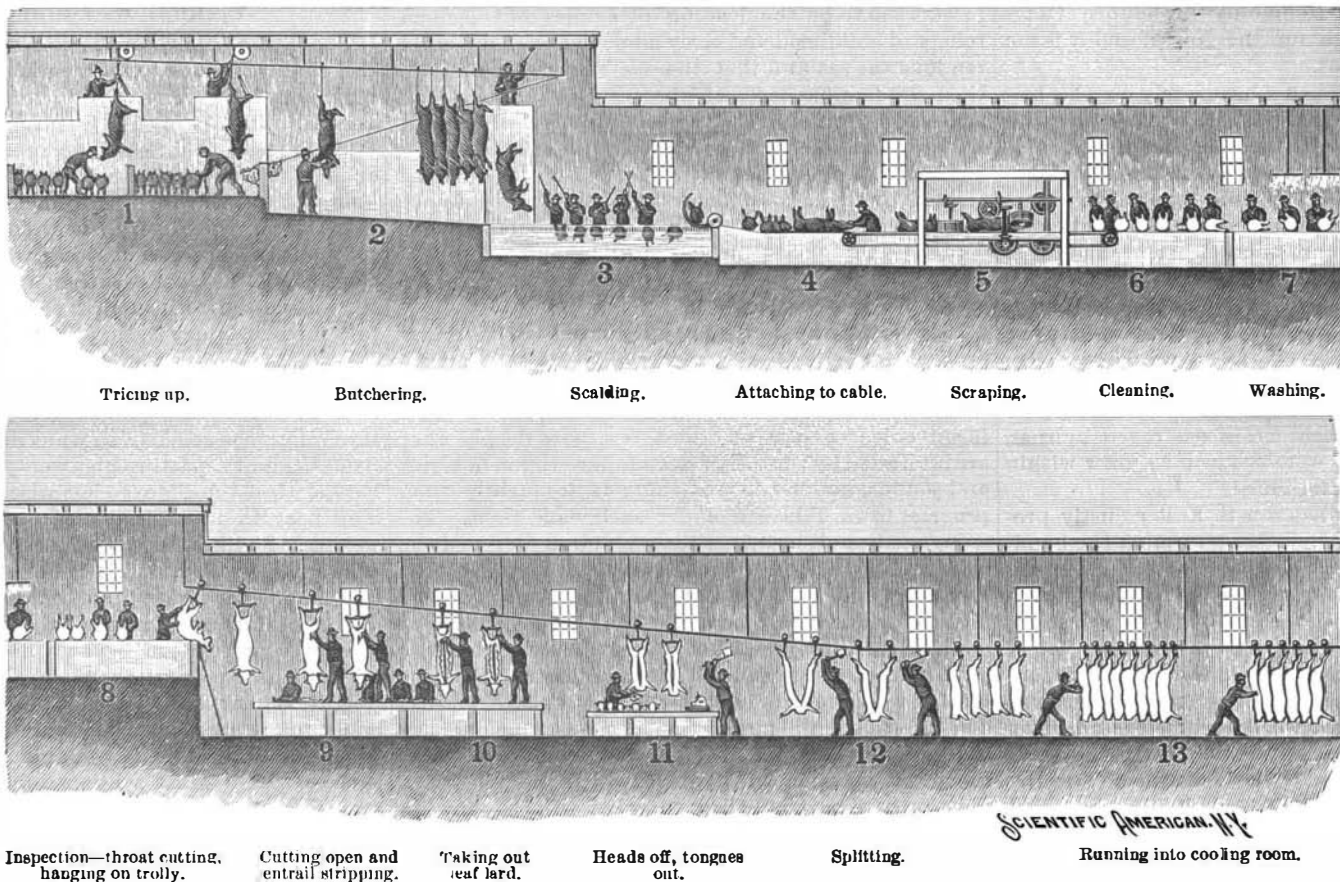
In barreled pork, standard mess must be from sides of well-fatted hogs, split through or on one side of the backbone, and equal proportions on both sides, 190 to 193 pounds of green meat to make a barrel, numbering not over sixteen pieces, including the regular proportion of flank and shoulder cuts, the packing to be done with forty pounds of coarse salt, and the barrel to be filled with brine. Prime mess is made of the shoulders and sides only of hogs weighing from 100 to 175 pounds,

cut in square pieces of four pounds each, twenty pieces of shoulder cuts to thirty pieces of side cuts, and in addition to the salt twelve ounces of saltpeter are placed in each barrel. Extra prime pork is made from heavy untrimmed shoulders, and light mess pork is made from sides, but with as many as twenty-two pieces to the barrel. Extra clean pork has the backbone and ribs taken out, fourteen pieces to the barrel, and in clear pork the backbone and half the rib next to it is taken out.

In pickled meats, careful requirements are formulated for standard sweet

pickled hams and shoulders, New York shoulders, Boston shoulders, California hams, skinned hams, pickled bellies, etc., while cut meats form the subject of a long list of regulations in which are described, among other things, what must constitute Cumberland, Birmingham, South Staffordshire, Yorkshire, Wiltshire, and Irish cut sides, South Staffordshire and Manchester hams, etc. The bacon put up for foreign consumption is usually packed in boxes holding about 500 pounds each, and much of the Chicago packed meat is retailed at many places in England and other foreign markets as of the choicest domestic production in the neighborhood where it is consumed.

The promised removal of the long standing restrictions upon the trade in American pork by Germany, France, and Italy will undoubtedly result in a large increase in our exports of hog products, the total of which for the last fiscal year, ended June 30, 1891, was \$84,908,698. This sum is made up as follows: Bacon, \$37,404,989; hams, \$8,245,685; fresh pork, \$56,358; pickled pork, \$4,787,343; lard, \$34,414,323. For the preceding year our exports of the same articles were \$372,476 greater than during the last fiscal year.



THE CHICAGO STOCK YARDS—SUCCESSIVE OPERATIONS FROM CATCHING PEN TO COOLING ROOM.

hind legs from a trolley, and thus passed over the table where the disemboweling is performed. The leaf lard is removed at a following table, and further along the heads are removed and the tongues taken out, the last operation being the splitting, before the carcass is run into the cooling room, the time taken to catch the hog, slaughter, cleanse, dress, and deliver him in the cooling chamber being ordinarily only from ten to fifteen minutes.

Each portion of the internal organs is carefully separated, cleansed, and set aside for use, the lungs, heart and liver going to the sausage department, and the intestines, stripped of fat, cleansed and scalded, following to form the casings. Many kinds of sausages are made, among which are "liver," "blood," and pork, "Frankfurter" and "Bologna," while the soft parts of the heads are made into head cheese or brawn. The mincing of the sausage meat, which also includes trimmings from the sides and hams, is effected by steam-driven mincers operating in large vats. From hogs in good condition it is estimated that as much as forty pounds of lard is obtained on an average from each animal. The fat and other refuse is placed in tanks heated by worms from steam boilers, and after melting is drained off in different grades, the first quality being made only from the leaf and trimmings. Some of the bristles are used for brushes, and others go to the cobblers, but the great bulk of the hair is mixed with horse hair for stuffing cushions and similar purposes. The blood is largely used for making albumen for photographic uses, as well as in sugar refining and for a fertilizer, the crushed bones and other refuse also forming a very valuable fertilizer, although many other uses are likewise found for the bones.

Antiseptic Soap.

An antiseptic soap for physicians and nurses, which has been found to possess the property of closing scratches and healing sores and cracks, has been introduced by M. Vigier, and is having considerable sale in Paris. It is made of 12 parts dried sulphate of copper incorporated with 88 parts of any good soap material. The product has a pleasing green tint and is devoid of any irritating action.

The Trees for Hedges.

When barb wire fences became common, the opinion was generally entertained that hedges would be wanted no longer, being superseded by the wire fence. But hedges are not entirely given up, since it has been found that the strong objections made to them have arisen from the careless manner in which they have been treated, and often left to take care of themselves. Carelessly planted, many parts have died and left gaps, and with pruning neglected or performed at the wrong season, large vacancies have been left below. But they will not become important farm barriers to any extent, rather the ornamental boundaries of home grounds, or screens for protecting gardens from intruders or prevailing winds. Yet in some instances they may still be useful boundaries of farm fields, as an example of which we now have had for over twenty years an Osage hedge nearly a fourth of a mile long, which for more than that time has afforded perfect protection between cattle and horses on one side and fruit trees and plants on the other. It was cultivated on each side for a few years, until large enough, after which the soil was allowed to harden or become covered with grass to check the growth of the hedge and favor early ripening of the young wood. This result has been increased by a tile drain a few feet from it, giving the Osage plants a dry bottom. As a consequence, the hedge has never been injured to any extent by cold winters. It has been annually cut back enough to reduce the height to about six feet. It is perfect throughout, and no animal or any man has ever attempted to pass it. It has cost less, in the long run, than a good board fence. *The Cultivator and Country Gentleman*, from which paper we copy, mentions these facts because intelligent planters very commonly pronounce Osage orange not hardy enough for the North, and it is not under common treatment.

Much discussion has taken place lately on the best trees or plants for hedges. W. G. Waring gives his views in the *Tribune* after much experience. He strongly favors the barberry, which he has found sufficient to exclude ill-bred boys from the fruit garden, who previously disregarded barb wire and picket fence. The plants were set eight inches apart, had been pruned back enough to "present countless needle points from ground to summit." The objection is mentioned too that the barberry is unfavorable to the wheat crop, but this is not always the case, as we have barberry hedge and barberry bushes in close proximity to unblighted wheat fields, and in other instances we have seen promising wheat crops destroyed by rust, although no barberries were known to grow within miles of such devastated localities.

In the same journal, Andrew S. Fuller justly pronounces the common hemlock as forming the handsomest and most perfect hedge. For its rich green leaves and soft foliage it surpasses the Norway spruce and the arbor vitæ. Its dense growth in its own shade and in that of other trees might have been mentioned as an additional recommendation, in which it is unlike many other evergreens, which present a bare growth of denuded branches when the interior is examined by lifting the exterior foliage. This characteristic allows it to be used for screens (taller than hedges) in the shade of deciduous trees, and to give it a full rounded growth when other evergreens would lose their leaves.

Since the introduction of barb wire, a larger list of hedge trees may be made than formerly, a few strands of the wire passing lengthwise in the interior giving the same advantage to thornless branches as formerly possessed by dense thorns. Evergreens may thus become efficient barriers. The buckthorn, which has the advantage of being easily raised from seed, easily transplanted, and having a natural hedge-like growth, may have sufficient artificial thorns supplied it; and dense-growing ornamental shrubs may now be used in the same way, if the planter will add the wire to the interior as they gradually increase in height.

Animal Temperature and Food in Disease.

The *Lancet*, of July 27 ultimo, brings forward the question whether the animal temperature is reduced by change from an animal to a vegetable diet, or to a diet in which animal food forms a main part. It refers to a gentleman and lady who, under what is called the V.E.M. system (vegetable, eggs, and milk), seem to have brought down their animal warmth from 98° to 96°, with 97.4° Fah. as a maximum, and at the same time have remained in perfect health and strength. If this be true, it is argued, the assumed natural standard of the *genus homo* is above the required standard, and men and women are wasting their powers by an unnecessary dispersion of energy. It is suggested that we ought to ascertain, from a long, patient, and truthful series of observations on the temperatures of animal and mixed feeders whether, by changing them into pure vegetable feeders or fruit feeders, any modification of temperature is induced. The idea is a good one, but the research should be extended to observations on the effect of dietaries in the course of disease. We have no system in the treatment of disease, of febrile disease especially, that so much as touches this all-important matter. In high fever we give cold

drinks, with broths and beef tea, guided more by what, from very crude ideas, we are led to think the stomach will bear, than by any forethought of what the substance, supplied as food, will do when it passes into the circulation. It is not known, elementary as the question is, whether the imbibition of cold water reduces temperature more decidedly than hot water; and when we come to foods, we have no sure knowledge whether those which are animal and fleshy, or those which are farinaceous, or those which are fruity are the most active antipyretics. Perchance there might be discovered some food and drink that of itself would be sustaining and antipyretic. I am usually led by what is called the "instinct" of the patient in directing foods and drinks, and my late friend Mr. Thomas Hunt, a shrewd and original observer, wrote once an essay to prove that instinct was an infallible guide for food in disease. It is a doubtful doctrine, but possibly up to date as good as any other, if not the best.—*Dr. B. W. Richardson.*

Climatology in Relation to Childhood and Old Age.

As regards childhood, we may safely lay down the general laws that children respond more readily to change than their elders, that they commonly do very well at the seaside, that they often benefit most signally by a sea voyage, and do not suffer severely from the discomforts attending such a voyage, that they enjoy and benefit by a country life, that they suffer more than grown people from the depressing influences of city life, and that, as a rule to which there are probably many exceptions, they do not specially benefit from the climate of high altitudes. Such, in brief, seem to be the leading principles of the climatology of childhood and early adolescence. That children love the sea and that the sea very generally suits them are familiar facts of observation. The explanation is to be found in such considerations as that children are commonly in a condition to bear stimulation, not having used-up nervous systems, that they are attracted by the sea and its products, and by the amusements natural to the seaside, and that some of their commonest ailments, such as struma and rickets, are among the affections most amenable to marine influence.

It is very striking how happy children are, as a general rule, on shipboard; how readily they accommodate themselves to their novel conditions of existence; how little they suffer from sea sickness or the other inconveniences of the life at sea; how deeply they are interested by the rather monotonous round of sights and sounds, and how astonishing is frequently their progress toward health under such conditions. The enjoyment and benefit which children derive from country life do not call for comment. That city life, especially under the insanitary and unwholesome conditions prevailing in many of our large centers of population, is prejudicial to the normal and healthy development of the child is a fact sufficiently obvious, but for which it is difficult to find an adequate remedy. The question is too large to be discussed incidentally in this connection, but it is not too much to say that the great problem in hygiene which the twentieth century will be compelled to solve will be how to reconcile the growth of great cities with the preservation of the national health.

That the mountain climates are not very suitable for children is probably a true general principle, but one upon which it would be rash to insist too rigidly. The explanation would appear to be that, upon the whole, the general conditions of climate and life which exist at high altitudes, although highly stimulating in certain morbid conditions, do not promote in a similar degree normal physiological development. We must admit, however, that this point has not been at all adequately worked out, and that any hard-and-fast rules are at least premature.

The climatology of old age may be roughly summed up as follows: Elderly people in general do well with equability and moderate warmth; they bear cold badly; they benefit by abundant sunshine. The high altitudes are very rarely suitable to them, and are usually decidedly injurious; they do best in level places, where there is abundant shelter. They may or may not benefit by the seaside or a sea voyage, but these measures cannot be recommended with at all the same confidence as in the case of children. Most of these principles become almost obvious upon a little consideration. The failing vitality, by which we mean impaired vigor of circulation, assimilation, and excretion, which characterizes advanced years, and the special maladies most frequent at that time of life, such as rheumatism, cardiac disease, gout, and renal affections, serve to determine the climatological problem. Moderate warmth with fair equability, abundance of sunshine with adequate shelter, and level walks, evidently meet the most obvious indications called for by these affections.

The unsuitability of the mountain climates to the aged is due partly to the cold, which depresses those in whom the circulation is feeble either constitutionally or as the result of age, partly to the sudden

changes, which are especially trying to the rheumatic or the subjects of renal disease, partly to the impossibility of obtaining sufficient easy exercise on the level ground, which is a serious difficulty in cardiac cases. A sea voyage, though by no means out of court at any period of life, is often a doubtful experiment for the old, who do not take kindly to such a revolution in their daily habits as life at sea necessarily involves, who often suffer severely on shipboard from sea-sickness and insomnia, and who may not possess sufficient elasticity of spirit to rise above the depressing influence of separation from home and friends. The elderly constitute the class most likely to benefit by the various spas, which now enjoy at least a sufficient vogue. The effect of mineral waters is in most cases to promote elimination, and this is often the first indication in the case of those advanced in years. It should never be forgotten, however, that vigorous eliminative measures are a great drain upon the system and may easily be abused.

We hardly need to say, in conclusion, that in nothing is the superior recuperative power of youth over age more apparent than in the greater readiness and certainty of its response to change of climate. We can confidently recommend to the young measures which we suggest dubiously to the old. In fact, change is rarely at fault in the earlier years of life, whereas it is very often a doubtful, and sometimes a most hazardous, experiment for the aged. In the case of the latter we need to have solid reasons and tolerably definite prospects before we induce them to give up the comforts and safety of home for the uncertainties of travel.—*Lancet.*

Cycling: Its Use and Abuse.

Those who believe in the necessity of physical exercise, and we belong to their number, have need also to remember that even so good a thing as this is in excess an evil. The use of the cycle is a form of bodily recreation in itself doubtless wholesome; none the less it is open to the mischievous effects of undue indulgence. Tempted by the ease of movement, combined as a rule with attractive scenery, every one tries it. Every one too finds he can do something with it, and considerations of weather, constitution, age, and health are apt to be dismissed with summary imprudence. One fruitful source of injury is competition. In this matter not even the strongest rider can afford to ignore his limit of endurance. The record breaker, who sinks exhausted at his journey's end, has gone a point beyond this. The septuagenarian who tries to rival his juniors by doing and repeating his twenty or thirty miles, perhaps against time, is even less wise. Lady cyclists, too, may bear in mind that their sex is somewhat the weaker. So likewise among men the power of endurance varies greatly, and it is better for some to admit this and be moderate than to labor after the achievements of far more muscular neighbors. In short, whenever prostration beyond mere transient fatigue follows the exercise, or when digestion suffers and weight is markedly lessened, and a pastime which ought to exhilarate becomes an anxious labor, we may be sure that it is being overdone. He that would reap its best results must content himself with much less than this; but unless he can observe such moderation, he had better abstain from it altogether.—*The Lancet, London.*

New Coloring Matter.

It is said: Some Belgian manufacturers of glass and porcelain have recently introduced from Germany a new coloring matter, which can be fixed without the use of fire. In this process a mixture of two solutions, of which one consists of 100 parts of strong potash and 10 parts of acetate of soda, and the other of 15 parts of acetate of lead in 100 parts of water. The second solution consists of 50 parts of borax dissolved in 100 parts of hot water and 20 parts of glycerine. Sixty parts of the first mixture are mixed with 40 parts of the second. When the composition has been applied, the objects are placed in a bath, which is composed of 1 part of borax dissolved in 12 parts of water, mixed with 50 parts of hydrofluoric acid and 10 parts of sulphuric acid. After being allowed to remain in the bath for ten minutes, the objects are washed in clean water, when the color appears as clearly as when the objects are fired.

Failure of the Galveston Harbor Works.

After more than twenty years of experiments, frequent changes of commanding officers, several modifications of plans, the expenditure of \$2,273,111.66 to June 30, 1890, and more than a quadrupled estimate of cost to complete, it may be said that the injuries caused by the works are greater than the benefits, and that the difficulties in the way of securing a deep water channel over the outer bar have been greatly increased rather than diminished, while it is proposed to apply \$6,200,000 to a continuation of these experiments on a plan which must prove fatal. Such is believed to be a frank, though greatly abridged, statement of the problem of securing deep water at Galveston, as it exists to-day.—*Lewis M. Haupt, C.E.*