and there was a gain in weight during the first week of three quarters of a pound. At the end of the second week another pound had been gained, the diarrhoea had wholly ceased, the intertrigo had disappeared everywhere, and there was only a little dry and scaly eczema left upon the cheeks. All these rapid changes ensued without any alteration in the treatment employed.

On the discovery of the arsenic in large amount upon the walls of the chamber the question naturally presented itself to me: May its presumably constant presence in the air of the room not have been the cause of these extraordinary dermatoses both in mother and child? What were the conditions which would warrant the conclusion of so direct a connection between them?

A young lady with an especially delicate skin lies for four weeks in a chamber the walls of which are heavily covered with an arsenical pigment loosely laid on. One week after leaving it for another apartment there is developed over a large cutaneous surface an inflammatory process of rare occurrence, so rare, in fact, that nothing whatever is known of its ætiological relations. As soon as this chamber is vacated by the mother the infant, who has spent the first month of its life in another apartment, with its wet nurse, is transferred to the arsenical room as its permanent nursery, and in ten days begins to present an inflammatory affection of the skin, one of most common occurrence at its age, but of an unusual type. Later it develops marked intestinal disturbances. Both sets of symptoms persist to an extraordinary degree, in spite of repeated changes of treatment and nurses, until the paper is removed from the walls, when the skin and intestines rapidly return to their natural condition. The first wet nurse did not sleep in the arsenical room. The second one was in the room nearly the whole day and night, and had several attacks of vomiting and diarrhoea. The third wet nurse was in the house but a short time before the discovery of the arsenic was made. She remained well, as did the monthly nurse who had charge of the mother during her confinement and subsequently of the child for two months. The two latter nurses were especially strong women.

These are the facts. Do they furnish evidence for a suspicion that arsenic was a factor in these manifestations of disease in this household, or are they explicable on the theory of mere coincidence? If pityriasis maculata et circinata is a well-defined entity, what possible relation can arsenic have to it as cause? Eczema is one of the most common affections of early infancy; why look for any unusual agency in its production here? Has arsenic been known to produce such effects? As just stated, pityriasis maculata et circinata is a rare disease, and we have no data collected to explain its occurrence. I do not know that its association with arsenic in any way has been hitherto observed. It may be that this case furnishes a clue to the ætiology of others which have been reported, could the circumstances attending them be recalled. It certainly should be remembered in connection with those which shall be observed hereafter. With regard to the eczema in the child, it did present some very unusual peculiarities. Intertrigo in the summer months is very common as the only manifestation or in connection with other phases of eczema, but I have never met with a case in which it was so marked in every possible locality for its existence, or so little influenced by treatment in

all. This feature in the winter is still more exceptional. Moreover its very rapid disappearance on the removal from the arsenical chamber was a most significant sequence.

WHAT IS REFRIGERATED BEEF?

BY H. LASSING, M. D.

ARTICLES of food are very complex in their chemical constitution, and are exceedingly prone to return to the simpler and more stable compounds called inorganic. The principal promoters of such decomposition are moisture, oxygen, and certain minute organisms. The art of preserving food in a manner to retain its flavor and natural qualities is chiefly modern, as the ancients only understood rude methods, the principal of which were drying and salting.

Animal food may be preserved by several methods, of which the following are the chief: (1.) By immersion in a solution of common salt, to which a small portion of saltpetre is often added, called brine. This acts by abstracting the juices from the meat, and also by preventing the development of organic germs and lessening the tendency to molecular change. (2.) By packing the meat in salt, whereby the juices are abstracted, then removing it and allowing it to dry, and packing in boxes or barrels. (3.) By rubbing with common salt, and drying in the sun, or in a current of dry air. (4.) By salting and smoking, by which means, in addition to the abstraction of moisture by the salt, pyroligneous acid and creosote act upon the flesh, causing it to contract and harden, and also preventing the development of mould. (5.) By drying in a current of warm air at about 140° F., or in the open air at even a lower temperature, when the air is comparatively free from ferment germs. The latter method has long been practiced, especially for "jerked beef," throughout Spanish America and in the warmer parts of the United States. This dried meat may be reduced to powder, packed in air-tight cans, and preserved for a long time. When mixed with fat it forms the pemmican used in Arctic voyages. Spices and dried berries are sometimes added to it. (6.) By cooking to coagulate the albumen, and then inclosing in air-tight cans with exclusion of air, after the manner of canning fruits. (7.) By cooking and pickling in vinegar, a common method of preserving oysters, lobster, and fish. Cooking and seasoning and covering with melted lard or oil is a common method of preserving small fish, like sardines. (8.) By refrigerating and freezing, a process now extensively practiced in all civilized countries, fresh beef being carried from South America to all parts of the world, and in the United States from the Pacific to the Atlantic coast.

There are several special methods which might be classified under one of these heads. Appert's method, introduced in France about 1810, for which he received a prize of 12,000 francs, and which was afterwards patented in England and improved by Donkin, Hall, and Gamble, consists principally in cooking the meats at a temperature of about 240° F., and sealing in air-tight jars. The process has been improved on by McCall & Co., who add a small quantity of sulphite of soda (twelve grains to every pound of meat) to absorb traces of oxygen which may have been left. Still another improvement is the exhaustion of air from the cans by an air pump, and subsequently the passing through the can of nitrogen gas to remove all oxygen, and

then of a small quantity of sulphurous acid, and after this of nitrogen, after which the can is hermetically sealed. The merit claimed for this process is that the meat may be preserved without cooking. The process of Professor Morgan, of Dublin, consists in forcing into the aorta of the recently slaughtered animal, and thence throughout the capillary and venous system, a strong brine containing a small portion of saltpetre, by which means the blood is forced out of the system at the same time that the meat is salted. It may then be cut into pieces, and dried and smoked or preserved in brine. One objection to this process is that it washes out nutritive material. By Dr. Endemann's process the meat is cut into thin slices, and dried in a current of warm air not exceeding 140° F. It may then be ground into powder, kept in air-tight cans, and used for making soup. Mr. Laujorrois has lately communicated to the French Academy a method of preserving food by the use of fuchsine (aniline red), but this is absolutely dangerous.

After all it was reserved for Yankee ingenuity to discover a method of preserving meat in its natural state, without the addition or use of any preservative agent, and by simply shrewd observation of the requirements of the natural laws governing the slaughtering, dressing, and keeping of beef.

To explain this matter intelligently it is necessary first to consider what are the characteristics of good beef, what should be avoided, and what required in its production.

Good beef, then, should be bright red in appearance, the muscular parts firm and elastic, the fat hard and light yellow or white; it should be free from all substances calculated to expedite putrefaction, such as exuded blood, bruises, or extraneous dirt. To produce such beef it follows that the animal from which it is taken must be in a perfectly healthy condition and of the proper age when slaughtered, and that the process of slaughtering and preparing for market must be conducted in such a way as to obviate anything tending to vary from the conditions just enumerated.

Certain conditions may be enumerated which invariably tend to produce poor, unhealthy, as well as unsavory beef, while others just as surely will result in good, healthy, and appetizing meat. No one can deny that long driving and exhausting railroad journeys in crowded cattle cars, with insufficient food and water, the animals goaded, beaten, and bruised by brutal drivers, frightened by unusual noises, will cause inflammatory, congested condition of the meat, and can never result in good, wholesome beef. Again, the careless handling of the dressed meat, filth and dirt allowed to accumulate about the meat in the slaughter-house, insufficient emptying of the blood from the carcass, all injure the quality of the beef.

The blood in its normal condition almost invariably contains noxious elements. From the very nature of the double office of the circulatory system this must be so, for while, on the one hand, the blood serves to renew the various parts of the system after their ordinary wear and tear, on the other it has to carry off the natural waste of the tissues. This waste or refuse is ultimately eliminated by means of the kidneys, the sudiparous glands, etc., and then appears in its avowed character of excrementitious matter; but it must always be, to a certain extent, present in the blood, and in the event of any derangement of the action of the kidneys accumulates in considerable and highly poison-

ous qualities. It must, therefore, be evident that the blood is always an undesirable article of food, especially as it is impossible when an animal is slaughtered to separate the arterial from the venous blood, which would be the only means of overcoming the difficulty. "We contend," says one writer, "that to use the blood as food approximates very closely to drinking urine, and is not merely loathsome, but, *pro tanto*, unsafe. That, like liquid and solid excrement, it is valuable for plant food, and that it serves as pabulum for certain classes of animals, is no proof that it is fit for human consumption."

The old Jewish rabbins well knew the importance of this, some 1700 years ago, when they recommended that in slaughtering animals, in addition to severing the trachea and œsophagus, the blood should be poured out from the vessels of the neck, and this at a time when it was believed that arteries contained only air.

And yet another consideration, which is that beef should be long enough killed before it is cooked to have allowed of complete relaxation of the muscular contraction of the fibre without permitting even the slightest decomposition to take place. We must not for a moment lose sight of the fact that any process of decomposition may be arrested by antiseptics, yet can never be undone, or, in other words, the destructive work can never be so remedied as if it had not taken place.

It is clear, then, that healthy animals of a proper age, well rested, fed, and watered, killed in such a manner as to produce the least fright and congestion, dressed in the cleanest possible manner, completely deprived of the excessive blood and animal heat, and so kept as to prevent even the slightest decomposition, will furnish the best, most wholesome, and appetizing beef.

The last consideration is the availability of such good beef to the largest number of people. The nearer to the point of production and the more direct a product is bought from the producer the cheaper it must be.

Having thus spoken of the characteristic requisites and cost of wholesome, well-tasting beef, we will now briefly consider if such can be so found within our reach.

In Chicago, one thousand miles nearer the vast cattle-producing pastures of the Far West, are the largest stock yards in the world. Connected with the entire Union by the most extensive system of railways centering here, cattle are brought here from all directions, but more largely from the vast ranches of Montana, Colorado, Nebraska, and Texas, and after being fully rested, fed, and watered, are picked out and bought by a vast army of buyers for local use as well as for re-shipment. The principal grades of cattle here represented may be divided, for our purpose, into home-raised and range cattle, and it may be stated that the quality of these latter has been vastly improved during the last few years, not only by more careful breeding, but principally from the fact that so many railroads are now operated through the country that it no longer pays to drive these range cattle on foot save for the shortest distances to the nearest railway station.

The cattle, having thus been carefully selected and purchased, are driven to the cattle-pens of the different slaughter and packing houses which surround the stock yards and form a very large suburb of Chicago.

To give a correct idea of what seems the best method

of slaughtering and dressing animals for the supply of wholesome, good beef for the Eastern markets we will now enter one of these establishments, and follow a steer from the pen to the market in Boston, New York, Liverpool, or London.

One of the largest of these beef-dressing places is located on the edge of the stock yards. These firms are known as Chicago beef dressers. It may be added here that beef dressing simply means the preparation of beef after killing by cleansing it of all uneatable débris and offal, and not, as some intelligent people even have imagined, the application to the meat of any preservative mixture or wash.

The bullock to be killed is driven from the inclosure wherein he is confined to a separate pen, and thence into a narrow stall, where he is alone by himself. Here he is stunned by one or two blows upon the head, which has a double object, — one to disable him, but the more important object is to drive all the blood possible to the brain and forward parts. After this a chain is fastened to him, and through a sliding door he is hauled upon what is called the bed of the slaughter-house. Overhead, throughout the entire buildings, are a system of iron tracks, intersecting and connected by switches, to which are attached sheaves and blocks with hooks, and these, being connected with powerful steam machinery, may be run in any direction. After the steer is thus placed upon the bed his fore feet are so placed as to open as wide as possible the opening which is to be made in his arteries, and thus make sure of the perfect and entire exit of blood. He is again knocked in the forehead until his muscles relax, when a man opens with a sharp knife one of the largest arteries in the body at the lower throat; his head is then entirely severed from the body, and by means of a chain on the hind legs he is hoisted up clear of the floor, and he is shoved into another place to make room for a fresh victim; he is again lowered on the floor, where he is placed on his back, his feet taken off, the skin taken off the belly and sides, the breast and crotch sawed open, and the caul taken off. This caul, surrounding the stomach contains the purest fat in the steer, and is washed and cleansed to be converted into the finest and most valuable suet oil. At this stage the examination of the lungs is made, and if any evidence of disease is found the carcass is prepared for other uses than refrigerating, as it has already been shown that such meat will not keep. Thus in the self-interest of these Chicago beef dressers lies the greatest safety of the consumers of this kind of beef. The carcass is then wiped all over, washed free from all blood stains and other impurities; he is then hooked and hoisted up part way, the tail is cut out, furnishing ample material for the celebrated ox-tail soup, the rump is skinned, and, after being hoisted clear of the floor, two men beat down the fell on the hind legs, another takes the hide off the back, the entrails are removed, and the animal is sawn down the spine from the tail, the back is thoroughly washed off and wiped, and split down the middle; he is then hoisted further, and run on a track to more thoroughly drain out the blood; the hide is entirely cut off from fore legs, neck, the last attachment, and this is done in such a neat, careful way, with clean knives and hands, that the hides from this establishment bring an extra price in the market. The neck is split, and the carcass is trimmed, carefully cutting off all ragged pieces of fat or meat, all blood stains, or bruises. It is again thoroughly washed in two waters and wiped

dry, when it is allowed to hang at the back of the beds near the cooler, where, after being allowed to thoroughly drip some fifteen minutes or more, it is again wiped and trimmed, and shoved in the cooler to be entirely deprived of its remaining animal heat. It will thus be seen that the carcass is not only kept very clean, thoroughly emptied of blood, being about one hour or more in transit from the pen to the cooler, but none of the meat is ever under any circumstances allowed to touch the floor. The number of men actually handling the animal from the pen to the cooler is forty-two. In addition to these there are large numbers carrying away offal, washing floors and posts, wiping the hooks and implements, so that at the close of each day's killing there is not any filthy débris or even blood left on the floor. While it is unavoidable for those who do the bloodiest work to keep from soiling their hands and clothing, they are, by the strictest discipline compelled constantly to wash their bodies, and the clothing is changed and washed at every resting spell. All débris is instantly removed and worked up to some useful purpose, so that there can be nothing remaining to cause any foul smell or decomposition; and in the various buildings on the grounds, though every process of manufacture of the débris is carried on, no smell of an objectionable nature is perceptible, and cleanliness is carried to such an extent that a lady with kid gloves could fearlessly handle the wood-work of the coolers and the meat therein contained without soil or stain. The floors of these coolers are covered with clean, dry sawdust, which is changed every other day. These coolers or refrigerators are very simple in construction, with hollow walls, having an ice chamber overhead, the cold air from which is conducted downward, and thus is kept up a constant circulation of pure air at an even temperature of about 40° F. These refrigerators have ample room to hold about 7000 cattle. The cars in which this beef is transported are built on a similar principle, and will each contain from twenty-five to thirty-four cattle. The meat is usually kept forty-three hours before shipment, by which time all animal heat is surely expelled from the meat. It is from three to four days on the way to New York, Boston, Philadelphia, or Baltimore, and on the way the ice is resupplied four times; thus beef sent from this place is at least seven days old when it reaches the New York market. In the winter time the same temperature is maintained, but the ice needs only to be replenished twice.

Beef which has been thus refrigerated will keep out of the refrigerators perfectly sweet and wholesome two days, even in the hottest weather. It is unnecessary to state that ordinary beef not so well cleansed, and not having the animal heat so thoroughly removed, will not keep nearly so long.

By actual experiment made this past summer, with the thermometer varying from 56° F. to 94° F., with two pieces of rib-roast bought in the open market, one being Chicago dressed, the other New York meat fresh killed, but both being from similar cattle as regards quality and weight, the New York killed beef decomposed the third day, while the Chicago beef was perfectly fresh and sweet on the twenty-second day, and was then cooked and eaten. Both were exposed together in the open air away from any ice box.

This concern uses about thirty-three car loads of fresh ice per day. As each car averages fourteen tons, this makes about 500 tons of ice per day.

Ice is very cheap in Chicago, so much so that it does

not even pay to manufacture artificial ice, much less to use any chemical or other artificial means of cooling.

One notable fact connected with this process of slaughtering cattle is that the hearts of animals so killed are always empty of blood, whereas those killed by other processes are generally full. Beef thus prepared is sent by rail to the coast, shipped in similar refrigerators on steamers to Liverpool and London, where it is taken out of the coolers, carted and sent by ordinary rail car to Smithfield and other markets in England, and has always been in good condition and superior to English beef. In one instance meat was thus kept forty-three days on a disabled steamer, and yet was in fair condition on arrival in England.

There has been considerable prejudice created against this so-called Chicago dressed beef by ignorant and malignant misrepresentation, sometimes willfully confounding inferior canned beef, which, because it is also packed in Chicago, has been called "Chicago beef," and again, the writer has frequently seen butchers selling Chicago dressed beef as home dressed beef, while they were vigorously declaiming against this Chicago stuff, and pointing out inferior home beef as being Chicago meat. It has got to be quite customary now with careless reporters whenever, justly or unjustly, meat has to be spoken of as the cause of sickness, glibly to describe it as Chicago beef, thus creating an unfounded prejudice against what is really a wholesome, palatable, and cheap article of diet. Many districts of country which have heretofore suffered for the want of tender, toothsome beef are now well supplied from this source. (About four thousand head of cattle are daily slaughtered in these establishments.)

Some of the prejudice against this beef has been created by the ignorance of the so-called leaders of working men, who led them to believe that by using Chicago meat they were injuring their fellow workmen along the various railroads between Chicago and the Atlantic board, as well as those in the Eastern slaughter-houses. The fallacy of this belief is too evident to require argument.

RAPID COCAINIZATION.

BY HENRY W. BRADFORD, M. D.,

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REPORTED BY WM. DUDLEY HALL, M. D.,

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THE anæsthesia of the cornea and conjunctiva produced by the instillation of solutions of cocaine of varying strengths into the lower palpebral sac will undoubtedly be of value in ocular surgery and therapeutics, but to what extent it will replace the anæsthesia of ether remains for a longer use of the alkaloid to determine. The results thus far are very gratifying, and it is to be hoped that there will be no cause for disappointment on the part of the gentlemen who favor its introduction. Cocaine, an alkaloid obtained from the *Erythroxylon coca*, has been known since 1855, but its application to diseases and injuries of the eye is due to the investigations of a brilliant young German physician, Dr. Koller, of the Vienna General Hospital.

The following are cases occurring in the service of Dr. Henry W. Bradford at the Massachusetts Char-

table Eye and Ear Infirmary, in which he has used cocaine from T. Metcalf & Co. for local anæsthesia.

CASE I. Male, aged twenty-five. Incised wound of the ciliary region with prolapse of the iris; right eye. Cocaine, two per cent. solution, the alkaloid having been rendered soluble by the addition of dilute hydrochloric acid. First instillation, one drop; end of third minute, cornea and conjunctiva somewhat anæsthetic, the sensibility being tested with the finger, a quill tooth-pick, blunt probes, and twisted linen cloth; end of fourth minute, one drop; end of sixth minute, cornea entirely insensible to pain, the patient being unable to indicate the precise moment of contact; end of ninth minute, third drop; twelfth minute, operation; prolapsed portion of iris seized with forceps and snipped with scissors, the patient, according to his own statement, not feeling the slightest pain.

CASE II. Male, aged fifty-five. Traumatic ulcer of cornea with hypopion; right eye. Cocaine, two per cent. solution. Both corneæ found to possess the usual amount of sensitiveness when the tests enumerated under Case I. were applied. First instillation, one drop; end of second minute, anæsthesia commencing; end of fourth minute, one drop; end of ninth minute, complete anæsthesia of cornea; conjunctiva incomplete but considerable; twelfth minute, operation; paracentesis of the cornea with a Graefe knife. Upon the introduction of the iris-forceps to dilate the opening into the anterior chamber slight pain was complained of which was not experienced after placing a drop along the line of the incision. The usual pain due to evacuation of the aqueous was not noticed.

CASE III. Male, aged forty-three. Iridectomy for lamellar cataract; left eye. Cocaine, eight per cent. solution. First instillation, one drop; end of first minute, one drop; end of second minute, one drop; no pain upon applying the usual tests; end of fourth minute, patient did not know when the finger of the operator touched the cornea unless considerable pressure was made; end of fifth minute, stop speculum was inserted, and the ordinary operation of iridectomy performed without the patient being conscious of any pain. The hæmorrhage into the anterior chamber was hardly perceptible. This patient was considerably terrified at the prospect of an operation without ether, but appeared very much surprised that it had been completed so quickly, not realizing that anything had been done beyond making an examination.

CASE IV. Male, aged sixty. Needle operation for secondary cataract; left eye. Cocaine, eight per cent. solution. First instillation, one drop; end of first minute, one drop; end of second minute, cornea anæsthetic to the before-mentioned tests; end of fourth minute, operation; cornea perforated by the needles, and the capsule ruptured. The patient, after the operation was completed, said that the discomfort he experienced was no greater than if some one had gently pulled a fold of skin on the back of his hand, and was surprised that an operation had been performed.

CASE V. Female, aged forty. Division of the internal rectus muscle for strabismus; right eye. Cocaine, eight per cent. solution. First instillation, one drop; end of first minute, one drop; end of second minute, cornea and conjunctiva anæsthetic to the usual tests; end of fourth minute, operation; stop speculum introduced; conjunctiva seized and divided. When the hook was placed under the tendon the patient resisted, and complained of pain. The hook was immediately