MOUND-MAKING BIRDS OF AUSTRALASIA.

The mound makers are members of a small family of birds peculiar to Australia and the neighboring islands as far as the Philippines and northwest Borneo. They are allied to our common domestic fowls, which they resemble in appearance, but differ from them in never sitting upon their eggs. Some of the family, like the *maleos* of the Celebes, and the *Megapodius wallacei* of Gilolo, Ternate, and Bouru, deposit their eggs in the warm beach sand, just above high water, in holes three or four feet deep, many birds laying in the same hole. The young birds work their way out of the sand as soon as hatched, and look out for themselves without any help from their parents.

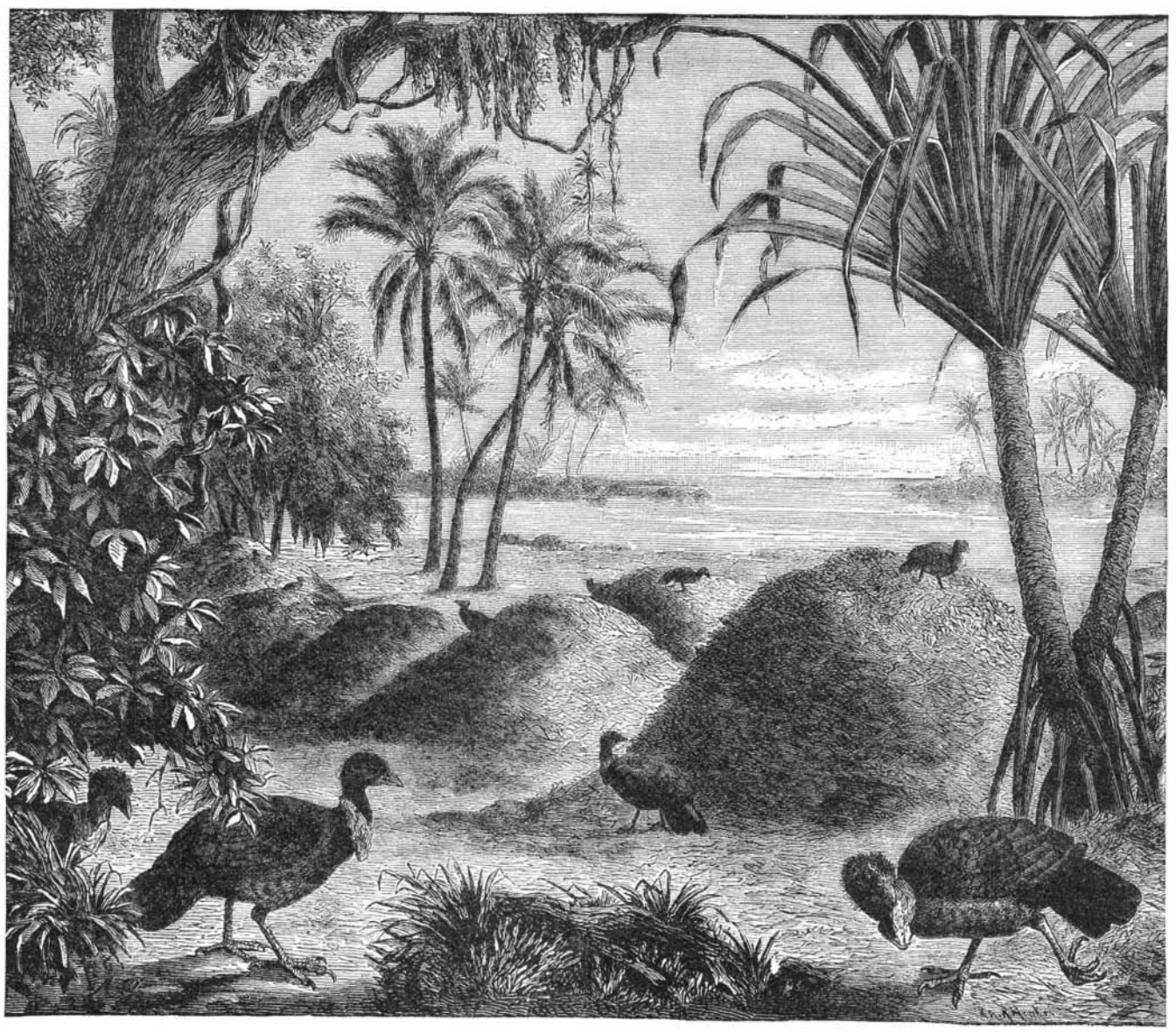
The most of the family, however, lay their eggs in mounds built of earth, stones, sticks, sea weed, and other rubbish, which they bring together with their large grasping feet. The mounds are often six or eight feet high and twenty or thirty feet in diameter. The eggs are buried in the center of the mound, at a depth of two or three feet, and are hatched by the gentle heat produced by the fermentation of the vegetable matter of the mound. In his "Malay Archipelago," Wallace says: "When I first saw these mounds in the island of Lombock I could hardly believe that they were made by such small birds, but I afterward met with them frequently, and have once or twice come upon the birds engaged in making them. They run a few steps backward, grasping a quantity of loose material in one foot, and throw it a long way behind them. When once properly buried the eggs seem to be no more cared for, the young birds working their way up through the rubbish and running off at once into the forest. They come out of the egg covered with thick downy feathers, and have no tail, although the wings are fully developed." The Lombock birds are miscellaneous feeders; other species live exclusively upon fruit.

The curious departure of the entire family of megapodidæ, or brush turkeys, in their breeding habits, from the usual habits of gallinaceous birds, Mr. Wallace traces to their peculiar organization. The eggs are extremely large for birds of their size, each egg completely filling the abdominal cavity. An interval of nearly two weeks is required before the successive eggs can be matured. Each bird lays six or eight eggs in a season, the time between the first and the last being two or three months.

Now, if these eggs were hatched in the ordinary way, either the parents must keep sitting continually for this long period; or if they began to sit only after the last egg was deposited, the first would be exposed to injury by the climate, or to destruction by the large lizards, snakes, or other animals which abound in the district, because such large birds must roam about a good deal in search of their food.

"Here, then," Mr. Wallace concludes, "we seem to have a case in which the habits of a bird may be directly traced to its exceptional organization; for it will hardly be maintained that this abnormal structure and peculiar food were given to the magapodidæ in order that they might not exhibit that parental affection, or possess those domestic instincts, so general in that class of birds, and which so much excite our admiration."

All the members of this curious family, whether laying their eggs in holes in the sand, or in mounds of their own making, would appear to be semi-nocturnal, their loud wailing cries being heard late into the night and long before daybreak in the morning. The eggs are deposited apparently at night. They are good eating, and are much sought after by the natives.



THE BRUSH TURKEYS, OR MOUND MAKERS OF AUSTRALASIA.

DR. HALEY states that he has found minimum doses of iodide of potassium of great service in frontal headache.

The Minute Size of Germs.

IT is altogether beyond the power of the mind to conceive the minute size of some of the germs which in their subsequent development work such wondrous changes, and which have such important influences an health and several industrial processes. We read of the experiments of Pasteur, Tyndall, and others, but we seldom realize the infinitely small size of the organisms and germs referred to, for some are undoubtedly so minute that the most powerful microscope fails to detect them. There are some interesting remarks on this subject in a recent number of *Knowledge*, which we quote:—"The minute organisms capable of inducing changes analogous to the fermentation caused by yeast have received great attention of late years, and several important diseases are distinctly traced to them. Béchamp estimated that eight thousand millions of germs of one micro-ferment only occupied one cubic twenty-fifth of an inch. Not one of these minute bodies could develop except by carrying on complicated processes of a chemical nature, involving very active movements of its atoms and molecules.

The mathematicians have made calculations founded on the pressure exerted by the gases, and other considerations, which show that a particle of the sort of matter, such as albumen and protoplasm, chiefly concerned in life processes, contain in a space of one cubic thousandth of an inch more molecules than any one could possibly form any conception of. Sorby, taking a probable mean of such calculations, supposes one cubic thousandth of an inch of water to contain 3,700,000,000,000,000 molecules. A sheet of ordinary note paper is about one-hundredth of an inch thick. One-tenth of this would, of course, be one-thousandth of an inch, and a little square box of that size each way would hold the amazing number of water molecules mentioned. Perhaps a few thousands of such molecules may suffice for some manifestation of life, but even if many millions should be requisite for the structure of the humblest and simplest germ, we could never expect to see the actual beginnings of life."

A Right Whale in New York.

A large right whale was recently captured off Montauk Point, and brought to this city for exhibition. It is a female, said to be 70 feet long, and estimated to yield 100 barrels of oil and 1,000 pounds of whalebone. It was prepared for exhibition by the removal of the entrails, and the filling of the cavity with 90 barrels of cork chips, saturated with 22 barrels of preserving fluid. The whales previously brought to this port for exhibition have been white whales or fin back whales.

PLATINUM CRUCIBLES, on being ignited, suffer a greater or less decrease in weight when they are new, but after repeated ignition such changes no longer occur.

Notes about Snakes.

A serpent's first instinctive impulse of self-preservation, like that of every other animal, lies in escape; probably a more nervous creature does not exist. If surprised suddenly, or brought to bay at close quarters, it may be too terror-stricken to attempt flight; then it *bites*, following a curious general rule which seems to obtain throughout nearly the whole animal world, from a passionate child downward, no matter what the natural weapons of offense may be. Young *Felidæ* will keep their talons sheathed until they have exerted all possible force with their soft milk-teeth, and a lizard will seize the hand which restrains it with its insignificant little jaws, when its tail or claws might inflict far more injury. The *Boidæ* never use their constrictive powers in self-defense (unless they are griped), and it seems probable that if a venomous snake's fangs lay in its tail, it would use its teeth *first* when attacked, before bringing them into play. Indeed, it must be remembered that very few animals are provided with exclusively defensive weapons, and that the python's enormous strength in constriction, the viper's poison apparatus, the lion's teeth and claws, and the electric discharge of the gymnotus are given them primarily for the purpose of securing their food.

A snake *runs* away, walking along on the points of its numerous ribs with a rapidity which can only be appreciated by those who have seen a long one—*Herpetodryas*, for instance—escaping in the open field or over the bushes when alarmed, its speed being further increased by the body being drawn up at intervals into folds, which, being extended, shoot the head forward. This is the swiftest mode of progression of which a snake is capable, and is, as I have said, difficult to be realized from the spectacle of these reptiles in cages; the Brazilian neck-marked snake (*Geopytas collaris*), at the Zoological Gardens, will perhaps convey some idea of it, being certainly the most agile denizen of the Reptile House. But this movement is only an increase of the same action which is observed in one creeping slowly along, displayed to best advantage when it is gliding from a plane to a raised surface.

When a snake is in imminent danger, however, it adopts a remarkable motion for the purpose of eluding injury or capture, which motion, though it may be termed, *par excellence*, "serpentine," has, singularly enough, been very little commented upon by ophiologists.

The body is thrown laterally into a series of deep curves, which alternate so quickly from convexity to concavity that it is extremely difficult to touch or aim a blow with precision at any part of it, the lateral movements covering a square of ground, the side of which would be represented by at least two-thirds of the snake's length. This motion is clearly protective in its object, and is only exhibited when the straight onward movement is felt to be insufficient to avoid peril, since the reptile's speed in traveling is greatly retarded by it—necessarily so, as the head turns alternately from side to side at an angle of fully a hundred and twenty degrees to the line of its course, thus describing the major part of the circumference of a series of circles which the body and tail follow. Even a small one on a table will not be picked up without two or three ineffectual efforts, when it wriggles in this way, and I have seen a tiny *Oxyrrhopus doliatus* defend itself so for some moments against the lightning "dabs" of a serpentivorous bird; while a lively whip snake, which was cruelly thrown to a peccary in my presence, actually twined away among the hog's feet and escaped into the jungle, in spite of the hungry and active animal's attempts to secure it. I was walking in the Botanical Gardens of Rio de Janeiro some time ago, when a lady called my attention to something going away among the ferns. Not being able to see it

from where I stood, I jumped down the bank, and found myself literally upon an immense green tree snake, at least nine or ten feet long; I was almost treading on it, but notwithstanding my most energetic efforts to catch such a magnificent specimen with my hands, feet, and the crooked handle of an umbrella, it succeeded in crossing an open space two yards wide and disappeared into a clump of bamboo, solely by virtue of this lateral movement. I noticed that the intensity of the curvatures caused the ventral plates to be exposed, so that the yellowish under color was visible at each contortion; owing, no doubt, to the interlocking of the vertebræ, and consequent expenditure of the excess action in rolling.

This serpent, of course, was harmless; so that there would have been no danger in grasping it; but it emitted a curious sound in its terror, such as I have never heard before or since. It *screamed*, and so loudly, that some people near, who saw nothing of what was going on, thought they heard a child cry. A snake's hissing, the only vocal expression of which the *Ophidia* are naturally capable, is produced simply by the rush of air through the narrow chink by which the trachea communicates with the pharynx, without any complex vibratory apparatus such as exists in mammals, though this may be prolonged for a considerable time on account of the enormous capacity of its single lung. I infer, therefore, that this one had just swallowed something, and that either its windpipe was not properly retracted to its normal position, or that the glottis was partially occluded by a pellet of mucus or (more probably) a filament of some extraneous material, which thus converted the hiss into a sort of whistle—just as boys produce a hideous screech by blowing forcibly on a blade of grass held edgewise between the applied knuckles of their two thumbs. Serpents make all sorts of noises besides hissing, according to their different kinds; Crotali spring their rattles; the carpet viper (*Echis carinata*) rubs the imbricated scales of its adjacent coils together; the fer-de-lance (*Trigonocephalus lanceolatus*) is said in St. Lucia to give out a series of little taps with its horny extremity; and many others—such as the rat snake (*Spilotes variabilis*) of South America—certainly indicate their presence when angry by quivering their tails against the ground; but a crying snake would have been a decided novelty in one's collection. —*Arthur Stradling, in Nature.*

The Mammoth.

At a recent meeting of the California Academy of Sciences Professor Henry A. Ward read a very interesting paper on "Mammoths," referring more particularly to the *Elephas primigenus*. One specimen of this, as "restored" by Mr. Ward, and now on exhibition at the Mercantile Library hall, San Francisco, is 16 feet high, and whose length, including the forward curve of the tusks, was 26 feet or more. The remains of the mammoth are among the earliest animal remains now found, and are noted by writers B.C. 300, who speak of their discovery. Some curious mistakes occurred among those who found the large bones of these animals, and mistook them for antediluvian giants. Such bones brought to ancient Rome were believed to form part of the skeleton of Pallas, and are recorded as being as high as the city walls when set up erect. Later, at Lucerne, in Switzerland, such bones were exhibited as those of a man 19 feet high. As late as February 13, 1638, the same thing was done in France, and also Scotland rejoiced in the skeleton of an antediluvian giant 14 feet high. Later, the mammoth was supposed to be the behemoth of the ancient Hebrew Scriptures. In 1696, the bones of one were collected, and mounted by learned professors and anatomists at Gotha, in Germany, who declared it was not an elephant, but the one they had was simply a *lusus naturæ*. It was finally reserved for that great French naturalist, George Cuvier, to dispel the darkness in January, 1796, when he boldly announced that all such bones were the remains of fossil elephants, differing from any now living upon earth. They have now been found all over the continent of Europe, in the pliocene and post-pliocene strata. In Asia there are vast quantities of such bones found on the northern limits of the continent, within the arctic circle. Siberia, along the Yenesei and Lena rivers, emptying into the Arctic basin, the Liakow or New Siberian islands, and the bed of the Arctic Ocean, crossed by the crew of the Jeannette in their retreat to land, all are said to be thickly covered with bones of this class, abounding in fossil ivory. Many huge masses of bones have been piled up by freshets from rivers running northward and emptying into the Arctic. Huge masses of this ivory are annually shipped to England and there cut and utilized in the arts and manufactures. The Yakouts, or natives of that part of Siberia, formerly supposed these enormous animals to be a species of huge moles, that lived and burrowed under ground, and because their remains were found beneath the surface, they thought they lived and died there. The word mammoth is a native Yakout word, meaning in their language "an animal that burrows under ground"—and the world has adopted it as a popular word. They are most abundant in the far north, and become less and less frequent as the distance from the Arctic basin increases. Professor Ward thought their long black hair and thick skin would enable them to exist in a temperate and, perhaps, a frigid zone. A mammoth was discovered frozen in latitude 72°, near a river, with his flesh frozen, and skin in place. In 1772, in latitude 64°, on the river Lena, a whole rhinoceros was discovered. In 1799, a Tungusian fisherman discovered in latitude 70°, near the mouth of the Lena, a dark mass in a block of ice, but it was too deeply embedded to get at it. In 1804, he returned to the spot and found the ice-block rent and fissured. The perfect mammoth had fallen out by its own weight. The hide was heavy, and had over it thin but long black hairs. The Yakouts fed their dogs upon its fresh meat, and white bears and Arctic foxes also joined in the feast. Branches or the woody twigs of trees were found undigested in its stomach, when, in 1808, a British traveler and scientist visited the carcass. He collected the bones, took 40 pounds of black hair and one side of its hide, which he transported fully 7,000 miles to St. Petersburg, where they were purchased by the Emperor Alexander for 8,000 rubles, and deposited in the Imperial Academy of Sciences there. They have since been set up, and pieces of the skin and hair have been donated to the Paris Academy of Sciences, and to the Royal College of Surgeons, in London. Professor Ward said there were two hypotheses entertained by scientific men in regard to how these animals came there in such large numbers. One was the hypothesis of a complete change of temperature by a sudden cataclysm; and the other, the gradual depression of the land, continuing through ages. In Europe the mammoth seems to have been coeval with early man. On the tusk of a mammoth found in a cave at Dordogne, in France, is carved with a flint implement a good likeness of a mammoth. Their remains are found more or less on every continent except Australia, which many geologists consider of recent formation. All our American valleys appear to have had their great herds of such elephants, which have now disappeared from our soil. Nearly 30 different varieties have been found. In Missouri a stone arrow head was found embedded under the shoulder blade of a mammoth now in the British museum. At Racine, Wisconsin, was found an ancient drawing of a mastodon, certainly drawn from life by men. Over a bushel of chewed twigs and succulent branches was taken from the stomach of the one found in the block of ice at the river Lena.

Man a Fruit Eater.

In reviewing Miss Kingsford, M.D.'s book, "The Perfect Way in Diet," *Knowledge* remarks: Man's nearest of kin among the animals is the ape. This is shown not only by those outward features which all can recognize, but more clearly and more certainly by the structure of the nervous system. The animal in which this system resembles most closely the nervous system in man is the ape, and of all apes that which comes nearest to man in this respect is the orang. The brain convolutions, which in rodents (gnawing quadrupeds—rats, squirrels, etc.) and edentates (toothless quadrupeds—ant eaters, ground hogs, etc.) are very simple, in the flesh eating animals are more developed, and in the apes, especially the orangs, they are developed still more fully. "We are authorized in concluding," says Professor Mivart, "that the difference between the brain of the orang and that of man, as far as yet ascertained, is a difference of absolute mass; it is a difference of degree, and not of kind."

Starting from this relationship, Miss Kingsford, in the book before us, proceeds to indicate the bearing of man's kinship to apes on the vexed question of man's proper or natural food. Carefully studying the entire digestive apparatus of animals and men, and especially comparing this apparatus in men and apes, she is led to the conclusion that man approaches nearest in this respect to those animals which are eaters of fruits and herbs. "If," she says, "we have consecrated to this sketch of comparative anatomy and physiology a paragraph which may seem a little wearisome in detail, it is because it appears necessary to combat certain erroneous impressions affecting the structure of man, which obtain credence not only in the vulgar world, but even among otherwise instructed persons. How many times, for instance, have we not heard people speak with all the authority of conviction about the 'canine teeth' and 'simple stomach' of man as certain evidence of his natural adaptation for a flesh diet? At least we have demonstrated one fact, that if such arguments are valid, they apply with even greater force to the anthropoid apes—whose 'canine' teeth are much longer and more powerful than those of man—and the scientists must make haste, therefore, to announce a rectification of their present division of the animal kingdom in order to class with the carnivora (flesh eaters) and their proximate species all those animals which now make up the order primates (men and apes). And yet, with the solitary exception of man, there is not one of these last which does not in a natural condition refuse to feed on flesh!" Pouchet says that all the details of man's digestive apparatus, as well as his dentition, are proofs of his frugivorous (fruit-eating) origin. Professor Owen agrees that the close analogy between apes and man demonstrates his frugivorous nature. So also do Cuvier, Linnæus, Lawrence, Bell, Gassendi, Flourens, and a host of other authorities.

Yet another belief is as common as it is erroneous, namely, that "flesh food contains the elements of physical force, and that to be strong, robust, and endowed with muscular energy it is necessary to partake largely of animal food." Yet no flesh-fed animal rivals in strength the herb-eating rhinoceros; in endurance, the horse, the mule, or the camel. A gorilla feeding on fruits and nuts is more than a match for the far heavier lion. "The buffalo, the bison, the hippopotamus, the bull, the zebra, the stag, are types of physical power and vast bulk, or of splendid development of limb. Only in ferocity are flesh-eating animals superior (?) to those who find their food in fruits and herbs."

As regards man himself, the idea that the flesh eaters are the most powerful is erroneous, as is the cognate idea that to acquire strength a man should eat daily large quantities of flesh meat. "In the palmy days of Greece and Rome, before intemperance and licentious living had robbed those kingdoms of their glory and greatness, their sons, who were not only soldiers but heroes, subsisted on simple vegetable food, rye meal, fruits, and milk. The daily rations of the Roman soldier were one pound of barley, three ounces of oil, and a pint of thin wine. It was no regimen of flesh that inspired the magnificent courage of the Spartan patriots who defended the defiles of Thermopylæ, or that filled with indomitable valor and enthusiasm the conquerors of Salamis and Marathon." Among the nations of to-day, also, we find the fruit eaters and herb eaters as enduring, to say the least, as the flesh eaters—and healthier.

Are we then to infer with our author that a diet of fruit and seeds, preferably uncooked, is the best for the human race? Or, if we infer this, may we conclude that all would do well to adopt such a diet? It might be unsafe to accept the latter inference, for habit and custom count for something in such matters. But we may very safely adopt the opinion, now generally prevalent among experienced physicians, that fruit and seed, herbs and vegetables, should form a larger proportion of our food than they do. Precisely as many who do not accept, in its entirety, the views of Dr. Richardson about alcoholic stimulants, yet hold that these stimulants, if taken at all, should be taken in much smaller quantity than is customary, so, many who would not agree with Miss Kingsford, that animal food should be entirely displaced (which is Dr. Richardson's opinion also), yet see that it would be well if flesh meat were taken in much less quantity than at present.

How much custom has to do with the use and effects of flesh meat is shown by cases such as Miss Kingsford mentions, in which persons unaccustomed to flesh meat have been actually intoxicated by its use. Dr. Dundas Thompson tells us of some Indians accustomed to vegetable food, who, dining luxuriously on meat, showed an hour or two later, by their jabbering and gesticulations, that the same effect had been produced upon them as if they had taken some intoxicating spirit or drug.

On the Refining of Low Grade Butters.

BY NELSON H. DARTON.

Some two years ago some parties engaged my attention to investigate upon an original and patentable process for the working over of old rancid butters, scrapings of tubs, etc., which can, as a rule, be bought at from five to ten cents per pound, and by a readily executed process, which would not cost over three cents per pound, produce an article which could at that time be sold for from twenty to twenty-five cents per pound, and bringing into use a machine they had recently patented for blending different butters, etc. I commenced the series of investigations, and, after considerable experimenting, arrived at the process detailed below.

The apparatus consisted of a wooden cylinder about six feet long and three in diameter, set upon a stand, and having an opening above. Through this cylinder passed a shaft bearing a large number of steel knives about fifteen inches long, and set in every direction. This was capable of rapid revolution by means of a pulley connection, and the knives are supposed to come in contact with every particle of butter. There are two inlet tubes, one at the bottom, the other at the top, and two corresponding outlets covered with linen gauze to drain off the water. These machines may be made to hold one thousand pounds. In this size, however, eighty pounds of butter with three gallons of water is placed in this apparatus, and the knives rapidly revolved until the mixture is perfect. A strong head of water is then run through the butter for about twenty minutes, the knives meanwhile mixing the butter. When the salt is thus all removed the knives are replaced with wooden beaters, the apparatus tightly closed, and a brisk stream of chlorine from manganic oxide and hydric chloride passed through the agitated mixture for about fifteen minutes; this is then partly displaced by blowing air through, and then entirely washed out with water as before. The butter now is in a thick cream with a slight peculiar flavor. The steel knives are then replaced, four pounds of fir chips and sufficient turmeric or color added, and these thoroughly mixed in by the knives. The lower tap is then opened, the water allowed to drain off, and the butter, after caking it together, removed and placed in a linen bag. This is placed in a zinc cylinder having a perforated bottom; from here the butter is pressed out into a receptacle below by hydraulic or other pressure, and, after salting, pressed into tubs for sale.

The product is an excellent cooking butter in most cases, and often well fitted for the table, having a deliciously fresh dairy flavor imparted to it by the fir chips, and containing no traces of free chlorine, thus making it pure and wholesome. The peculiar fatty acids imparting the flavor to dairy butter, and so prone to rancidity, have been here removed, and the butter may consequently be kept for a long period without damage, and may also be heated in cooking without acquiring a tallow flavor. In these two respects it is similar to well made oleomargarine.

The only difficulty encountered in this manufacture is the variability of the raw material, and as it is generally filled with salt, water, rags, chips of wood, nails, and everything else, thus entailing a great loss beyond the two cents per pound for refining. The only advantage then to be had is to produce a fine butter by these processes and get good prices for it. The process above surely does turn out fine butter, but the profit is very small.