danger or ignorance of the necessary precautions. In the navy, for instance, every precaution is taken to avoid spontaneous combustion. Thus, all the officers are aware that before packing away the tarpaulins or oiled coats which the sailors wear in bad weather, it is necessary to see that they are thoroughly dried. They should not be packed together in too great numbers. Oils, when drying, undergo a change which is simply a slow combustion at low temperature. If this action is hastened by any cause whatever, it brings about a higher temperature, which may result in fire.

The experiment may be made of producing spontaneous combustion, even in a few yards of cotton cloth, by painting it with linseed oil. M. Chevalier cites an instance of this nature, in the sail room at the arsenal at Brest, where three cases (for sails) of canvas painted with oil had been laid one on the other, after having been dried in the sun two days. Each piece measured about ten yards. Whether in the sun or shade, or under cover or exposed to the air, these pieces of fabric, whether yarn or cotton, can readily take fire, but fortunately very soon attract attention from the dense smoke that is emitted. Cotton fabrics containing oil, however, do not alone take fire in closed chambers and in the holds of ships, for I have seen the phenomenon produced in open air. I witnessed a case in point near the railroad station of l'Ouest, in July, 1878, when the heat was very great. The lamp room is situated at the foot of the Rue de Rome and the Pont de l'Europe. There, in a large sack, were gathered all the useless, greasy rags that had been used for cleaning the lamps. One of these bags had been filled so full that the rags had fallen to the ground, and as I passed by I noticed an odor of burning rags, but after a careful examination discovered no cause for this. Passing the same place five minutes later, I found the odor stronger, and I discovered the rags were just bursting into fire. I called an attendant and showed him the fire, and it was very soon extinguished with the help of a pail of water.

M. Chevalier, in his memoir on fires, instances the experiments of Messrs. Golding and Humphries, who caused spontaneous combustion by shutting up a piece of fabric immersed in linseed oil in a closed box, where it was left for three hours. The fabric commenced to smoke, and as soon as the air was admitted burst into flame.

Messrs. Renouard and Rouen carried still further the experiments of Golding. They mingled a few pieces of oiled cotton with some dry cotton and then put the whole under pressure, and after a few hours fire was discovered. Every one is aware that when cotton is baled, it is subjected to an enormous pressure. If the cotton is greasy, or even damp, it ferments, becomes heated, and then ignited.

A curious instance was reported by Dumas to the Institute in 1844, and cited by M. Fonssagrives. An artist was rubbing with a wad of cotton a painting freshly varnished. When he threw the cotton away, it immediately took fire in mid-air. Later, at the Academy of Sciences in 1879, during a discussion concerning a fire in the floor of a laboratory of a certain botanist, M. Cosson, M. Dumas cited a number of cases which prove that the condensation of the air in porous and combustible bodies frequently produces combustion, if the temperature is sufficiently low. Among these he again cited the case of the wad of cotton taking fire in mid-air. A savant as prominent as Dumas, who repeats the same statement at an interval of thirty years, classes it evidently as an indisputable fact. The temperature of 80° or 100° in the hold of a vessel does not sufficiently explain the cause of a fire in a cargo of damp linen, hemp, manure, oats, grain, or cereals. It is necessary to take into consideration the changed conditions. The rise in the temperature is due to the condensation of gas and to the rapid and powerful oxidation. Thus charcoal, which is very porous, when shut in a closed atmosphere, absorbs a large proportion of gas, which condenses and produces heat.

I cite another case, not so well known: The waste from vulcanized rubber, when thrown, in a damp condition, into a pile, takes fire spontaneously. This occurred at the factory of M. Menier, at Grenelle, in France.

Messrs. Dumas and Chevreul, in treating of this subject of spontaneous combustion before the Institute, stated that when a package from China containing some fresh vegetable matter and some dried substances was opened, they took fire, even before their eyes.

M. Fonssagrives states that the temperature of boxes of figs from Barbary has been so raised by fermentation that you could hardly bear your hand upon them.

There is less surprise in the increase of heat in heaps of coal, whether in storage or in open air. These masses of coal, whether in the quay or in the yard, take fire, nevertheless, without a spark being applied. The complex composition of coal gives a sufficient cause for spontaneous combustion. It contains essential oils, sulphur, and, above all, phosphureted hydrogen and marsh gas, which is spontaneously combustible. The impalpable coal dust also adds another danger of combustion.—*La Nature.*

BRITISH MUSEUM.—At a recent meeting of the electing trustees of this institution, Professor Huxley was elected to the vacancy in the trust caused by the death of Mr. Beresford-Hope.

AN AUSTRALIAN CHLAMYDOSAURUS.

The menagerie of reptiles of the Paris Museum recently came into possession of an Australian lizard, of a singular appearance, which has not heretofore been received in a living state, and which is remarkable, by the presence on the sides of the neck of a broad projecting membrane, toothed along its edges, folding back after the manner of a fan, and, in a state of repose, lying along the neck and forming a sort of collar. This curious lizard is the *Chlamydosaurus kingii*, Gray. The two halves of the collar are continuous beneath the throat, but are separate on the dorsal side, where they slightly overlap. Each consists of a fold of skin covered with large carinate scales, and supported on each side by a subcutaneous thickening, having the appearance of cartilage, and also by a bony projection from the os hyoides that is situated between the two flaps of the fold. Peculiar muscles control the movements of this apparatus, which the animal can thus spread out or fold up.

CHLAMYDOSAURUS KINGII

We do not think, however, that the animal can spread it out to its full extent, as the number of the radii that support it is too few, and observations made at the menagerie confirm this view. Our lizard, in fact, has at times erected its collar when some one has tried to seize it, but very incompletely.

We lack positive information as to the role that these cutaneous folds play, but, as they are of the same nature as those observed on the sides of the body in other lacertians, such as dragons, for example, or in certain mammals, such as bats, flying phalangers, etc. it is presumable that they serve for analogous purposes, and that they constitute an accessory apparatus of locomotion. In fact, this lizard is essentially a tree inhabiter. The individual seen by us was constantly perched, and it is probable that at the moment that it jumps from one branch to another, it spreads its collar, which serves as a sort of parachute. On another hand, it feeds chiefly upon insects, and perhaps seizes them as they fly, by jumping after them, and using its collar to increase and regulate the length of its leaps.

The chlamydosaurus, which is a great deal stronger, and especially much slenderer, than the lizard of Southern France, attains a total length of 30 inches from the snout to the tip of the tail, which latter is very long. Its legs are very strong, and its claws are curved and sharp, as they need to be in a climbing animal. Its motions are agile and have a certain abruptness. When at rest, it sits upon its haunches, and erects its forelegs and head, which it holds immovable, and seems to be making observations.

During the three weeks that our specimen remained at the menagerie, it absolutely refused all kinds of food, although the keepers offered it everything that they thought capable of exciting its appetite. At the end of this period it succumbed. It seemed to be absolutely harmless, and never tried to bite any one who endeavored to seize it.

Its color was dull, of a pale brown above and lighter under the belly, with irregular and darker blotches on the back and legs, and blackish rings around the tail. The teeth of its collar were white at the tip, and, from a distance, looked like two rows of pearls.

As regards zoological affinities, the chlamydosaurus is quite distant from the lizards of France, and belongs to the family of Agamians, which has few representatives in Europe and none in America. The only species of the genus known is the one under consideration which has hitherto been met with only in Australia and on a few islands to the north of that continent.—*La Nature.*

Milk Inspection in Massachusetts.

We glean the following from the annual report for 1887 of James F. Babcock, inspector of milk and vinegar for Boston:

The collectors are authorized by the statute to enter all places where milk is stored or kept for sale and all carriages used for the conveyance of milk, and to take samples for analysis from all such places or carriages. Samples taken by the collectors are put into clean and dry cans, each can being provided with a wooden stopper. Each can is numbered by being stamped upon the handle. At the time of collection a tag is filled out with the date, hour, name of dealer, locality, and all other necessary particulars, and is securely fastened to the handle of the can by means of a twisted wire. Each collector is provided with a small leather hand bag holding ten cans, which is the number of samples procured at a single trip. As the statute requires that return sealed samples shall be given, if requested, it is necessary that the collectors shall carry materials for this purpose. The sample bags are accordingly provided with compartments holding small glass bottles, etc.

The full list of articles which must be carried by the collectors on every trip is as follows: Ten sample cans with stoppers, ten bottles fitted with corks, bunch of tags for marking cans, bunch of tags for marking sealed samples, wires for fastening tags to samples, sealing wax, seal, spirit lamp, matches, lead pencil, and receipt book for signature of drivers receiving sealed samples. Thus provided the collectors visit different sections of the city at an early hour of the morning, sometimes starting out as early as 2 o'clock A. M., and await the arrival of the milk peddlers supplying the locality. When the collectors have obtained the requisite number of specimens they report at the office, and deliver their samples to the inspector or his laboratory assistant, by whom the necessary examinations and analyses are made. The person receiving the sample is required to place his initials upon the tag attached to the sample.

COLORED MILK.

Watered or skimmed milk has a peculiar blue color, when a thin layer is observed, and particularly that portion of the upper surface which is next to the sides of the containing vessel. This appearance is so noticeable, and the cause so well known, that dishonest milkmen have found it necessary to color such milk, by adding something to give a rich, creamy, yellow color. The coloring of milk is a practice of long standing. Dr. Normandy in his Commercial Hand Book of Chemical Analysis mentions it as early as 1850, and it had probably at that time long existed. It was common with Boston milkmen more than twenty years ago.

The use of color at that time was so general, that many whose milk was otherwise good felt obliged to use color when brought into competition with unscrupulous dealers whose watered product, disguised by color, appeared richer than their own pure article. One of the largest milk contractors in Boston has informed the writer that he formerly required farmers who sent him their milk to color it, and he not only instructed them how to do it, but sent them the color prepared for use. In 1880, Hon. Martin Griffin reported:

"The public has been so long accustomed to this false article that it is now difficult to know the color of honest milk, and very rare to have the opportunity of looking upon it. Attention was first called to this matter by observing the milk as it came from the country, and then seeing a different color in the milk as sold. The secret was soon known. The milk was pure in the first instance, and doctored or colored in the other. Dealers make no secret in the matter. Indeed, many of them complain that they are forced into the practice by their customers, who insist upon the colored being pure, and the white the impure; and that they have lost customers by leaving a pure, uncolored milk. Nor is this surprising; for people have so long been accustomed to this color, and been educated to the belief that the colored, creamy, brownish milk is the only good article, that they turn with disgust from the whitish, bluish tint of the pure product. By turning to the description of milk as given by Hassal, it will be found to be of a milky white or bluish tint. Hence any liberty taken with it exposes the spoliation of cream or the addition of water, and its poverty is apparent in the thin, watery appearance and bluish tint which are inevitable in milk thus treated. The adulteration is easily seen, and hence the purpose of coloring, to conceal the fraud by giving an artificial richness and color to hide the bluish tint."

The milk color at first used was prepared from molasses or brown sugar, and sometimes from honey. The application of heat to these substances converts them into a substance known chemically as caramel, and this body dissolved in water produces a dark brown solution which forms sugar color. It is still extensively used for producing fine, old (?) brandy or whisky from inferior goods, and for making so-called white wine vinegar into cider (?) vinegar. About 1879 another preparation was manufactured, and has since been sold in large quantities, which consisted of a solution of annatto color in potash or soda. The nature of this preparation, and the dishonest purposes it was intended to serve, may be gathered from the following letters from a manufacturer which came into the possession of the Massachusetts State Board of Health:

——, MASS., November 8, 1884.

DEAR SIR: I would like to call your attention to ——, for which I am the agent. It is the article which all milkmen in Boston and vicinity use to improve the quality of their milk, and help them out when milk is scarce. It is perfectly harmless, and the milk inspectors and State Board of Health cannot detect it in the milk. The amount of water you can add to your milk in one day without detection will pay for —— enough to use three months. If you have any friends in the business, please tell them of this.

Yours truly, —— ——

——, MASS., November 8, 1884.

DEAR SIR: Yours received. Sent by Adams express one bottle of "Benefit." Give it a good trial. Don't be afraid of the color, taste, or smell, as you will find it to be all right when in the milk. A sample of milk taken from a batch put up with "Benefit" and analyzed will prove to the inspector to be all right, as the "Benefit" counteracts the chemicals they have to use in the analysis.

DIRECTIONS FOR "BENEFIT."

Take a two-gallon can of cold water and add —— of salt, —— of brown sugar, and —— of "Benefit." Shake it up so as to dissolve the salt and sugar, and then add —— of water to —— quarts of milk. If you take off cream from the milk, add a trifle more "Benefit." Some use sugar only when sticking their milk pretty hard. It gives a good body, however.

Yours truly, —— ——

A bottle of this so-called "Benefit" was procured, and proved on analysis to contain a solution of annatto. It had a very offensive smell, and a nauseous taste. The label on this bottle is significant. It is as follows:

BENEFIT. KEEP STRICTLY IN THE DARK. Use according to judgment. Keep corked. Prepared by —— ——, P. O. Address, Pollard Square, Somerville.

The addition of such materials to milk, whether injurious or not, had long been prohibited, but the enactments had never been enforced; but the inspector was so fully persuaded that if the coloring of milk could be prevented, it could but have a marked effect in reducing the quantity of watered and skimmed milk which had hitherto been sold, that, after mature consideration, it was decided to notify all dealers that they would be liable to complaint if colored milk or milk containing any foreign substance, intended for sale, was found in their possession. The announcement of the decision of the department to enforce the law was received with considerable opposition. Several of the largest and most respectable dealers visited the inspector and declared that "the idea was impracticable. The color could not be detected; and the attempt to enforce the law would result in failure." Many milkmen, however, at once conformed to the requirements; but some persisted in doing otherwise, so that it became necessary to make complaints against a considerable number. Many of these complaints were most stubbornly contested, but finally resulted in a conviction in every case except one, where the jury disagreed. The defendant in this case, however, pleaded *nolo contendere*, and paid his fine in a subsequent complaint.

The reform so successfully commenced has been continued to the present time, so that colored milk in Boston is now a thing of the past. True, we still occasionally find it in a badly watered milk, but its general and almost universal use, as formerly, has ceased.

ANNATTO AND ITS DETECTION IN COLORED MILK.

Annatto is the name given to a dye drug prepared from the seeds of a tropical shrub, known to botanists as the *Bixa orellana*. The plant, originally a native of South America, was used by the natives as a dyestuff at the time of the discovery of America, and was made known in Europe soon after the conquest of Mexico by the Spaniards. Thomson, in his "Chemistry of Organic Bodies," describes the preparation of annatto as follows: "The fruit of the plant is a coccus containing thirty or forty seeds smaller than a pea, and having a vermilion red color. To extract this coloring matter the grains are rasped down, water is added, and the whole allowed to remain for some days. A sort of putrid fermentation takes place. The whole is thrown on a drain, and the water which holds the coloring matter in suspension is collected. The coloring matter gradually subsides." Dr. Thomson describes annatto as having no taste; but a disagreeable smell resembling that of putrid urine, and he adds in a foot note: "This smell is not natural, but is communicated to it in the magazines by adding to it urine from time to time, in order to keep it moist and improve its color."

Dr. F. Crace-Calvert, in his work on "Dyeing and Calico Printing," says: "It is imported from Mexico, Brazil, the Antilles, and especially from Cayenne, in masses varying in weight from 5 to 20 pounds, which are usually covered with banyan leaves or reeds. It is also imported as a homogeneous mass in casks weighing 4 or 5 cwt. The paste has a repulsive oder of urine, which is added by those who store it, to keep it moist and impart to it a brighter hue."

COLORED BUTTER.

For many years preparations of annatto have been used for coloring butter, those persons using it being in all probability ignorant of its sources and the disgusting means employed in its manufacture. A microscopic examination of paste annatto, or of the alkaline solution of it as employed for coloring milk, shows, as Dr. Davenport has recently reported, the presence of innumerable *bacteria*, a necessary result of the putrefactive changes through which the coloring matter has passed. It is not surprising, therefore, that milk to which even the smallest quantity of annatto coloring has been added should sour much more rapidly than pure milk—a fact which has long been known to milkmen, and many times acknowledged to the writer by milkmen of whom inquiries have been made.

The Glycerine Patent—the Supreme Court Reverses its Former Decision.

In 1854 Mr. Richard A. Tilghman, of Philadelphia, obtained a United States patent for the manufacture of glycerinic and stearic acid from ordinary fat, by the use of highly heated water alone, under pressure in a close boiler. The invention revolutionized the manufacture of candles in this country, and led to the production of glycerine at such a price as brought it for the first time into general use. He visited England and sold his patent to the Prices, of London, the great glycerine manufacturers. While engaged in the introduction of his invention into England, several large manufacturers in this country appropriated Tilghman's invention. Among them were R. G. Mitchell, of New York, and Proctor & Gamble, of Cincinnati. In 1858 Tilghman, through George Harding as counsel, sued Mitchell in the Circuit Court of New York. After many years of litigation that court gave Tilghman a decree sustaining his patent and ordering Mitchell to pay the sum of $250,000 damages.

From this decree Mitchell appealed to the Supreme Court of the United States. That court decided that Mr. Tilghman's patent was limited to a mere apparatus, and did not cover or control the broad process or principle of decomposing fat by highly heated water, and that as Mitchell had not used Tilghman's apparatus he could recover nothing, and reversed the decree of the lower court. Not daunted by this defeat, Tilghman prosecuted a new suit against Proctor & Gamble, of Cincinnati, who were using the same apparatus that Mitchell had used.

The circuit court in Ohio, following the decision of the Supreme Court, decreed that Tilghman could recover nothing, and dismissed his complaint. An appeal was again taken to the Supreme Court of the United States, and on this occasion Mr. Harding, representing Mr. Tilghman, presented the case to that court, and it unanimously reversed its former decision and decided that Mr. Tilghman was entitled to the patent for the principle or process, and that Proctor & Gamble must pay him for using it. The case was returned to Judge Baxter, in Ohio, to ascertain how much Tilghman should be paid. That judge decided that the rate which other licensees had paid Mr. Tilghman was the measure of his damage, and awarded to Tilghman $79,566.

From this award Tilghman appealed, claiming that the license fee which honest users paid should not be the measure of the amount which an infringer should pay, and that he was entitled to receive all the money savings which Proctor & Gamble had made by their wrongful use of the patent. The Supreme Court, in the decision just rendered, determined that the usual license fee of Tilghman was not the limit of the amount which he could recover, and awarded $266,153.86 as damages, with interest for three years and five months, amounting to $320,715. Mr. Tilghman was represented at the final argument by Messrs. Harding and Chambers, and the defendants by Parkinson and Ramsay, of Cincinnati.

The Sturtevant Rock Mill.

The method of reducing rock by this machine is novel and interesting, the material being hurled against itself with tremendous force, reducing it at once to powder, and the grinding which would otherwise be upon the mill is transferred to the material, thereby reducing the wear of the machine to a minimum. It is a combined crusher and pulverizer, and has been extensively introduced both in this country and in Europe for reducing ores, phosphates, cement, etc., with very satisfactory results, as the testimonials received by the manufacturers show. The capacity of these mills is marvelous. One of the largest cement manufacturers states that one 20 inch mill at their works crushes and grinds from 140 to 150 barrels cement per hour (equal to over 20 tons). Additional information and references can be had by addressing the Sturtevant Mill Co., 88 Mason Building, Boston, Mass.