THE DIAMOND PHEASANT.

This beautiful bird was first introduced into Europe by Lady Amherst, and hence it was called *Thaumalea Amherstiæ*, but it is generally known by the name of diamond pheasant. It is thought by many to surpass the golden pheasant in beauty.

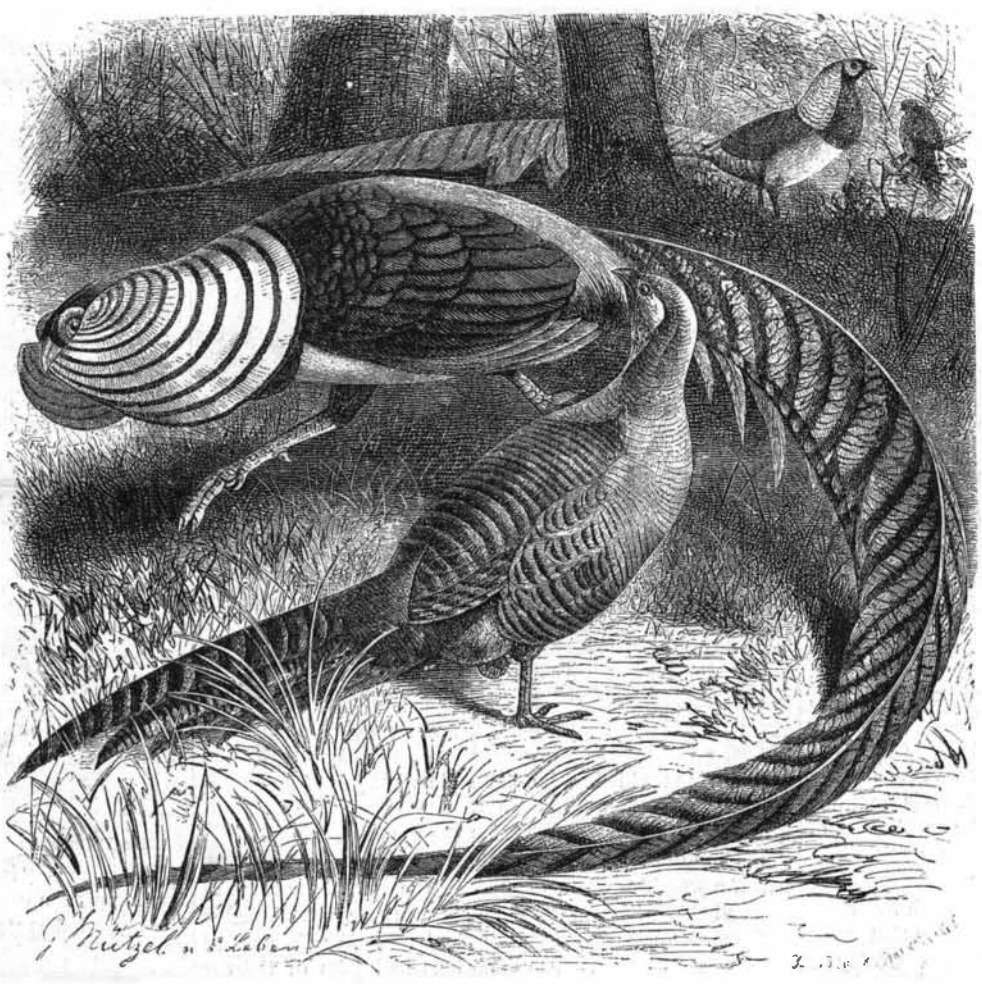
The crest is black upon the brow; the rest is red. The collar about the neck consists of silver colored feathers edged with a darker color. The feathers of the upper part of the back and the upper wing coverts are of a bright golden green, and appear like scales on account of their dark border. The under part is golden yellow shading into a darker yellow.

The upper tail coverts have black bands and spots upon a pale red ground; the under side is pure white. The wings are brownish gray edged with lighter gray. The eye is golden yellow, the bill bright yellow, the foot dark yellow. The length of the bird is one hundred and twenty-five centimeters, the length of the wings twenty-two, and of the tail ninety centimeters.

The home of the diamond pheasant is in Asia It is most frequently found in the provinces of Yunan and Kuyscho, and in eastern Thibet. It lives in the mountains about two or three thousand meters above the sea. Its motions are very graceful, and it is more agile and intelligent than other pheasants. It can make its way through the thickest branches with astonishing ease. Its voice, which is seldom heard, is a peculiar hiss. These birds are very easily tamed, and soon become accustomed to their attendant, distinguishing him with unerring certainty from strangers.

It has been generally thought that as these birds come from the warm countries of Asia, a house must be provided for them which is exposed to the rays of the sun, and all moisture avoided, but this is a mistaken idea. The dried sand which is generally placed upon the floor of their houses is not suitable for them. The floor should be partly of turf, and they should have access to a place thickly planted with bushes. Their food should be a mixture of animal and vegetable material.

They pair toward the end of April. The hen begins to lay about the first of May. She selects a well concealed place, and like other pheasants scrapes together a loose nest. She lays from eight to twelve small symmetrical eggs, which are rust color. The hen will seldom brood in a narrow inclosure, consequently the eggs are often placed under domestic hens. After twenty-three days of brooding the beautiful little chickens are hatched. For the first few days they need great care, and must be kept perfectly warm and dry, but after three or four weeks they require but little attention.—*From Brehm's Animal Life.*



THE DIAMOND PHEASANT.

The Vaccination of Pigs in France.

M. Pasteur, on the 26th of November, 1883, read before the Academy of Sciences a paper upon the vaccination of pigs with the diluted virus of a malady which has made great ravages among the flocks of that country and designated as the *rouget du porc*. M. Pasteur opened his essay by deploring the early death of Louis Thuillier, his associate in these investigations and one who executed his directions, and supplemented them with original studies.

In March, 1882, M. Thuillier began his examination of the disease in the department of Vienne, where it raged with great virulence. He soon discerned in the blood and humors of the dead pigs a new microbe which appeared to be the cause of the disease. Dr. Klein, of London, had previously indicated that a microbe was the source of the plague, but was completely mistaken in his identification of it. At the same time that M. Thuillier made this discovery, Professor Detmers of Chicago published his detection of the same parasite.

At once a proper medium for the culture of this bacterium was prepared, viz., veal soup sterilized. These culture propagations were multiplied, the successive infections of the new fluids being made with a drop from the preceding ones. The last infusion provided the matter for inoculation, which upon certain stocks of pigs reproduced the characteristic traits of the disease, and demonstrated the identity of the microbe, isolated by Thuillier as its cause. Further investigations proved that the microbe of the disease in Vienne was the same as that which in Vaucluse, Charente, Dordogne, Gironde, and in the northern provinces had originated this pestilence. The vaccination of the herds followed as a preventive for the disease, the diluted virus being used as the contrarient injection. One difficulty soon appeared in the very variable receptivity manifested by the numerous brands of pigs for the disease, but experiment did prove conclusively the possibility and efficacy of the remedy. The disease disappears upon the approach of winter and reappears in spring, and the subjects vaccinated in the autumn were kept until the following summer with flattering results.

M. Maucuer, a herder whose animals were put at the disposition of M. Pasteur, wrote to the latter one year after the vaccination had been extensively applied: "The happy effects of the vaccination become more and more evident. The plague is active at Bollene, Saint Restitut, Mondragon, and in the neighborhood of Orange, and not one vaccinated subject has succumbed. At Saint-Blaise your subjects are the only survivors. At M. De la Gardette's no news, but a great mortality exists around him; it has never been equaled. The vaccinated pigs will soon be the only living ones. The success is complete."

M. Pasteur insists that the *rouget* can be prevented by inoculation with the weakened virus of the disease; that the immunity from the disease by this means extends over a year, and that therefore one vaccination is sufficient, as the time required for fattening the pigs for market is seldom longer; that the sensitivity of the various stocks of pigs to inoculation and its consequences varies greatly and should be further examined.

He says the properties and physiological characters of the virus are highly modified by treatment, that its virulence can be weakened or heightened, and that these varying states can be fixed by culture.

A microbe is fatal when it can multiply in the subject's body, leading, in its reproduction, to disorders that terminate in death. If the microbe of a zymotic complaint has passed many times through the organisms of one species of animal, it attains a fixed and maximum development for that animal. Thus the anthrax of sheep varies but slightly in different subjects from one year to another, for the same country, attaining thus as it were a definite state. But the virulence of a virus which has not reached its maximum activity can be essentially modified by its passage through a series of individuals of the same race. Thus also the virulence of a virus can be developed to its maximum by inoculating young subjects and progressively treating older and older subjects.

But it further appears that a virus which has acquired its fixed state for a race can be modified in its virulence by passage from one race to another. Thus the microbe of hydrophobia, which proved to be very malignant for rabbits, has appeared inoffensive for adult cavias, but rapidly destroys those a few hours or days old. And in pursuing the inoculation of young cavias the virus has strengthened, and finally reached a condition where it easily killed the most aged. But the most singular change ensued. The virus which had at first been so destructive to the rabbits, after this culture in the bodies of the cavias lost its poisoning power upon the systems of the former. In fact, it induced an easily curable affection in the rabbits, and then rendered them inert to the effects of their own specific parasite.

These experiences led Pasteur and Thuillier to suspect that the virus of the *rouget* of pigs could be similarly modified, and the following results attended their inoculation of pigeons and rabbits with the porcine virus.

If the pectoral muscle of a pigeon is inoculated, the pigeon dies in six or eight days, showing the symptoms of poultry cholera; when its blood is inoculated upon a second subject and a number are successively treated with the poisoned blood of the previous subjects, the virus gains in virulence, reaches a fixed maximum of malignancy, and is then more fatal to the pig than the most deadly products of a hog killed originally by the *rouget*. On the other hand, the migration, so to speak, of the microbe of *rouget* through the rabbits has an entirely different consequence. The virus is progressively weakened, and soon the blood of the sick rabbit inoculated upon the pigs does no longer lead to death, but only to a curable sickness, after recovery from which they are invulnerable to the attacks of the plague.

Symbiosis.

Professor Hertwig, according to *Nature*, at the last meeting of German naturalists, read a paper on this subject. This term, symbiosis, first suggested by De Bary in connection with certain phenomena of the vegetable world, is here extended to the whole organic system. As distinguished from ordinary parasitism, it is explained to mean the normal fellowship or association of dissimilar organisms which dwell together in a common abode for their mutual welfare. In the case of parasites the connection is altogether one sided; one of the two organisms attaching itself to the other and flourishing at its expense, as, for instance, the mistletoe on the apple tree.

But in this newly revealed phenomenon of symbiosis, which appears to pervade the whole biological world, both associates are mutually beneficial, and in some instances even indispensable to each other. They act, so to say, like two partners in a well regulated business concern, co-operating in the work of life, taking part in all its toils and troubles, and honorably sharing the common profits. An illustration is drawn from the familiar hermit crab, one species of which, after taking possession of the first available empty shell, goes into partnership with a sea anemone (*Adamsia palliata*). This lonely creature, bright orange spotted with red, attaches itself to the roof of the common abode in such a position that its mouth and prehensile apparatus are always turned toward the head of its associate. It is thus enabled to join in all the expeditions of the restless hermit crab and conveniently share in the common plunder. In return for this service, the anemone protects his companion from his many enemies by means of the numerous long threads which it shoots out at the least alarm, and which are provided with millions of capsules charged with a stinging acid like that of the common nettle. So close is the compact entered into by the two partners, that both have become indispensable to each other, as appears from a series of experiments made at the Neapolitan Aquarium. If the crab be removed from his house, and this be stopped up so as to prevent his re-entering it, he will cast about for another shell, and never stop until his old associate is also transferred to their new abode.

A still more remarkable illustration is drawn from the *imbauba*, or candle nut tree of South America, which strikes up an alliance with a species of small black ant to their mutual benefit. The whole subject of symbiosis, which naturalists are only beginning to study, is calculated to throw great light on the Darwinian theory of biological evolution. The various cases of fellowship between animals and plants of different orders, and even between members of the animal and vegetable kingdoms, show how, in the perpetual struggle for existence, the individual organism avails itself of the smallest advantage to secure a place in the household of nature. It often thus acquires marvelous habits of life, which it is afterward unable to lay aside, and in consequence of which it becomes gradually modified in its bodily form and organization. Thus *abyssus abyssum invoca*, one change superinduces another, altered conditions require fresh combinations, and the organic world resolves itself into an everlasting ebb and flow of life, in which the individual counts for nothing, the species—itself transitory—for but little, and the sum of existence alone is considered in the self-adjusting scheme of the universe. Symbiosis thus leads at once to a broader and more searching study of various branches of human knowledge.

To prosecute the subject successfully, vegetable and animal organisms must be examined, normal and morbid conditions attended to, anatomical and physiological questions investigated. For this boundless theme belongs to a border land in which zoology, botany, anatomy, physiology, and pathology meet as on common ground.

The Electric Light on Board Men of War.

The result of the use of the electric light during the recent evolutions of the German iron clad squadron have shown that, notwithstanding its employment, torpedo boats may approach vessels unperceived. In a recent number of the *Marine-Verordnungs-Blatt*, it is even stated that those who have seen the electric light used on vessels will come to the conclusion that it is disadvantageous rather that beneficial, supplying the torpedo boat with a safe aim.

Burning of a "Fireproof" Theater.

The new year opens with a number of serious fires. One of these, the account of which has a certain air of grotesque inconsistency, occurred in Cleveland, where an "absolutely fireproof" theater was completely destroyed in three-quarters of an hour, blazing with such a fury as to set fire to a "stone church" near by, which was also burned into a useless shell. The theater was a new one, having been open only a little over two months, and is said to have been constructed with all the safeguards now regarded as necessary to complete security. The stage was separated from the auditorium by a thick proscenium-wall of brick, extending six feet above the roof; and the proscenium-arch was closed by a fireproof curtain. Brick and asbestos were used in place of wood wherever possible, and all the stair cases in the building were of stone or iron. Even the dome over the auditorium was made of sheet-iron, and, in accordance with the most recent and approved practice, an immense skylight was placed in the roof of the stage, so that in case of fire the glass would break, setting in motion a current of air from the auditorium into the stage, to carry smoke away from the audience.

In addition to all these precautions, which it must be remembered are not less valuable because they have once failed of the entire effect hoped for from them, stand-pipes were provided at various places in the theater and on the stage. The cause of the fire, according to the excellent account of the Boston *Herald*, seems to have been a leakage of gas from the meter or the pipes near it. A violent explosion took place when the janitor, carrying a lamp, opened the door of the meter room, and the flames poured out of the door and kindled some light wood-work near by. The engineer was standing close at hand, and immediately ran to the pumps and set them in motion, but in a few minutes the scenery and stage apparatus caught fire, driving every one out of the building. Although an alarm was promptly sounded, the utmost efforts of the whole city department were insufficient to control the progress of the conflagration, which raged until nothing was left of the building but the front and side walls, which, being of brick, may possibly be used again in rebuilding. The church, which was simply a combustible frame with a stone shell, suffered the usual fate of such structures under similar circumstances. This occurrence is the more interesting, as it is the first trial of the new principles of theater-building which have found currency since the terrible warnings given by the catastrophes at Brooklyn, Nice, and Vienna. It is very much to be hoped that we may have later an account of the fire written by the architect of the building, or by some other equally competent expert, which will serve to show the value, in time of actual trial, of the various precautions employed. Such an account would serve a most excellent purpose, not only in pointing out the way for further improvements in theater construction, but in showing the real efficacy of the devices, which at least deserve the credit of having probably saved the lives of the few persons who happened to be in the theater—*Amer. Architect.*

Our Little World.

Some physical results of the Java disturbance help us to understand how small the world is. Take a bowl of water, agitate the fluid in the center, and the undulations you excite propagate themselves in smooth-swelling concentric rings till they lap against the sides of the bowl. There they break, and slop up in mimic tidal waves. This is an exact illustration—*magna componere parvis*—of the oscillations of the sea reported from both hemispheres this week. The tidal irregularities, as might be expected, were most violent on the northwestern seaboard of Australia, which lies right opposite the scene of the Java disturbances. On that coast the sea retreated and advanced a hundred yards. A day or two later oscillations appeared on the Atlantic seaboard of America. The particular undulation which, on the fifth day out, slopped up on the east coast of New Zealand must have come by way of Cape of Good Hope and Cape Horn, and had nearly completed the circuit of the globe. Australia lies as a breakwater between us and Java by the direct route. It gives one a new conception of the littleness of what Henry Ward Beecher calls "this fi'penny-ha'penny world," when a man can stand on the Ocean Beach at Dunedin and watch the ripples from a splash made in the Straits of Sunda.—*Otago Times.*

Gold in North Carolina.

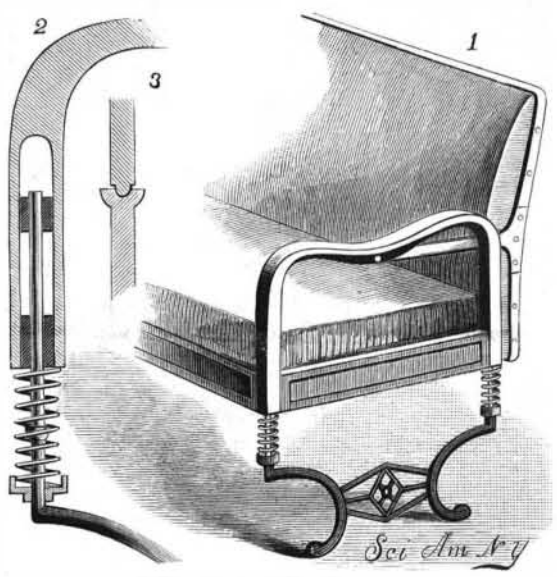
At a recent meeting of the Academy of Natural Sciences, Professor H. Carvill Lewis exhibited some remarkable gold nuggets found in Montgomery County, N. C., forty miles east of Charlotte and two miles from Yadkin River. Some of the nuggets were of great size. One of them weighed over four pounds, and contained nearly $1,000 worth of gold. It was finer than any specimen in the collection at the U. S. Mint, and was probably one of the largest nuggets ever found in eastern America. Many of the specimens exhibited were of nearly pure gold, of a crystalline structure, and of a fine golden yellow color. It was stated that in the district of North Carolina whence these nuggets were taken gold is very abundant. The larger nuggets were found in the gulleys, where they had been washed out of the decomposed rock, and it had been stated that a shovelful of dirt dug out of the hillsides anywhere in the district would pan out traces of gold. Some years ago one man took out of a hole sixteen feet square $30,000 worth of the precious metal. The quartzite containing the gold occurs in a white clay or decomposed schist.

Complimentary Words.

The *Christian Intelligencer* of this city, whose veracity has never to our knowledge been questioned, says, "The *Scientific American* is one of the first mechanical journals of the world. No paper printed anywhere," it continues, "presents a larger number of inventions or contrivances in the course of a year, describes them more clearly and luminously, illustrates them more liberally and skillfully. It is noted for the beauty and lucidity of its illustrations. We seldom take up a number which does not contain an account of some invention or contrivance suited to the outdoor or indoor wants of the farmer or gardener, described in words and in a picture that really illustrates. A long experience has carried this journal to a high pitch of perfection in such matters. Farmers generally acquire some mechanical skill, and find in such a publication innumerable valuable hints. This journal also presents constantly a variety of interesting scientific facts from every department of investigation and experiment. Such a journal also, it seems to us, gives dignity and worth to work, to mechanical pursuits, gives one broader views of their usefulness and a more exalted opinion of the grandeur of their achievements. A farmer who has a group of promising and perhaps restless boys around him would render to them, and to himself as well, a service of incalculable value by putting the *Scientific American* in their hands."

CAR SEAT.

The car seat is supported by spiral or other springs surrounding the upper parts of the seat legs, which pass into cavities in the standards of the arm rests. The legs are bent so as to form an upwardly projecting vertical part, which extends through apertures in the seat and into longitudinal openings in the standards of the arm rests. A short distance below the seat the vertical parts of the legs are each provided with a cup-shaped collar, upon which the spiral spring rests which surrounds the upper part of the leg and upon which the seat is supported. The vertical part of



ACKLEY'S CAR SEAT.

each leg is provided with a ball and socket joint (shown enlarged in Fig. 3) about midway between the collar and seat. These joints are so arranged that the upper parts of the legs can swing in the direction of the long axis of the seat, so that if a weight rests on one end of the seat the springs at that end only will be depressed and the upper part of the leg will move outward correspondingly. Other than spiral springs may be used. The vibrations and jolts of the car will be taken up by the springs and will not be transmitted to the seat. The standards of the arm rests (shown in section in Fig. 2) contain rubber sleeves, to prevent noise, and through which the upper ends of the legs pass.

This invention has been patented by Mr. William A. Ackley, of Hackettstown, New Jersey.

Gems from the Himalaya Mountains.

Professor C. U. Shepard* has called attention to the discovery of a remarkable locality for sapphire and ruby in the Himalaya Mountains. The crystals occur, with other varieties of corundum, in a schistose or slaty rock, and are associated with chlorite. The gems, which are limpid and finely colored, are also finely crystallized. The locality was discovered accidentally, but is now guarded by government troops. Professor Shepard believes that the resemblances between the mode of occurrence of these Indian gems and those found in North and South Carolina are "sufficiently important to encourage the expectation that valuable corundum gems may yet be found in the United States."

Professor Shepard is apparently not aware that a much more full account of this discovery of gems in India was published more than a year ago, by Professor F. R. Mallet, in a paper entitled "On Sapphires recently discovered in the northwest Himalaya."†

It is there stated that the correct locality is Padam, east of the village of Machel, Zanskar district, territory of Kashmir. The gems were exposed by a landslide, and occur far up on the mountain, at the limit of perpetual snow. Some of the sapphires discovered were a foot in length. A physical and crystallographic description of the crystals is given. In the center of a hexagonal prism of sapphire a cavity was found, in which were two crystals of tourmaline. Frequently the specimens are coated with a thin white mineral resembling gibbsite.

The crystals are bluish white and translucent, with transparent fine blue portions irregularly mixed. These blue portions, of course, constitute the only valuable parts of the crystals, and are carefully cut out by the lapidaries.—*Amer. Naturalist.*

Amer. Jour. sc., Nov., 1883.

† Records Geolog. Surv. of India, vol. xv., part 2, p. 138.

Friction.

The ratio obtained by dividing the entire force of friction by the normal pressure is called the coefficient of friction, hence we may define the unit or coefficient of function to be the function due to a normal pressure of one pound:

Iron on oak	0·62
Cast iron on oak	0 49
Oak on oak, fibers parallel	0·48
" greased	0·10
Cast iron on cast iron	0·15
Wrought iron on wrought iron	0·14
Brass on iron	0·16
Brass on brass	0·20
Wrought iron on cast iron	0·19
Cast iron on elm	0·19
Soft limestone on the same	0·64
Hard limestone on the same	0·38
Leather belts on wooden pulleys	0·47
Leather belts on cast iron pulleys	0·28
Cast iron on cast iron, greased	0.10

Pivots or axes of wrought or cast iron, on brass or cast iron pillows:

First, when constantly supplied with oil	0·05
Second, when greased from time to time	0·08
Third, without any application	0·15

Electric Lighting in New York.

The novelty of the new light has worn off, and the extent to which it is being introduced as a substitute for gas is little noted except in the reports of the companies. These, however, do not always give one a full idea of the growth of the business, as so many establishments where the electric light is used generate their own electricity by dynamos worked by power on the premises. The arc light seems to have the field to itself for streets and the lighting of large areas, as the incandescent light has for shops, saloons, offices, dwellings, etc. The Edison Company are now planning two large establishments to light the field in this city, from Twenty-fourth to Fifty-ninth Street and from Eighth to Madison Avenues, to be of a capacity of 7,000 and 9,000 horse power respectively. Touching the practical effect of a heavy rain in interfering with the perfect insulation of overhead wires, an observer thus describes the appearance of the arc light at the top of the tall mast in Madison Square during a heavy storm:

"The lights danced up and down, varying with the floods of rain apparently, occasionally sinking to a dull red, and then going out altogether and leaving the wind-swept square in total darkness. Then the lights would flash out gloriously, flooding the spaces with their dazzling brilliancy and defying the elements that raved through the air. And so, up and down, the rays of the electric lights rose and fell through the tempest, and they who were fortunate enough to see the show without being exposed to the wild storm will long remember the spectacle."

The Microscope in Detecting Lard Adulterations.

The famous "lard corner" in Chicago last fall, and how the speculation came to an end and large quantities of lard were rejected as "good delivery" on account of alleged adulteration, excited a degree of interest in the public mind which has not yet subsided. If it were true, as was so strongly asserted, that an article as cheap as lard could be successfully adulterated on a large scale, people would hardly know where to stop in their suspicions of everything not strictly "home made." The principal distinguishable difference heretofore between beef tallow and lard is that the former contains rather more stearine, and this difference is so slight that there have been considerable adulterations of lard with beef fat which it has hitherto been almost impossible to determine. But on the trial of the lawsuits which grew out of this lard corner some strong and highly interesting evidence was presented as the result of nice examinations by the microscope.

In this way, by dissolving samples in ether in a test tube, which were crystallized on evaporation, and then examining them under an amplification of two hundred and ten diameters, it was found possible to detect an adulteration of lard with tallow as low as five per cent. The different forms of crystallization of lard and tallow were first discovered by Dr. P. B. Rose, of Chicago, about two years ago, but the successful application of the discovery to detect this adulteration was made by William T. Belfield, M.D., of the same city, one of the expert witnesses in the recent trial. The pure lard crystals are thin, rhomboidal plates, while those of pure tallow have curved forms somewhat like the italic letter *f*.

A BILL introduced by Mr. Vance, of North Carolina, makes it the duty of the Attorney-General to attack the validity of patents. As though enough had not already been proposed in the way of nullifying the rights of patentees, the Law Department of the Government is, by this bill, made an agent for invalidating the titles which the Interior Department, after careful examination, grants to patentees.