THE PORCUPINE ANT EATERS RECENTLY DISCOVERED IN NEW GUINEA.

Every one has perhaps heard of the duck mole (*Ornithorhyncus*) and the porcupine ant eater (*Echidnæ*), the most singular of all marsupial mammals—a class of animals confined exclusively to Australia and the adjacent islands. These animals were known to neither Buffon nor Linnæus, specimens having been brought to Europe for the first time at the close of the eighteenth century by Sir Joseph Banks, one of the companions of Capt. Cook Peron and Lesueur, who made a voyage similar to that of Banks, on a French vessel commanded by Bandin, also procured specimens. Professor Blumenbach, of Hanover, having received a duck mole for examination, proposed for it the generic name that it still retains—*Ornithorhyncus*—and he named the species (the only one thus far known) *Ornithorhyncus paradoxus*, which at once recalls the form of its bill (like that of a duck) and the oddness of its principal characters. Almost at the same time the English geologist Shaw proposed the name *Platypus anatinus*, the generic name having reference to the palmate or webbed feet of the animal, and the specific name expressing the resemblance of its bill to that of the duck. Since that time the numerous memoirs that have been written on the subject of the ornithorhyncus have had more especial bearing on the curious and important characteristics by which mammals of this sort are distinguished, and which make it one of the most inferior animals of the class of marsupials.

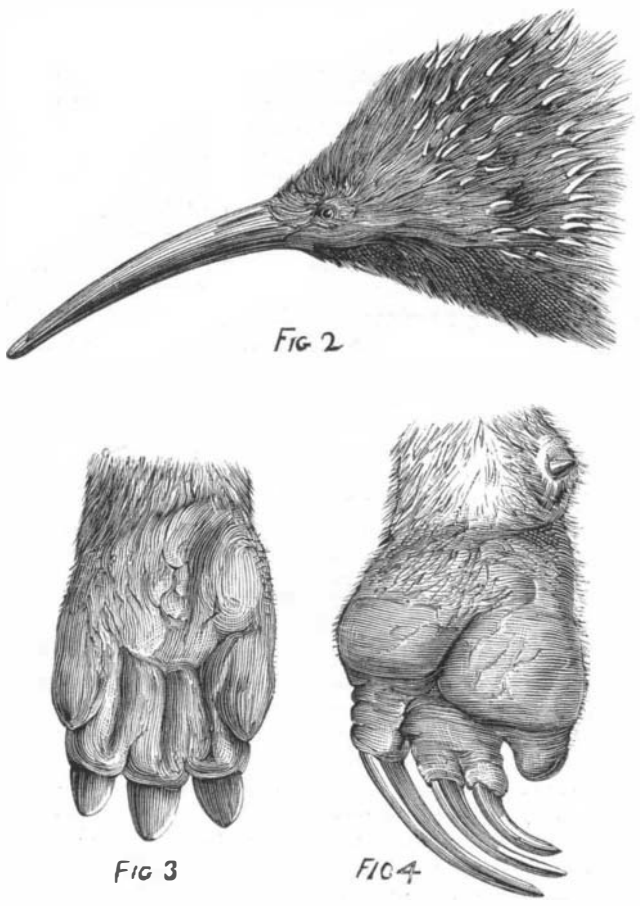
This inferiority is seen in the conformation of the skeleton, the disposition of the reproductive organs, and in several other systems of organs, as well as in the structure of the offspring.

The porcupine ant eaters (*Echidnæ*), of which it is our intention to speak more particularly in this article, partake of this same inferiority; it is for this reason that these two genera have been brought together to form a sub-class by themselves, known as *Monotremes*, which seems to form a connecting link between mammals and birds, and in some respects having anatomical affinities even with reptiles.

The porcupine ant eaters (of which several species are known) are not, like the duck mole, aquatic in their habits, so their feet are not webbed, but are furnished with five well developed toes with large nails the forefeet being formed for burrowing, and the hind feet in the male armed with a horny spur, as in the duck mole (Figs. 3 and 4). Their snout, although horny, and in many respects analogous to that of a bird, is not flattened like the bill of a duck, but long and slender (See Figs. 1 and 2). Their tongue is very long, slender, and protractile, as in the ant eaters properly so-called. The upper part of the body is covered with spines and hairs intermixed, like those of certain species of hedge hogs and porcupines.

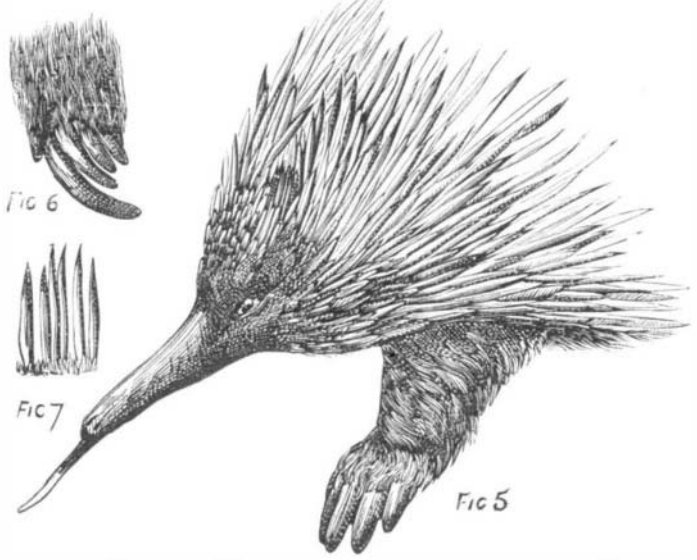
Shaw, who first described the Australian echidna, saw no possibility of separating it generically from the ant eaters proper, so classed it under the same generic name. It was Cuvier who demonstrated that it should be separated and placed in a genus apart, and it was he who erected the genus *Echidna* to receive it. The learned German naturalist, Illiger, has substituted *Tachyglossus* for the Cuvierian nomenclature, this name (from Greek, *tachus*, swift, and *glossa*, tongue) having reference to the swift movements of the tongue of the animal in seizing its prey.

The porcupine ant eaters inhabit sandy places, and scratch up the earth to find their food; this consists of ants and other small insects, which it captures like the ant eaters with its tongue, by means of a viscid matter secreted by two large submaxillary glands extending from behind the ear to the forepart of the chest; there are no teeth in the jaw, but the palate is armed with several rows of horny spines directed backward, and the upper surface of the tongue is furnished with numerous small horny warts. In captivity it is a slow-moving, stupid animal, avoiding light, and displaying activity only in burrowing, which it does with amazing rapidity. When irritated it rolls itself up into a ball, its head between its forelegs. It can sink into the loose sand directly downward, presenting only its spiny back to its enemies; yet, in spite of its defensive armor, it often falls a prey to carnivorous marsupials. Until to within comparatively few years, but a single species was known—the Australian *Echidna aculeata* (Shaw); but it has now been found that Australia is not the only home of these singular animals. Two species have also been found in New Guinea, that country which has so many analogies with Australia proper, in respect to its principal productions and mammalian fauna. These two species are quite different from that just mentioned: one of them, Lawes' echidna (*Echidna Lawesii*), being more closely related to the Australian animal than the other, which has been named Bruijn's echidna (*Echidna Bruijnii*) These two animals are so different from each other that there would be no danger of referring them to the same genus. While the first-mentioned has, like the Australian animal, a beak of medium length, and five-toed feet provided with nails, the second has an exceedingly long beak, comparable with that of the New Zealand bird, the apteryx; besides, it has only three clawed toes to each foot, and, moreover, its tongue is remarkable for the three rows of horny hooks directed backward, and situated at its base. These remarkable characteristics have led M. Gervais to erect a new genus—*Acanthoglossus*—to receive such animals as Bruijn's echidna; and a full discussion of the facts relating to the question will be found in a quarto memoir, entitled "Osteography of the Monotremata," by this author, published a few months since at Paris.



BRUIJN'S PORCUPINE ANT EATER

Fig. 2.—Head and Beak; Fig. 3.—Forefoot of Male; Fig. 4.—Hind Foot of Male



LAWES' PORCUPINE ANT EATER.—(*Tachyglossus Lawesii.*)

Figs. 5, 6, and 7.—Head, Beak, and Forefoot; Foot detached, and a few Spines of the Animal.

In conclusion, it should be stated the Lawes echidna was discovered at Port Moresby, in that part of New Zealand which is nearest to Australia, and that Bruijn's echidna was found at Mt. Karon, in the northern part of the same archipelago. The figures which illustrate this article refer solely to these two new species.

The common name—porcupine ant eater—which has been bestowed on these animals is far from being appropriate, since they are neither rodents like the porcupine nor edentates proper like the ant eater, though they have the spiny covering of the former, and the toothless jaws of the other. Still, this name, originally imposed by Shaw, may be the best that could have been selected to denote such odd animals.

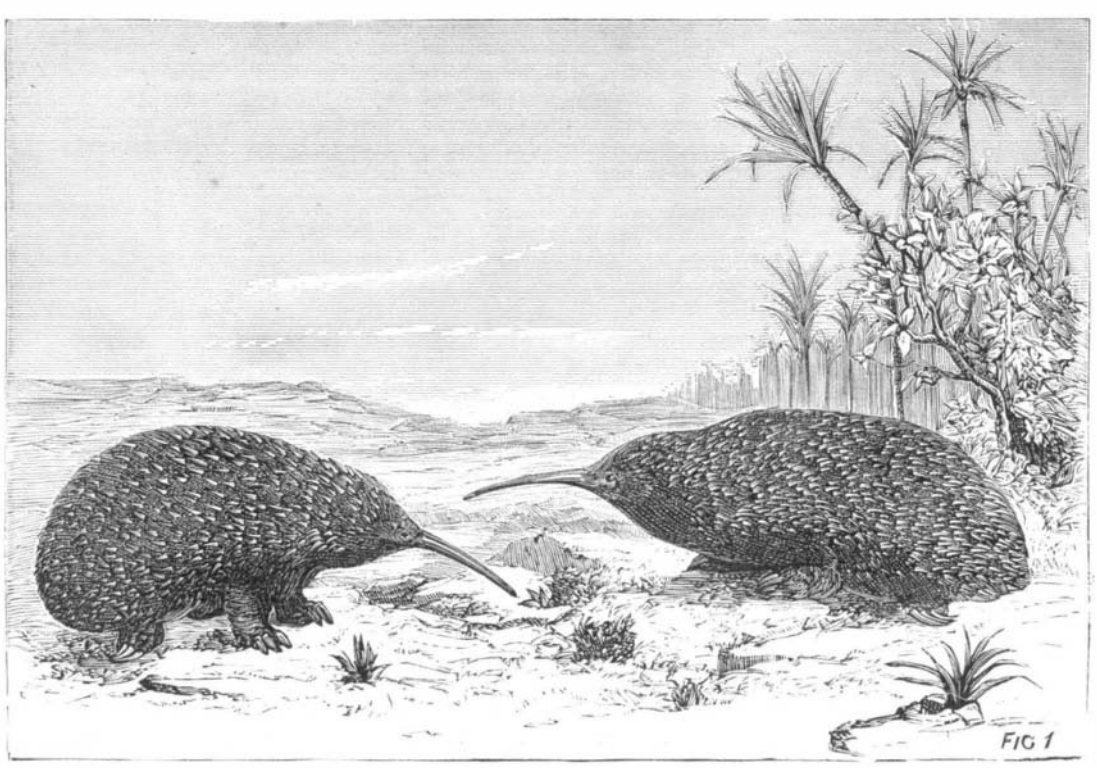


FIG. 1.—BRUIJN'S PORCUPINE ANT EATER.—(*Acanthoglossus Bruijnii.*)

Hair Eels.

In many parts of the country the notion has long prevailed that if horse hairs be placed in a brook and left there, they will after a time become endowed with life; in short, that they will turn into hair eels. Very recently, a correspondence on this subject was published in the columns of a prominent Scotch newspaper, between an anonymous writer and Dr. Andrew Wilson, of the Edinburgh School of Medicine; the former alleging that a friend in Shetland had succeeded in effecting the transformation of hairs into "hair eels," the latter denying that any such "spontaneous generation" of living beings was possible. The life history of the *Gordius aquaticus*, as naturalists name the hair eel, is perfectly well known. It passes the earlier stages of its existence as a parasite, lying coiled up within the body of an insect, such as the grasshopper; the worm exceeding its host many times in length. In this condition it is immature, and has no power of reproducing its kind. When mature, it leaves the body of the insect and seeks the water, being found in summer at the breeding season in thousands in some localities. There the eggs are laid in long strings, and from each is developed a tiny embryo or young gordius, which gains admittance to an insect host, there to lie quiescent for a time, and soon to repeat the history of its parent.

It is plain that in such a life history there is neither room nor need for the supposition that hair eels are developed in an unnatural fashion, and at the will of man. The fallacy that hair eels are transformed hairs arises frequently from imperfect observation; often from preconceived notions, and from an inability to perceive the unnatural nature of the supposition, or to reason out the procedure adopted to produce the hair eels. Thus, for instance, it would be an absurd supposition were any one to maintain that hair eels could only be formed artificially from hairs. It is a perfectly evident truth and a demonstrable fact that they reproduce their kind by means of eggs, and this fact shows us that they possess a natural method of reproduction, and further that the statement of any supposed infringement of a natural law should be received with caution and suspicion.

But judging the "hair eel" tales on their own merits, is the evidence of the experimenters trustworthy as to their facts? And even admitting that the facts are as they have been stated, it may be asked if a more rational interpretation of them cannot be given. A boy places a number of horse hairs under a stone in a brook. Three weeks afterward he finds the brook to be swarming with hair eels; therefore, he concludes that his hairs have become transformed into hair eels. But the old maxim, *Post hoc non propter hoc*, must be borne in mind. It does not follow, as a matter either of logic or common sense, that because hair eels are found in a brook where horse hairs were placed three weeks or so previously, the transformation of the hairs into living worms is proved. Could any experimen-

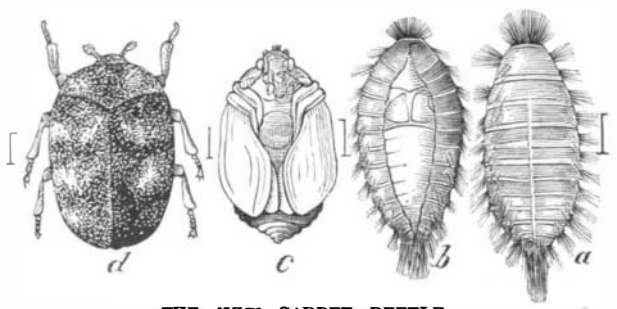
ter, for instance, be prepared to state that he had found in the brook just as many hair eels as there were horse hairs? The brooks literally swarm with hair eels in summer, and, as already remarked, the upholders of the "horse hair theory" will have not merely to account for the transformation of hairs into hair eels, but also for the marvelous multiplication of the former.

Then, also, we must not lose sight of the simple and natural explanation that hair eels occur after experimentation, simply because they appear naturally in the brook at their own breeding season. Why are hair eels not obtained in winter from horse hairs? The answer is clear. Because in winter these animals are encysted, or exist as do many other co-tenants of the brook, in a torpid state. and because the breeding season is past and over. Best of all, it must be remembered that against the precise information of the naturalist there is no evidence forthcoming of the steps of this marvelous transformation. The idea that horse hairs contain potentially in themselves generations of living beings simply exemplifies a use of the imagination the reverse of scientific, and offers a fresh proof that the superstitious habit of preferring an unnatural to a natural explanation of common phenomena is not yet extinct in this advanced and enlightened age. The exponents of the "horse hair" theory in truth hardly realize the exact nature of their belief—that a dead structure should give origin to a living animal—otherwise they would be chary of asserting that every country boy is able to perform a veritable miracle and act of creation—the mere idea of which, as an act of human power, has never entered into the mind of any scientist, save in the dark ages of myth and superstition. We must not be deemed uncharitable if we venture to regard the hair eel myth as a survival of a bygone age, when the fabulous in zoology represented the exact science of to-day.—*Chambers' Journal.*

THE NEW CARPET BEETLE.

In vol. xxxv. of the SCIENTIFIC AMERICAN we noted the recent advent into this country of a new carpet beetle, which had been brought to the notice of the scientific world by Mr. J. A. Lintner, the entomologist of New York State. This beetle, new to every one, was pronounced by Dr. Le Conte to be a European species, the *Anthrenus scrophulariæ*, and closely allied to the museum pest (*A. varius*). Its habitat was stated to be beneath the borders of carpets where nailed to the floor, eating in those portions numerous holes of an inch or more in diameter

Occasionally it made its way into the crevices left by the joinings of the floor, following which, entire breadths of carpet would be cut across as if by scissors. In several instances carpets had been destroyed—new ones as readily as older—and it was questioned whether their use could be continued in view of the prospective increase of the alarming ravages. Since the period of its discovery, in 1874, up to the present time, this destructive insect has gradually spread over the country until it has been heard of from several States. From the advance sheets of the Thirteenth Annual Report on the New York State Museum, we obtain the accompanying figures of the beetle in its various stages, drawn by the skillful pencil of Professor C. V. Riley; and also a further description of the insect from the pen of Mr. Lintner. The figures are all enlarged, the lines beside them giving the natural size of the insect.



THE NEW CARPET BEETLE.
a, Larva; *b*, Skin of Larva; *c*, Pupa: *d*, Perfect Beetle.

At *a* is represented the larva; at *b*, the skin of the latter, after the beetle has emerged from the fissure on the back; at *c*, the pupa; and at *d*, the imago or perfect beetle. The larva (*c*)—the form in which it is usually found when pursuing its ravages beneath the carpets—measures, at maturity, about 3-16 of an inch in length. A number of hairs radiate from its last segment, forming a tail-like pencil nearly as long as the body; these are not shown in their full length in the figure, the latter having perhaps been drawn from an immature specimen. Similar short hairs clothe the body, those on the sides forming tufts. The body appears to be banded in two shades of brown, the darker band being the central portion of each ring, and the lighter the connecting portion of the rings. On the underside will be found the six little legs, of which it makes such good use in extending its field of depredation.

After attaining its full growth, it makes preparation for its pupal change. It constructs no cocoon, but merely seeks a quiet retreat, where it remains until it has nearly completed its pupation, being the while unaltered in external appearance, except somewhat contracted in length. Its pupation completed, the skin is rent along the back, and through the fissure the pupa may be seen. After a few weeks the skin of the pupa is also split, disclosing the brightly colored wing cases of the perfect beetle. After a few days' repose the fully developed insect emerges from the pupal case and appears in its final stage.

The beetle is quite small (about 1/8 of an inch long by 1-12 broad), elliptical in form, and rounded above and beneath. It is beautifully marked, its colors being black, white, and scarlet. The edges of the wing cases, where they meet, is bordered with scarlet forming a central red line, with three red projections from it outward. The first projection, near the head, is connected with a white spot running upward. On the outer border of the wing cases are three white spots nearly opposite the red ones. The ground color of the wing cases is black. The earliest beetles emerge in October, and continue to appear during the fall, winter, and spring months. They probably pair soon after their appearance, and the females then deposit their eggs for another brood of the destructive larvæ. The latter do not confine themselves entirely to carpets, but also infest articles of clothing in closets or drawers. Through correspondence with European entomologists, Mr. Lintner discovered the remarkable fact that this beetle in its native home is not known to prey upon carpets (this taste seemingly having been developed in this country), but there infests dried meats and similar substances. As to the remedy, Mr. Lintner states that Persian insect powder, camphor, pepper, tobacco, turpentine, carbolic acid, etc., are powerless; but he believes that cotton, saturated with benzine or kerosene, stuffed into the joinings of the floors and crevices beneath the baseboards during the winter months would prove fatal, since at this season the insect will be found occupying these retreats, either in its perfect form or as eggs for another brood.

Lac.

Lac, in its raw condition, is, as is well known, found in India incrusted round the twigs of the trees in which the insect feeds. The twigs are generally, for convenience of transport, brought to market cut up in lengths of two or three inches, and it is probable that a great deal of material is wasted in this process. The objects of the manufacture are, first, to separate the resinous incrustation from the wood; second, to free the resin from the coloring matter; third, to convert the resin into what is known as shellac; and, fourth, to form from the coloring matter cakes of dye, known as lac dye. As generally practiced, these processes are conducted in a primitive manner. Mr. O'Connor, from whose notice upon the Indian lac in all its branches the following particulars are taken, was enabled to see the extensive lac factory belonging to Mr. Elliott Angelo, of Cossipore. The manufacture is there conducted on an improved and civilized system by the aid of machinery worked by steam power. The lac is first separated from the twigs by the action of rollers, worked by steam. Of these rollers there are three sets, each consisting of an upper and an under roller with a sieve attached. Between these the twigs pass from a feeder, and the lac is, by the turn of the roller, separated from the wood and broken up, falling on to a sieve, while the twigs are thrown off aside in a heap. If the lac has not been sufficiently broken up by the first roller to pass through the sieve, some of the twigs not having been separated, it passes on to the second roller, and goes through the same process, passing again if still not fine enough, to the third, whence the lac is dropped, as the sieve is filled, into a series of small troughs arranged in an endless chain working with the machine, and is projected thence, as the chain moves, into a heap upon the floor. The twigs are thrown off to a platform on the other side. These are afterward again examined by women, and all the remaining lac separated by hand, and as far as it may be worth while used in manufacture. The refuse is bought by natives for the manufacture of various articles made of lac. The sticks are used for fuel in the furnace of the steam engine.

The lac is now placed in a horizontal cylinder furnished internally with arms arranged on a bar passing through the cylinder from end to end. These arms are worked by steam power, and their action, combined with water, with which the cylinder is filled, breaks up the lac into very small pieces, and separates the coloring matter which forms lac dye. Lime is frequently employed to assist in the precipitation of the dye when the water is not naturally impregnated with lime. In the liquid thus obtained the lac is left to soak for twenty-four hours in a large vat, the liquid being then drawn off, by the removal of plugs, into a vat on a lower level, and there left to settle in the same way as indigo, the coloring matter being precipitated to the bottom. The clear water at top is drawn off, and the sediment, after having been passed through a strainer—much of the same nature as that used by papermakers for the straining of pulp—is finally allowed to settle and consolidate, when it is pressed in frames into cakes, which are afterward dried in the sun. These cakes are the lac dye of commerce.

The lac, now called "seed lac," after maceration, is thoroughly melted in a close vessel heated by steam, and thence conducted into open shallow troughs, also heated by steam, where the melting continues. Some resin is here mixed with the lac, to act as a flux and to prevent the lac from burning and adhering to the vessel. The resin, which is probably useful for this purpose, flies off, at least in great part, during the process of ebullition.

Ranged round the troughs are a series of zinc columns, inclined outward at an angle of 45°. These columns are hollow, and, being supplied by pipes with tepid water, are maintained at a certain temperature. They must never become too hot, or the fluid lac would not consolidate; nor must they become too cool, for then the lac would harden at once, and break up into small fragments, which would adhere to the surface of the column. A quantity of the melted lac is now taken up by a workman in the concavity of a piece of plantain bark—this being the material best adapted to the purpose—and flung on to one of the columns. Here the liquid mass is spread evenly and thinly over the surface by a man, who makes use, for the purpose, of a leaf of the pineapple plant, or some other tough, fibrous material. The leaf being held in both hands, its edge is drawn over the material until the mass is properly spread over the surface of the column to the required degree of fineness. It begins to consolidate at once, and becomes of a pliable, leathery texture. As soon as the lac is thoroughly consolidated it is taken off by a workman while still so hot that it would burn the fingers of any person not accustomed to the work, a considerable section of the upper portion of the sheet of lac being torn off, because it is thicker there than in the rest of the sheet, and thrown back into the trough to be melted again. The sheet is placed on a rod held in readiness by a woman, each extremity of the sheet hanging down, like a towel on a rack, and the whole is hung up to dry in a large drying shed, the rods supporting the lac being ranged on supports running across the sheds from side to side, just like a tobacco drying house. The next day it is fit for dispatch, and it is then packed in boxes and sent away. The various qualities of shellac are known by different names and marks, and there is a considerable range in prices, from "Fine Orange DC" to "Livery," "Garnet," "Native Leaf," and "Button." The last quality is so named from the lac not being made in sheets, but dropped from a height and solidifying into masses.

In India lac is used chiefly for the manufacture of bracelets, rings, beads, and other trinkets, worn as ornaments by women of the poorer classes. The lac is bought in the bazaar, and, after having been melted, it is mixed with vermilion, arsenic, and lampblack for coloring purposes. It is also used as a varnish, in many cases the dye being left in the lac to produce a colored varnish; by the turners of wooden toys, which are coated neatly with colored compositions, in which lac predominates; in lacquered ware, and by goldsmiths for the coloring of the metal. In Burmah it is also employed to fix the blades of knives, and similar instruments, in their handles. In Bombay Presidency and elsewhere lac is also used in manufacturing grindstones, for which purpose three parts of river sand and one part of clean seed lac are mixed over a fire, the mass being formed into the shape of a grindstone, having a square hole in the center. This is then cemented to the axis with melted lac, and the stone, having been moderately heated, is caused to revolve rapidly, when it can easily be turned down to shape. The sand should be finer and the proportion of lac greater when the stone is only required for polishing. Japanese lacquered ware is made of an entirely different material, being a varnish obtained from the gum exuding from certain trees.

In Europe, lac is largely used in the preparation of varnishes and by hatters. The body of all the silk hats in common use is rendered stiff and waterproof by the liberal application of a composition of shellac, sandarac, mastic, and other resins, dissolved in alcohol or naphtha. The brim is always imbued more thickly than the body with this varnish.

Lac is also extensively used in the manufacture of sealingwax, which is formed of an amalgam of shellac, Venice turpentine, colophony, and coloring matter, the quantity of lac used being equal to that of all the other articles put together. Lac also enters largely into the composition of lithographic ink, and in the preparation of lake (the name is derived from "lac"). Lake, however, is also made with madder and cochineal. Lacquer is based on a solution of shellac in alcohol, colored with gamboge, saffron, etc. It is used to give a golden color to brass and other metals, and to preserve their luster. In India, lac dye is mostly used to dye silk, and to some extent it is also employed in the dyeing of leather. It is not much used as a dye for cotton, on account of the expense.

New Agricultural Inventions.

Mr. Albert W. Flanders, of North Grantham, N. H., has devised an improved Fastening for fastening a Scythe to the Snath, which will not require the use of a wrench in fastening the scythe or removing it, and will make a firm and reliable connection. It is of such form that it may be attached to the snath without requiring the snath to be bored or mortised.

An improved Horse Hay Rake has been patented by Messrs. William P. Clark and Charles E. Clark, of Belmont, N. Y. This horse hay rake is so constructed that the teeth may be raised to drop the collected hay by the revolution of the drive wheels, or by the driver with a hand lever.

Mr. Manfred D. Slocum, of Union City, Mich., has patented an improved Jointer Clamp, by which the jointer may be readily adjusted to bring it into line with the plow when the plow beam is adjusted to cause the plow to take or leave land, and which permits the jointer to be adjusted to bring its colter toward or from the land, as desired.

NIELLO.—This consists of nine parts silver, one part copper, one part lead, and one part bismuth, which are melted together, and saturated with sulphur. This mixture produces the gorgeous blue which has often been erroneously spoken of as steel blue.