

From the Fourth Annual Report of Charles V. Riley, State Entomologist of Missouri.]

**THE PERNYI SILKWORM.**

*Attacus [Antheraea] Pernyi*, Guér-Mén.—(Lepidoptera, Bombycidae.)

This is an oak-feeding silkworm which has been introduced from northern China, and closely resembles *yama-mai*, published in the SCIENTIFIC AMERICAN, June 23, 1873. It was named after M. Perny, a missionary who, in 1850, sent it to France from Manchouria, China. It has been cultivated in Europe with better success than has attended the culture of *yama-mai*; and in this country, the success with it has also been greater. It develops more rapidly than the *yama-mai*, and differs essentially from that species in being double brooded, and in passing the winter in the chrysalis state, like *cyntbia* and our native species. This trait gives it a great advantage over *yama-mai*, as not only can more silk be produced, but we can more easily obtain sound eggs. It is also less affected by confinement indoors. Its cocoon is not so valuable, though ranking third best of the eight species treated of.

The egg (Fig. 2, enlarged and natural size) is of about the same size, form, and color. The worm in the first stage is of a chocolate brown, with the tubercles reddish and emitting reddish bristles. In the second stage it is yellowish green; in the third and fourth it becomes greener, while silvery spots begin to show at the base of the anterior tubercles. In the last stage it is of a dark green with a faint reddish lateral line over the stigmata; the head and legs are light brown with black spots, and the triangular anal mark is chocolate brown. In form and general appearance it resembles *yama-mai*.

The cocoon (Fig. 2) is suspended by a cord, which does not, however, materially affect its reeling properties, as it is attached only to the loose outer silk. The silk is yellowish gray, stout, brilliant, and valuable. It is almost twice as thick as that of *yama-mai*, and stuffs made of it are said to have the appearance and nature of mixed silk, cotton, and wool.

The moth (Fig. 2, female) bears a striking resemblance to *yama-mai*, and varies nearly as much in color. The tips of the front wings are generally a little more curved; there is less black about the eye spots, the hind wings are less produced behind, so that their transverse band is more in a line with that of the front wings, and the ground color is usually darker and more uniform.

In China, the species is reared in the open air in a wild state, and also indoors on cut branches kept fresh by insertion in vessels containing water. In this country, Mr. Andrews obtained cocoons from the first brood of worms by the 4th of July; the moths began to issue three weeks later; copulation immediately ensued, and by the middle of August, or about ten days from the time of laying, the second brood of worms began to hatch. He also found that the worms would feed on beech and sweet gum.

**Austrian Railway Cars.**

The English passenger, when traveling in Austrian carriages, will notice with little comfort the heavy rattling and jingling that surrounds him, disturbing his night's rest and exciting his nerves in a painful degree. The cause of this is that but few of the means, long used in England to secure quiet running, have been adopted in Austria. The panels of the carriages are not made as in England of wood or papier maché, but of thin sheet iron, which can never be secured in such a firm manner as to prevent shaking, and which conducts the sound and the heat in a more disagreeable manner than the former materials, thus making the carriages hotter in the summer and colder in the winter. Besides, the frames consist in nearly all cases entirely of iron, this construction increasing the noise made by the moving of the chains, brakes, and the movable parts of the heating apparatus. Layers of india rubber between body and frame are seldom applied, and wooden disk wheels, which so greatly improve the easy running of the carriages, are practically unknown on Austrian railways, although we notice in the exhibition one carriage—a hunting saloon for the Emperor—which is fitted with them. Finally, the bad custom has been adopted of providing passenger vehicles with brakes fastened directly and rigidly to the body of the carriage, the play of the springs thus ceasing at once as soon as the brake is put on. An unbearable and, for the health of nervous passengers, often injurious rattling is thus produced, against which the

passengers of our English railways would certainly protest. Unfortunately the press of Austria is often in the pay of the railways, the result being that it is impossible to get any complaints published.—*Engineering*.

**Phenolcyanine.**

This new substance is derived from phenol, and appears to me to possess considerable interest, from the analogies it presents with certain coloring matters derived from lichens, and inasmuch as it may perhaps throw some light on the constitution of indigo. It is obtained directly from phenol by dissolving the latter in alcohol, adding liquid ammonia, and allowing the mixture to remain for some weeks in a partially closed flask; but, in about fifteen days, when the

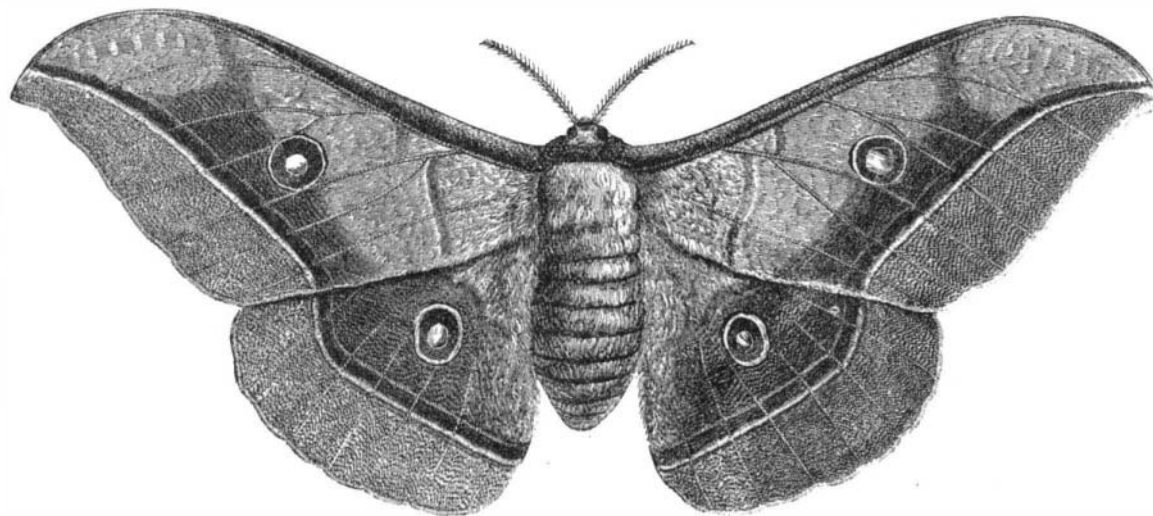


FIG. 1. THE PERNYI MOTH, FEMALE.

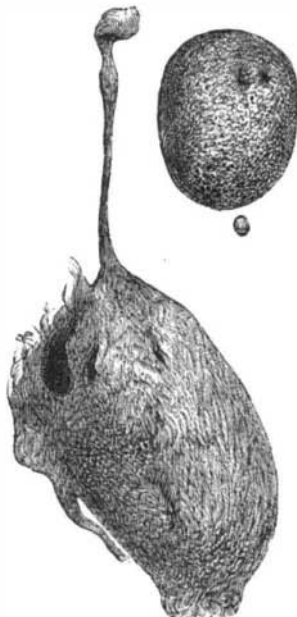


Fig. 2. Cocoon and egg of Pernyi silkworm.

liquid has become a rather dark green, twice its volume of water and one quarter of its volume of ammonia are added, and the mixture is left to itself for about six weeks. By this time the liquid has taken a very fine blue tint, very dark, and a certain quantity of phenolcyanine is found at the bottom of the vessel and adhering strongly to the glass. That which remains in solution can be collected by saturating the liquid with salt. The product is thrown on a filter, and the new substance dissolved in hot alcohol or benzol, from which it is obtained by evaporation.

*Properties.*—Thus obtained, phenolcyanine is a resinous substance of a very dark blue, nearly black, and showing metallic copper colored reflections like indigo. In alcohol, it forms a fine deep blue solution, in ether a reddish purple blue, and in benzol a reddish purple solution. Concentrated sulphuric acid dissolves it easily, forming a bluish green liquid; hydrochloric acid has little action; and nitric acid forms a nitrous compound very different from picric acid. Phenolcyanine is very slightly soluble in water, but dissolves in hydrated alcohol to which ammonia is added, and this solution can be considerably diluted with water. These alkaline solutions are deep sky blue by day, but of a vinous red by night or when a flame is seen through them. Acids redden these solutions, and alkalies bring back the blue, as with litmus. Nascent hydrogen reduces phenolcyanine, and renders it completely colorless; but when the solution remains exposed to the air in presence of ammonia, the blue color soon returns. A mixture of ferrous sulphate and lime does not destroy the color of phenolcyanine as it does that of indigo blue; so that the former rather resembles the colored derivatives of oricine than it does indigo. Phenolcyanine melts very easily, and can be partially volatilized in purple vapor; the remainder is decomposed, and leaves a porous charcoal.—*Dr. T. L. Phipson, in Chemical News*.

**Stellar Photography.**

Professor C. S. Sellack, of the Cordova University, Argentine Republic, says that the objects of the southern heavens are numerous and glorious. He has photographed some twenty star clusters, most of them in the constellation *Argo*, some in *Canis Major* and *Scorpio*. The cluster near *Carina Argus* gave a hundred and twenty-three stars on the photograph in the most favorable night. The *Pleiades*, the richest northern group, did not yield to Mr. Rutherford more than forty-five stars.

In a recent communication in the *American Journal*, he states:

The greatest difficulty in stellar photography is to make the image on the plate stationary during a long exposure. The steadiness is absolutely necessary for the production of circular images; the images must be circular, because in elliptically lengthened images the eye cannot fix the center with the sharpness required for the measurements. Employing even the most perfect clockwork, the steadiness of the image is affected by the effect of the atmospheric refraction, by the variations in the refraction produced by disturbances in the atmosphere, and by the increase of refraction dependent on the zenith distance.

The photographic image of stars is circularly spread by prolongation of exposure; this is principally the effect of the scintillating motion of the image, not of want of definition, as its amount depends on the state of the atmosphere. Bond has found the increase of the area of the image proportional to time. This admits the explanation of the scintillating motion as consisting of transversal vibrations round the central position in all azimuths, and with uniform velocity. When the state of the atmosphere produces a strong scintillating motion, the images of bright stars become very large by long exposures, and faint stars do not produce any im-

pression. In great zenith distances, another obstacle combines with the increased scintillation the strong absorption of chemical rays by the atmosphere.

**Petrified Tree Stumps in Colorado.**

A correspondent of the New York *Sun*, writing recently from Colorado, gives an account of a visit to the famous petrifications existing near the residence of Judge Castello, thirty miles west of Pike's Peak.

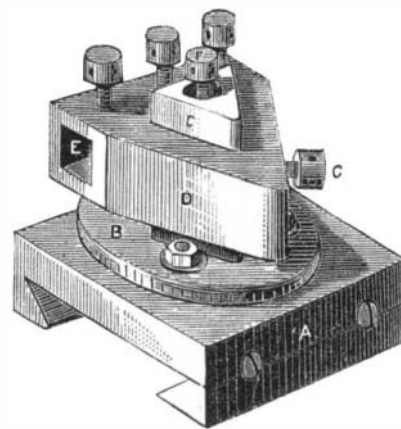
Within a square of a half mile, there were thirteen of these petrifications. All but one had been ruined by curiosity seekers. That one had evidently been a tree of gigantic size. It stood at the foot of a picturesque ledge of rocks. The stump arose from the soil to the height of three feet, and it was at least ten feet in diameter. Though preserving the grain and even the color of the wood, it was a mass of solid stone. The heart of the tree bore a beautiful polish. The petrification was smooth and hard, and resembled the creamy whetstone that used to be so common in the East. It was more brittle, but it would sharpen a razor or a knife as quickly and as well as a whetstone. Where the sun had baked the wood dry and black before it was turned into stone, the color and the almost imperceptible cracks in the grain of the wood were perfectly preserved. Some of the splinters of the stump seemed to have been rotten before petrification, and presented a remarkable appearance. They

were pure stone, but their edges were frayed, like the chewed end of a rattan, and the stone was so thready and limber that in some cases it might be used as a paint brush. Most, if not all, of the trees seem to have been spruce or pine, though the large stump looked like the Southern cypress. The gum or rosin exuded from their trunks is petrified. It sparkled in the sun like tiny dew drops. Occasionally, when pieces of the stone were cracked open, great flakes of petrified rosin were revealed. They encrusted the wood like frosted silver.

**NEW TOOL HOLDER FOR THE SLIDE REST.**

E. ELSMLIE SANG, C. E.

On the ordinary upper plate, A, of the slide rest, a circular



groove is turned for bolts to work in, for the purpose of fixing a round plate or turntable, B. From this turntable, a prism, C, projects of such a length as to suit the variety of work or the raising pieces that are generally used with the lathe. On this prism there is fitted a piece, D, which may be called the tool holder, with a horizontal square hole, E, of sufficient size to admit the largest turning tools that may be required, the tool being secured in the hole with binding screws in the usual manner. This tool holder is kept at the proper height by means of a screw, F, working in a projection from the tool holder, a vertical hole being made down one of the faces of the prism for this projection to pass through, the point of the screw bearing on the bottom of this hole. It is best to keep this supporting screw as near to the tool as possible. By turning this screw, F, in or out, the tool is raised or lowered at pleasure; and when adjusted to the required height, the holder is fixed in position by means of a binding screw, G, at the side. It will be seen that by this arrangement the upper sliding plate is never bent, however securely the tool may be fastened, as the bolts which work in the  $\perp$  groove merely bind together two flat surfaces. Then the tool may be moved horizontally to any required position without disturbing the height, or the height may be altered without otherwise disturbing the position of the tool. For the purpose of recording as well as assisting in placing the tool horizontally, the edge of the turntable is graduated.—*English Mechanic*.

A GENTLEMAN who has tried it says the best way to catch a rat, which has found its way into your room, is to lay a boot flat upon the floor, close to the mold board. The rat will run into the boot leg for protection, when he is readily captured.

A SPLENDID passenger depot is now in course of erection in Washington by the Baltimore and Potomac Railroad Company. The building is 137 by 510 feet, and located at the corner of 6th and B streets.