

AN INTERESTING INSECT—THYRIDOPTERYX EPHEMERIFORMIS.

BY N. HUDSON MOORE.

The farmer regards an insect as "interesting" if it succeeds in destroying other insects that prey upon his crops.

With the students of natural history it is different. The fact that an insect is beneficent is a point in its favor, but an insect whose life history is not satisfactorily cleared up, or whose family history may be still amended, is one that gives him keen delight.

The bag-worm, basket-worm or drop-worm, as it is variously called, is one of several species of the family *Psychidae*, whose exact place in the insect world is still open to discussion.

These particular ones we have before us are commonly called the Evergreen Bag-worms, but they are quite catholic in their tastes and are equally well satisfied with the leaves of deciduous trees, apple, pear, cherry, plum, locust or poplar, and when none of these are easily come by, shrubs will do as well.

These insects are found most plentifully in the South and Southwest, though they are not unknown in some of the New England States, in New York and on parts of Long Island. When it once gets a hold it is very tenacious, and if left alone will increase rapidly in a few years.

The bag-worms are not masons like the wasps, nor carpenters like some bees, nor cave-dwellers like some ants; for, better than this, they are travelers, carrying their homes with them.

The cases here shown are some of a number that were procured at Atlantic City, N. J., and two of them are prettily thatched with twigs and evergreen needles. But the third one has utilized some young leaves of the privet, and provided for itself a case more than usually ornamental. It is the female that is by far the most interesting member of the family. Forever hampered by her bag, which she never leaves except to die, she yet may take quite a journey, climb a tree, selecting a suitable one, and there lay her bag full of eggs, warmly protected, before her mission is accomplished.

The eggs hatch out generally during the last two weeks in May, and if you have a specimen in a box there is much amusement in store for you. The little wriggling worms, even before they will eat, commence to make some sort of a bag for themselves. They will take any material you will offer, worsted, cotton, paper, straw, leather, and, standing on their anterior legs, with tail in air, weave about themselves the bag to which they attach bits of foreign material.

As they grow they add to the bag from the bottom, always pushing it up, till at last they and it become so heavy that it is allowed to drag behind them. They eat young leaves and grow rapidly. Four times during their growth they withdraw into their bags for from fourteen to twenty-four hours, during which time they stop up the mouth of their bags, and change their skin. The neatness of these insects keeps pace with their cleverness. Although the upper opening is closed, there is a smaller one at the bottom of the bag which is always left open. Through this, in some remarkable manner, they push the old skin and all excrement, so that the interior of the bag is quite clean.

While the larva is completing its growth, if the food supply remains sufficient, it seldom leaves the tree where it was born. But with maturity an instinct for travel seems developed, and they crawl about as much as they can. Even this mode of locomotion is not speedy enough, and they spin silken threads by which they dangle until some person or animal comes beneath their tree, when they drop down, and are thus carried to new localities. This habit has given them one of their names, drop-worm.

After a time, however, nature urges them that the time has arrived for settling down, and they now moor their bags to some twig, with a stout silken band, and prepare to settle down for the winter. Not only do they have sufficient instinct to select some tree, the leafage of which will provide agreeable food for the young, but they never make the mistake of fastening the bag to a leaf, so that the first fierce wind could blow it away.

The exterior of the bag having been looked after, the interior is now attended to, and softly and warmly lined with silk. This accomplished, the insect begins to pupate, having first turned around in the bag so that its head comes near the lower opening.

During the larval state the worms of both sexes have been alike in appearance, and each has alike dragged about its bag. In the chrysalis form a marked change takes place, the male chrysalid being smaller than the female, and the wings, antennæ, etc., showing through the case as is usual in chrysalids.

But *she* has lost form; shows no possibilities of ever becoming a moth; in fact, is nothing better than a bag of eggs, even the few legs she had as a larva being denied her as perfect insect.

The male chrysalid, after about twenty-one days of

repose, squeezes himself, still in the pupa case, partly out of the lower opening, the case splits and away he flies, a perfect moth—not a very pretty one, but still complete.

Once in the air his mission is to find a mate—and this accomplished he dies. His life is a short and a merry one—but a few hours, or a day at most. His mate, such as she is, is busy with her mission, too. Never able to wholly leave the pupa shell, she wriggles partly out of it, but after a time wriggles back. In the upper part of the pupa shell she lays her eggs, protecting them with some down which has grown on the lower part of her body. When this work is done she dies, but whether she dries up in the pupa shell, or whether she forces her way out from the bottom of the bag and dies on the ground, is a point open to discussion.

When in the larval state the insect is most peculiar. That part of its body which is protected by the bag is soft and of a brownish color. The mere rudiments of legs which occur on this portion are only of use in assisting the insect to cling to the bag. So much



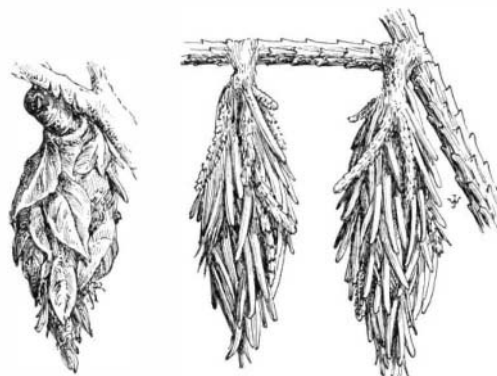
MALE BAG-WORM MOTH.

for the concealed part. The exposed or working segments are wholly different; indeed, they might seem to belong to another class of insect. Hard, horny, black, with a few white speckles upon it, you see at once that the foreparts are strengthened to enable the constant pulling about of the rear quarters and bag.

The bags themselves are interesting to study, much variety being displayed. I have one bag heavily thatched with arbor vitæ, which I cut from a privet bush. There was not any evergreen tree anywhere in the neighborhood, so the larva must have come from a considerable distance. It is not the rule, by any means, that the bags will be thatched with material from the tree they are found on.

The silk which composes the foundation is very soft and fine, and the bag itself, when once its occupant has left it, seems as delicate as a spider's web, save for the rough material woven in with it. However amusing it is to watch these young insects in the study, to applaud their vigor and activity, and their insatiable desire to build, they do not make admirable neighbors, nor are they desirable in the garden. The only effectual means of getting rid of them is to destroy the bags.

Like so many other insects which build comfortable



FEMALE BAG-WORM. BAG WORM CASES.

coverings to protect the eggs in winter, the bag-worm is a victim to at least two species of *Ichneumon* flies.

There may be anywhere from ten to two hundred eggs in a case, and to see scores of these small brown worms all beginning as quickly as possible, in exactly the same manner, is a revelation. First a perfect arch is built. Then, grasping it with its fore feet, the insect turns a complete somersault, raises the arch above its head, builds the other half, joins the ends, and has swiftly and beautifully formed its circle.

What name shall we bestow on the faculty which gives to a mere worm the power of building to perfection the most difficult feat in masonry, and that without the benefit of working by imitation?

The Cunard Steamship Company will equip its passenger steamers with wireless telegraphic instruments. It is also proposed to install a wireless telegraph station at Fastnet, which would be a better signaling station than Brow Head. This would enable the steamers to be reported with greater celerity, and there is not so much chance of running on the rocks.

Large Hydraulic Plant in the Jura.

Among the new hydraulic plants of Europe is that of Saint-Mortier, in the Jura region. It has been installed by the Union Electric Company and develops about 3,000 horse power. The motive force of the Ain is utilized for this plant. This river has in this part of its course a very swift flow; this varies considerably between high and low water. In the former case it sometimes reaches 24,000 cubic feet per second, and in the latter may fall as low as 135 cubic feet. In the latter case only 600 horse power would be obtained, so in order to keep a constant output of 3,000 horse power a canal has been constructed which during the dry season brings to the river the waters of Lake Chalain, situated 27 miles above Saint-Mortier, on the left bank of the Ain, from which it is separated by only 4,000 feet of alluvial deposits. An underground canal leading from the bottom of the lake gives a supply of over 400 cubic feet per second, so as to bring the total up to 540 cubic feet at low water. The level of the lake is 104 feet above that of the river at the nearest point, and its surface is about 500 acres, so that a considerable water reserve is provided; if the lowering of the water of the lake is limited to 33 feet a supply of 680 million cubic feet is obtained. The engineering work upon the river Ain includes a dam 33 feet high and 140 feet long, a lock of 800 feet, and a derivation canal 4,600 feet long; of the latter, 400 feet are underground. The generating station contains at present four groups composed each of a 700 horse power Picard & Pictet turbine and a triphase Oerlikon alternator working at 700 volts; a fifth group will be installed later. This plant has been in successful operation for several months, and supplies current for lighting and power to a number of towns within a radius of 12 miles.

The Kammatograph.

A London inventor, Mr. Leo Kamm, has devised a new camera in which a circular glass plate takes the place of the celluloid film for moving the pictures. The plate can be made to rotate rapidly by means of a multiplying gear, and at the same time to traverse laterally. A small lens forms an image upon the plate, and when the plate is put in motion these images are multiplied into a series of pictures arranged in a spiral. The plate is developed in the same way as an ordinary negative, and a positive is then taken from it. To display the pictures it is only necessary to place the positive in the camera and to arrange it so that the beam from the lantern close to it can pass through the lens. The plate is then rotated as before, the succession of pictures projected upon the screen reproducing the original movement. About 600 pictures can be photographed during the motion of a single plate at the rate of twelve or fourteen a second.

The Antiseptic Barber Shop in Paris.

Several barbers in Paris have been induced by medical students to introduce aseptic hair dressing. In front of each chair there is a gas burner, metal combs are used and they are passed through the flames several times. Scissors and razors are likewise purified by fire. The brush cannot, of course, be treated in this manner, but it is given a frequent wash in an antiseptic solution, in which thymol is the principal ingredient. The principles of the operating room of the hospital are thus extended to the barber shop, and as the barbers used formerly to be surgeons as well they should be flattered if they are required to observe the practices of surgeons of to-day.

The Current Supplement.

The current SUPPLEMENT, No. 1325, is admirably illustrated. The first page is devoted to "Observation of the Solar Eclipse Carried on by the Astrophysical Observatory, Smithsonian Institution." The article is accompanied by several interesting engravings, showing the prominences, and two views of the corona, and well as two illustrations showing the instruments in position. "Machinery and the Man" is by Alexander E. Outerbridge, Jr. "Mechanical Traction in Paris" is concluded. "The Social Service of Science" is a most valuable address by Prof. William Harmon Norton. "Women as Inventors" is a subject of great interest, and is well treated. "Electrically Operated Punching Presses" deals with the latest types of heavy punches operated by electricity. The usual Trade Suggestions from United States Consuls and Trade Notes and Receipts are published.

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