

marked that it was impossible to buy a copy of it; he knew of only two copies in this country, one in New York and the other in Washington. Mr. Ashmead said he had experienced great difficulty in getting access to the works on South American insects by Spanish authors in South America.

—Mr. Caudell read the following paper :

AN ORTHOPTEROUS LEAF-ROLLER.

By A. N. CAUDELL.

Early in July, 1900, while collecting in the vicinity of Washington, D. C., I found a small papaw leaf neatly rolled by some insect. Upon opening it I was surprised to see a very small apterous orthopteron leap actively out, losing itself immediately among the leaves on the ground. On close search I found on the same plant another exactly similarly rolled leaf. Upon peering into this very cautiously I found that it contained a specimen like the one just lost. From an examination of the specimen within the case I could only determine that it was a delicate, pale colored Locustid with very long slender antennæ, apparently a very young specimen. This was preserved, but, not being at that time interested in Orthoptera, I made no notes, nor did I then know that the leaf was rolled by this insect.

On May 22, 1902, Mr. Busck handed me a small jar containing some bits of willow bark and two Locustid nymphs. Upon closely examining the material I found three eggs in a crevice in a piece of bark, two empty, obviously those from which the nymphs had issued, and one shriveled up, evidently destroyed by fungus. The nymphs were identified as those of *Camptonotus carolinensis* Gerst. The piece of bark containing these eggs was taken about two feet above ground from a large tree. Placing one of these nymphs in spirits I enclosed the other in a glass tube with some willow leaves covered with plant lice. On examining this tube the following day I found the insect had constructed for itself a pocket in one of the leaves, and then I recognized without doubt the same insect I had taken two years before on papaw. The pocket was made by cutting the leaf through on each side to the midrib and at right angles to it and again one-third of an inch further along the midrib, this time the incision being formed at an angle with it. The flaps thus formed on either side were then folded together and their edges fastened together with silk-like strands, and I have subsequently seen cases with

one end completely closed by a solid mat of this silk. The manner of constructing the pockets or rolls is not uniform. In some cases the incisions are made near the apex of the leaf and then only the two basal cuts are made, the tip of the leaf being folded back, thus making the terminal cuts unnecessary. Sometimes the pocket is formed altogether on one side of the midrib. Mr. Busck luckily observed the formation of one of the pockets and thus describes the process:

“When supplied with fresh leaves the insect at once commenced making a new house, cutting with its mandibles incisions from the edge of the leaf; then, grasping the thus movable edges each with the three legs on each side and forcing them together, it spun what was apparently silk thread from the mouth, fastening the edges together. The whole performance did not take five minutes after it was begun. The insect accurately measured the proper places for the cuts by placing itself on the leaf and realizing how much space was needed. This being determined, the work went rapidly on.”

Within these pockets the nymphs live, coming out mostly at night to feed on plant lice, which seem to form their entire food supply during their early life. In confinement they will eat other insects as Mr. Busck reports a specimen as eating at least one young leaf hopper. In two days one I had under observation ate a dozen large rose aphids, several willow lice and innumerable smaller lice. It increased in length from four to five millimeters in three days. Leaving the city at this point my interesting captive was turned over to Mr. Banks who conscientiously fed and cared for it until the 30th of May, when he unfortunately lost it while attempting to transfer it from one jar to another.

From notes made by Mr. Banks this insect seems to be principally a night prowler. It feeds mostly at night though it will at times feed quite readily during the day. The following notes are taken for the most part from those made by Mr. Banks:

There is apparently no choice in the kind of leaves used for making the rolls. On May 26th it formed one in a honey-suckle leaf. The exact manner of forming the roll, which was on only one side of the midrib, was not noted. On May 27th, after dark, when given some aphids from honey-suckle and maple, its feeding was observed by the light of a lamp. It seized an aphid, bit it, turned it about by means of the palpi, and then proceeded to eat it entirely up, skin and all. Then it walked nervously around, palpi quivering, till it came close to another aphid, which it seized by the back, sucked out the juices and then ate the skin. Seven large aphids were thus eaten in a short time. On May 29th another pocket was formed and the insect appeared on that date to have grown considerably, showing indications of

having molted, though no cast skin could be found. It is quite possible that the insect eats the cast skins of the earlier molts as is done in the case of some other Locustidæ, *Microcentrum* for example.

This spring another attempt was made to rear this species from the egg, but I had to leave for British Columbia and failure resulted. It is to be regretted that the life cycle of this interesting insect could not have been completed, but, since so much is known, it is to be hoped that the near future will see the completion of the life history. Later in life its food habits doubtlessly change, probably becoming essentially vegetarian. Though no adults were secured from these experiments there is practically no doubt of the determination, the generic characters being plainly indicated in the nymph and there being but this one species known from the United States.

Under the name *Camptonotus scudderi* this insect is said by Prof. Uhler* to occur on oak trees about Baltimore in the larval state as early as the first of August, and as adults from the latter part of September until sometime in October. Mature specimens were taken by Mr. Barber on Plummer's Island, Md., on September 10, 1902.

While the nymph of this species has been mentioned by several writers, no reference to its feeding habits has been published so far as I can learn. Riley, in a popular account of the insect on page 186, volume II, of the Standard Natural History, says it hides in a rolled leaf during the day with its long antennæ wrapped several times around the body. It is possible that it is only during the younger stages that it forms these rolls. The young nymphs are very active and run about rapidly. They seldom jump except when disturbed, though capable of leaping a considerable distance.

The egg and first stage nymph of this species may be described as follows:

Egg. Size, 1.25 mm. wide by 4.25 mm. long. Shape round, obtusely pointed at each end; the surface, when seen through a lens, has a regularly beaded appearance. The color of the egg after the insect has issued is pallid with the extremities infuscated, but before hatching they may be colored, probably greenish. The young insect issues through a small trap cut in one end. This door is made by a longitudinal split on one side, which at the lower end intersects at right angles a transverse fracture which extends a fourth of the distance around the egg at about one millimeter from the end.

1st stage nymph. Head long and typically locustian. Eyes oblong, dark brown in color; palpi pale, white at the tips; apical segment of the

* Proc Ent. Soc. Philadelphia, 11, p 549, 1864.

maxillary palpi white on the apical half and brown on the basal half, the whole very slightly longer than the penultimate segment; antennæ situated between the eyes and below the median line; the segments beyond the first, which is twice as long as the second, subequal in length and gradually growing smaller at the tip where the antenna is as fine as a fine hair, the whole antenna brownish in color and covered sparsely with short microscopic hairs. The entire insect is of a very light brown below, almost white, growing darker above, almost fuscous dorsally on the meso- and metanota which are both visible behind the medium sized quadrate prothorax. This latter is scarcely as wide as the head, truncate anteriorly and broadly rounded posteriorly with weakly-developed lateral lobes. The abdomen, which is slightly pyriform, shows ten dorsal segments, the terminal one scarcely visible between the bases of the divergent cerci. The legs are pale brownish, paler beneath and with pallid geniculations. The tarsi are also pallid. Anal cerci flesh colored, scarcely as long as the last three abdominal segments.

Length of body, from front of head to the tip of the abdomen, 4 mm.; of antennæ, 20 mm.; hind femora, 2 mm.

Mr. Caudell was asked whether he considered the orthopteron a true silk-spinning insect, and he replied that he thought the material used in fastening the roll might be simply dried saliva. Mr. Banks said he thought the spinning material might properly be called silk. Dr. Howard suggested that fresh specimens should be dissected to see whether there were true spinning organs. Prof. Uhler stated that he had collected this insect near Baltimore by beating it from trees.

—Mr. Kotinsky showed specimens of a scale-insect (*Lecanium hemisphericum* Targ.), which were found on a plant sent in to the Department of Agriculture. Curiously enough some of them, during transit, had transferred and fastened themselves to the dryers in which the plants were pressed and had there laid eggs.

—Mr. Caudell exhibited specimens of a West Indian cricket (*Anurogryllus antillarum* Saussure). This insect is injurious to various crops in the South, where it has been known for many years, although it has never been referred to in print nor listed as belonging to our fauna.

—Mr. Barber exhibited specimens of the rare and curious neuropteroid insect, *Merope tuber* Newman, collected the past summer at Plummer's Island, Maryland, and presented the following note: