
DEPARTMENT OF THE INTERIOR.

SECOND REPORT

OF THE

UNITED STATES.

ENTOMOLOGICAL COMMISSION.

FOR

THE YEARS 1878 AND 1879,

RELATING TO THE

ROCKY MOUNTAIN LOCUST,

AND THE

WESTERN CRICKET

AND TREATING OF

THE BEST MEANS OF SUBDUING THE LOCUST IN ITS PERMANENT BREEDING
GROUNDS, WITH A VIEW OF PREVENTING ITS MIGRATIONS INTO THE
MORE FERTILE PORTIONS OF THE TRANS-MISSISSIPPI COUNTRY,
IN PURSUANCE OF APPROPRIATIONS MADE BY
CONGRESS FOR THIS PURPOSE,

WITH

MAPS AND ILLUSTRATIONS.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1880.

HAIR-WORMS AND RED-MITES REMARKABLY ABUNDANT UPON LOCUSTS IN CALIFORNIA.—Since reading my brother's articles last week (being absent myself last fall and winter), I am reminded of having seen about one-fourth of an acre of my meadow, thickly filled last fall with eggs in the pools and along the creek, as the snow went off, covered with millions and millions of what I now think may have been *Gordius* (white hair-snakes), about one inch long; also, another quarter of an acre fairly covered with little red-mites, which I will hereafter observe more closely.—[W. C. Lemmon, Sierra Valley, California, June 13, 1880.]

CHALCID FLIES.—The only instance in which these flies have been observed to attack locusts is described in the following quotation from an article by Professor Lemmon in the Sacramento, Cal., *Weekly Record-Union*, November 29, 1879:

Another enemy greatly feared by the locusts is a minute, ant-resembling fly of the *Chalcis* group. It has monstrous enlargements of the hind legs just above the foot; yellow, lenticular, and prominent, they resemble the pollen baskets of a bee. This little swift-flying insect pursues the locust, and hovering over its head, attempts, by a quick thrust of its ovipositor, to place an egg upon its head or in the sutures of its neck, meanwhile dexterously dodging the blows aimed at it by the frantic locust. My close-observing brother, B. F. Lemmon, and myself watched it particularly when attacking female locusts ovipositing. Frequently the locust would duck and dodge about, strike with her hind feet, or hasten away to another spot, but becoming wearied, or perhaps more concerned in her work of providing for the continuation of her own species, she often remained motionless, martyr-like enduring attacks from all quarters. How this pest is fostered or when or how born the writer cannot tell; circumstances prevented the examination necessary at the right times.

The egg-parasite, *Caloptenobia ovivora*, of our First Report, proves to be *Sparasion famelicus* of Say,³³⁸ a member of the Hymenopterous family *Proctotrupidæ*. The insect, however, belongs not to *Sparasion*, but to the closely allied genus *Scelio*, Latreille, and should be known as *Scelio famelicus* (Say). In our types we note that the mandibles and tegulæ are honey yellow. From Say's description these specimens differ only in having two, instead of six, of the basal joints of the antennæ pale, and in the mandibles being hardly "piceous."

DIGGER WASPS.—Accompanying a letter dated July 11, 1880, Mr. W. C. Lemmon sends specimens of *Larra tarsata* Say, a digger wasp

labrum (misprint for labium?), which they cannot possibly be; they are evidently the maxillæ. The upper lateral pieces bearing the antennæ are much less conspicuous, judging from the description, in *Bombylius* than in *Systæchus*. The pupa of *Bombylius*, from Dr. Chapman's excellent description, differs in the greater prominence and somewhat different arrangement of the cephalic spines, the anterior pair being stouter and more bent forward than in either of the genera we have treated of. Dr. Chapman speaks of these spines forcibly reminding him of the tusks of a walrus, and of their admirable adaptation to tearing down the clay stopping and digging through, as "with mattock and shovel," the long burrows of the bee upon which it preys. The dorsal and anal spines are also much more prominent than in our locust-egg parasites. The pupa of *Systæchus* and *Triodites*, not being under the necessity of such strenuous digging, have a less formidable armature; otherwise, there is strict structural correspondence with *Bombylius*.

³³⁸ Boston Journal of Natural History, vol. 1, p. 276 (1836).

differing from that figured on p. 317 of our First Report in nothing but its slightly larger size. Of it he says :

We have (to us) a new locust exterminator, that in certain localities kills and buries large numbers. It appears to kill the locust by stinging him, thrusting into his body an egg which hatches in a few days into a little grub.

The same species is referred to by Prof. J. G. Lemmon in a letter dated Sierra Valley, California, July 18, 1880 :

I hear much and see a few specimens of a species of *Pompilus*, which has been seen very active in catching, stinging, and dragging locusts into holes dug in the sand, and covering them hastily—then seize new victims in rapid succession.

CHAPTER XIV.

COURSES THAT MAY BE ADOPTED BY THE GENERAL GOVERNMENT TO LESSEN LOCUST INJURY.

The First Report of the Commission was the result of labors directed against the unfledged locusts as they hatch out in the more fertile portions of the Mississippi Valley and ravage the crops in what we have designated as the Temporary region. An equally important—nay, more important—problem left for solution was how best to destroy the insect in its native or permanent breeding-grounds, or how to prevent the destructive migrations of the winged insects from the Permanent region to the more thickly settled and fertile country. As intimated two years ago, the solution of this problem, if at all possible, would require several years of investigation. The writer has been deeply impressed with the importance of concentrating all efforts of the Commission to the obtaining of facts that bear directly on this important question. Of the different means that have been suggested we mentioned six more particularly, in our first report, and discussed some of them hopefully, as follows :

“1. The protection and encouragement to the increase of the native locust-feeding birds. 2. The introduction of foreign locust-feeding birds. 3. Inducements offered to the Indians to collect and destroy the eggs and young. 4. Destroying the eggs or young by making the greatest possible use by artificial means of the natural water-supply. 5. Burning the young in spring. 6. Diverting winged swarms by means of smoke.

“While every one of these suggestions might be carried out in exceptional cases to advantage, and while it is the intention of the Commission to endeavor to acclimate certain foreign locust-feeding birds,³³⁹ yet the

³³⁹ In the summer of 1878, with the coöperation of Mr. Montague R. Levenson, of Levenson Ranch, Douglas County, Colorado, we imported two dozen English rooks with a view of sending them out to be acclimated in Colorado and in the belief that this bird would prove one of the most useful to acclimate there. The birds were badly handled on the voyage and detained in the custom-house in New York, and we ar-