

X. PRELIMINARY NOTES ON THE ORTHOPTERA OF NOVA SCOTIA.
BY HARRY PIERS.

(Read 13th April, 1896.)

The order Orthoptera, which includes the cockroaches, crickets, grasshoppers, locusts, earwigs, etc., may be defined as a group of insects having mouth parts formed for biting, an incomplete metamorphosis, and four wings, the first pair thickened, the second pair thin and folded into longitudinal plaits when at rest.

The species of this order are mostly common and well-known; and as many of them are very destructive to vegetation, their study is of much economic importance. In the United States, extensive reports have been made upon the more harmful kinds, and the question of how to keep them in check has been carefully considered by many experts.

With the exception of incidental notes in Walker's list of Canadian species,* the Orthoptera of Nova Scotia have received no attention from naturalists. During the past year (1895) and occasionally in former seasons, I have given some attention to their collection and study, and I now present a few preliminary notes on the species which have so far come to my notice. I hope to devote some years to their study, and will, I trust, at a future time be able to give a full account of our species. It is probable that the Orthopterous fauna of this province does not embrace a great many species, but future collecting will reveal the presence of a number which have not come under my observation during the time I have already devoted to the order.

The Orthoptera of Nova Scotia, as far as observed by me, represent four families, viz, (1) the Blattidæ or cockroaches, of which two species (introduced) are recorded in the following pages, and one or more other species will doubtless be found

* *Vide* Hemiptera, Heteroptera and Dermaptera (Orthoptera) of America to the north of the United States. By Francis Walker, F. L. S., London, England. *Canadian Entomologist*, vol. iv., 1872, pp. 29-31.

under stones and the bark of stumps; (2) the Gryllidæ or crickets, two species reported; (3) the Locustidæ or grasshoppers, two species reported; (4) the Acrididæ or locusts, eight species. Of the remaining North American families—the Forficulidæ or earwigs, the Mantidæ or praying mantes, and the Phasmidæ or walking-sticks—I have so far met no specimens.

I am under obligations to Dr. Samuel H. Scudder, of Cambridge, Massachusetts, the best authority upon North American Orthoptera, and also to William Beutenmüller, Esq., Curator of the Department of Entomology, American Museum of Natural History, New York, for examining specimens and thus checking my own determinations. The nomenclature of my paper follows in the main that of Mr. Beutenmüller's "Descriptive Catalogue of the Orthoptera found within fifty miles of New York City" (*Bulletin American Museum of Natural History*, vol. vi., 1894, pp. 253-316.)

BLATTIDÆ.

Phyllodromia germanica (Linnæus).

Croton Bug; German Cockroach.

This species, which is a native of Europe, made its appearance in New York at the time the Croton aqueduct was built. It is very abundant in some houses in Halifax, and is locally known by the name "Yankee Settler." It is a small species, about 16 mm. in length, and is of a yellowish brown colour, with two dark-brown longitudinal stripes on the thorax. Warm places, such as the vicinity of fire-places and hot-water pipes, are most attractive to it; and it is said to be particularly destructive in buildings heated by steam. It is less likely to be found in filthy surroundings than the oriental cockroach. The great rapidity with which it breeds, and its small size, which permits it easily to hide itself in cracks, make the species one of the worst insect pests in cities. Dr. Riley was of the opinion that Persian insect powder was the best means of stopping the inroads of this roach. The species is less strictly nocturnal than *S. orientalis*.

Stylopyga orientalis (Linnæus).

Oriental Cockroach ; Black Beetle.

This large, dark-brown roach is a native of Asia, but it has been carried by shipping to all parts of the world. It is common in Halifax, and delights in damp, dirty places. The introduction and continual burning of electric lights in our city bakeries, has done much to rid such places of these pests, for they have a great aversion to light. Bakers tell me that they largely use powdered borax for keeping them in check. Infested places should be kept clean, dry, and light.

GRYLLIDÆ.

Gryllus pennsylvanicus, form *neglectus*, Scudder.

On September 4th, 1892, I observed immense numbers of these large crickets in the grass of King's Meadow, near King's College, Windsor, N. S. They were in company with *Nemobius fasciatus vittatus*, but far outnumbered the latter. The extreme timidity which characterizes the species was cast aside and they only moved from an approaching foot when it threatened to trample upon them. They were still numerous when I left Windsor at the end of September. Seven alcoholic specimens, six females and one male, were preserved. The species seems to be rare about Halifax. On September 2nd, 1896, I obtained two specimens on Bedford Rifle Range, where they are probably not uncommon ; and another was taken at Halifax on October 10th.

It may be mentioned that the nomenclature of the Gryllidæ has been very unsettled and the study of the family is consequently attended with much difficulty. *Gryllus luctuosus*, *G. nigra*, and *G. neglectus*, which were formerly considered as species, have recently been regarded as merely forms of *G. pennsylvanicus*.

Nemobius fasciatus, form *vittatus* (Harris).

Wingless Striped Cricket.

This well-known small cricket is exceedingly abundant in fields about Halifax. I have also found it very common at

Windsor, and it is probably as plentiful all over the province. Its notes are one of the most familiar sounds of autumn, and are heard both during the day and night. The stridulation is produced by lifting the wing-covers about 45° above the abdomen and then shuffling them together, producing a sound resembling the word *plee-e-e-e*, *plee-e-e-e*, *plee-e-e-e*, or *cree-e-e-e*, etc. It has been suggested that these notes can be reproduced by taking a silver half-dollar between the fingers and striking the coin with the edge of a nickle. These autumnal sounds ring continually in our ears until the first frosts put a stop to the love-making. During recent years the shrilling of this species has been first noted on the following dates: August 19th, 1890; August 6th, 1891; July 29th, 1892 (at Windsor, N. S.); August 2nd, 1893; July 29th, 1895; August 11th, 1896. By October 31st of last year, only two or three individuals could be heard, and by November 6th, a lovely, warm, Indian summer day, on listening at one place, only about one individual could be detected—in fact the species was all but silent. None were noted after that date, although a few individuals might have been found two or three days later.

I have not observed the form *fasciatus* in Nova Scotia.

Scudderia pistillata, Brunner.

The general colour of this insect, as found in Nova Scotia, is a pale oil-green or apple-green; upper part of eye, brown; region between base of antennæ, centre of face, and labium, white; a cream-buff stripe on each dorso-lateral part of the thorax; beneath, whitish-green; white between the legs and on the throat, and two longitudinal white lines, slightly raised, on the ventral surface of the abdomen; soles of feet and antennæ light brownish. Length of head and body, exclusive of abdominal appendages, 22 mm.

This handsome Katydid is very common about Halifax. It is found upon the foliage of bushes, chiefly alders, in or near swampy places. Although so plentiful, yet its protective similitude to a leaf, both in colour and form, and its usual slow move-

ments, make it very difficult to detect. Attention is chiefly directed to it by the loud stridulation of the males at nightfall. During the day they are usually silent, or at rare intervals produce a short, sharp note, *zip*. After dark, however, they make the swamps resound with their loud calls, and we then become aware of their abundance. On close examination at such a time, the males—usually only one on each bush—may be seen walking very slowly over the leaves and twigs. Occasionally they suddenly slightly lift and part the wing-covers and close them again, thereby producing a sharp *zip* or *crick*, not very loud—this being the note which is usually heard during daylight. After making this sound at irregular intervals for some time, the wing-covers are opened to a greater extent, and are then again closed, producing a long-drawn, exceedingly loud *cr-r-r-r-r-r-r-ick*. This is repeated in couplets several times in succession. This challenging cry is immediately answered by one after another of its neighbouring fellows, until numbers are rasping out their ear-piercing notes, as notable a rural chorus as that of the Tree Toads. Gradually the sounds become few, but after a short interval they are again frequent. This note is doubtless the loudest produced by any of the Orthoptera I have yet heard in the province. It can be partially produced by moving the wing-covers of a captive or dead individual. The note bears little or no resemblance to that of its famous relative, the broad-winged Katydid (*Cyrtophyllus concavus*) of the Central and Eastern States. Our species, as I have before observed, is usually very slothful. Occasionally, however, in daytime, and doubtless also at night, they fly some distance from tree to tree. One noted on September 28th, while it was attempting to cross a road, made only short flights, and usually fell on its side when it came to the ground. It, however, easily flew to and lighted upon a fence rail. Usually the insect can be readily captured with the fingers while it clings to a leaf. Occasionally, on a near approach to the bush upon which it rests, it will drop suddenly a foot or two to a branch beneath. I have not yet succeeded in detecting the female, although I have carefully

searched at night with a lantern. There is a female, however, among some Orthoptera collected by Mr. G. Marshall in the eastern part of Annapolis County. I have noted the species as late as October 17th, (1895). This insect has not heretofore been reported from Canada.

Xiphidium fasciatum (De Geer).

Slender Meadow Grasshopper.

This fragile, apple-green species, with a long, straight ovipositor, is very common about Halifax, and I have also collected specimens on the meadows at Windsor. The species has a very wide range, perhaps the widest of any of the North American Locustidæ, being found, according to Redtenbacher, from Canada to Buenos Ayres. It frequents damp situations, and numbers were observed among the rank marsh grass on Marsh Lake, at Sackville, N. S., on September 3rd, 1895. The last individual noted in 1895 was seen on September 10th. Females are observed much more frequently than males. The stridulation of this grasshopper is rather weak. One observed in September produced a song which may be represented thus, *plee-e-e-e-e-e-e-e-e-e-e, tcit, tcit, tcit, tcit*. This was produced by rapidly vibrating the tegmina for the first note, *plee*, and doing the same at intervals for the remaining ones, *tcit*, (imitated by suddenly drawing in the breath, with the tongue applied to the roof of the mouth).

ACRIDIDÆ.

Stenobothrus curtipennis (Harris).

Short-winged Locust.

Abundant in Nova Scotia among grass in meadows. Both the green and the more sober coloured varieties are found. The species is easily known by its short tegmina. Its stridulation is frequently heard in the country, and hundreds rise from about the feet when walking through short grass. The last individuals of 1895 were noted on October 19th. Several were seen on October 25th, 1896.

Camnula pellucida, Scudder.

Clear-winged or Pellucid Locust.

This sober-coloured insect occurs from Connecticut northward, and has been reported from Quebec (Provancher) and is common at Montreal (Caulfield). I have so far obtained but two specimens, both females. The first was captured, September 5th, 1895, in company with *Circotettix verruculatus* in a stony place near Block-house Pond, Halifax. The second was taken, October 2nd, in a damp, grassy spot on the side of the road, close to Cow Bay Bridge. When upon the ground, the species somewhat resembles *C. verruculatus*.

Dissosteria carolina (Linnæus).

Carolina Locust.

This locust is widely distributed, being found from the Atlantic to the Pacific, and in the United States as well as in Canada. It is the largest acridian occurring in Nova Scotia. It frequents dry stony places and roadsides, and resembles in colour the prevailing tint of the situation in which it occurs. It is much less abundant than *C. verruculatus* which is found in the same situations. The last individual noted in 1895 was seen on September 28th.

Circotettix verruculatus (Kirby).

Very common in dry, warm stony places, in company with the less abundant species, *D. carolina*. During flight it produces a loud cracking or clapping sound, which is familiar to all and very suggestive of hot and dusty country roads. Although resembling, when on the ground, the larger *D. carolina*, it may be readily distinguished when in flight—the basal portion of the wing being yellow in *verruculatus*, whereas in *carolina* it is black and the outer edge of the wing is yellow. In 1895 the last specimen of *verruculatus* was taken on September 28th. It appears about the end of July.* Six specimens of this insect are among some Orthoptera collected by Mr. Marshall in the

* In 1895, it was first noted on July 18th, and it was common on the 25th.

eastern part of Annapolis County, and it is doubtless found throughout the entire province.

Mecostethus gracilis (Scudder).

A handsome species, apparently rare in this vicinity. Last year I was able to obtain but four specimens, all males. One of these was taken among long grass in a dry situation on the summit of Block-house Hill, Halifax, September 1st, 1895. The remaining three were captured in a damp, grassy place on the side of the road near Cow Bay Bridge, on October 2nd. The stridulating area on the wing of this species is large and prominent, and stridulation may be easily produced in the dead insect by moving the femora against the wings. The species has not hitherto been reported from Canada.

Melanoplus femur-rubrum (De Geer).

Red-legged Locust.

This excellent flyer is common in Halifax County. It was also noted on the diked meadows about Windsor, and without doubt is abundant throughout the entire province. It is generally distributed over Canada and the United States, occurring from the Atlantic to the Pacific and south to Central America. It is said to occur, however, only at certain suitable localities within its limits, a favourable amount of humidity being the chief climatic condition required. The species is closely related to the very destructive Rocky Mountain Locust (*M. spretus*)—the most terrible insect pest in America. It seldom, however, exhibits the migratory habits of the latter. *Femur-rubrum* no doubt does much damage throughout Nova Scotia, devouring field crops and other vegetation, and it should be destroyed whenever possible. The species was noted up to October 20th, 1895.

Melanoplus atlantis (Riley).

Lesser Migratory Locust.

Apparently not common about Halifax, but at present very abundant on Sable Island. Next to *M. spretus* of the Western United States, this is the most destructive locust of North America, and the question of how to protect the country from

its ravages, has occupied the attention of all agriculturists and economic entomologists. It occurs from 53° north latitude or even nearly to the Arctic circle, to the north of Mexico, and from ocean to ocean. With *femur-rubrum* it has, perhaps, a greater range than any other species of North American Acrididæ. To an unpracticed eye, it can be easily mistaken for the less destructive *femur-rubrum*, from which it has only of recent years been separated by the late Prof. Riley. To distinguish it, a minute examination of the last abdominal segment and the cerci of the male is necessary. The former is *notched* in the present species, and the latter are of uniform width and rounded at the end, instead of tapering as in *femur-rubrum*. The females are very difficult to distinguish, these differences being inapplicable to that sex.

Although I have examined hundreds of specimens of *femur-rubrum* collected about Halifax during the past summer, yet I have found but few of the present species. A male was taken on August 29th in a dry field, two more were taken in short, poor grass on Camp Hill, September 28th, and another was captured at Cow Bay, October 2nd. I think it probable, however, that it will be found more frequently in such situations as Camp Hill.

Last fall the Marine and Fisheries Department gave me some locusts that had been taken on Sable Island, off the coast of Nova Scotia, on September 23rd, 1894. Upon examination they proved to be *M. atlantis*, one male and three females. I was told that these insects had suddenly become a frightful scourge upon the island, insomuch as to demand attention from the authorities in charge. Mr. R. J. Boutilier, superintendent of the place, informs me that up to about 1891, he had neither seen nor heard of any locusts upon the island. About that time, however, they made their appearance, and since then have increased at an appalling rate. So destructive did they become, that in 1894 it was only possible to cut one load of hay at a place where fourteen loads had previously been obtained. They seem to attack the grass near the root, and unless kept in check they will ultimately destroy what little vegetation there is upon the

place. This would be a serious matter, for the sod prevents the sand from being shifted by the winds. Should the grass become destroyed, nothing could prevent the island from ultimately disappearing beneath the sea, in which case this dreaded spot would become a hundredfold more dangerous to shipping.

Last year, 1895, these pests were more numerous than ever, and it was necessary to import a quantity of hay for the purpose of supporting the ponies, which were suffering from want of grass. It also became necessary to send to the mainland more of these animals than is usual, in order to reduce the stock which had to be fed. I am told that the insects could be swept in bucketsful from the doorsteps, and I have the superintendent's positive assurance that they even entered the half-closed window of an unused room and ate considerable portions of a cotton blind, a piece of which was sent to me. No means have been taken to keep them in check, and the probability is that during the coming summer the plague will be worse than ever.*

Thinking that possibly there might be more than one species upon the island, I asked Mr. Boutillier to send me, upon his return, a larger number of the insects, and particularly any which appeared to differ from those already examined. In November I received a pint bottle full of locusts preserved in alcohol. All were *atlanis*, mostly females. Mr. Boutillier informed me that upon his return to the island on October 12th, he found that many of the insects had disappeared owing to the lateness of the season, and at the time he wrote (November 10th) they were all dead, although in 1894 they had survived very cold weather if not frost. So far, he said, the season had been very mild with no frost.

It therefore cannot be doubted that *Melanoplus atlanis* is responsible for all the extraordinary damage upon the island. Their sudden appearance in a place previously without such insects, and so many miles from the mainland, is most remark-

* In a letter dated May 23th, 1896, received since the preparation of the above paper, Mr. Boutillier writes as follows: "The locusts are with us again, but are a month later than last year. The season, however, is that much late—very cold and backward, and vegetation is greatly retarded. The young have appeared as yet only at the east end of the island, whereas they were much more plentiful at the west end last year."

able. It is possible that they may originally have been taken to the island in small quantities of hay used for packing—for no cargoes of hay were then imported; or perhaps the eggs had been introduced in some earth which may have coated vegetables. This, however, is unlikely to account for their sudden appearance in large numbers. Upon informing Dr. Scudder of the matter, he said he had no doubt that the insects had flown to the island, their powers of flight being great when aided by an advantageous wind.* The scarcity of natural enemies has since greatly favoured their rapid increase.

The introduction of a number of turkeys would, I think, be the best means of destroying the invaders, if it were possible to protect the birds from animals which might prey upon them. Perhaps some of the locust-killing appliances used in the United States might be employed in the present instance with advantage. The matter seems to demand immediate attention.

Melanoplus femoratus (Burmeister).

Yellow-striped Locust.

This insect is familiar to everyone, and its distinctive colouring makes it impossible to confound it with any other locust found in this locality. It is one of the most abundant species in the county of Halifax, and is also without doubt as common in all other parts of the province, probably doing much damage wherever it occurs. It is common in long grass in meadows, and seems very fond of the rank vegetation which grows on the skirts of fields. I have also frequently observed it in marsh grass. The last individual was noted in 1895 on October 20th. Should it be found advisable to keep this pest in check, the destruction of weed patches and the plowing of waste spots in the vicinity of field borders, etc., as recommended in the United States, would probably keep down its numbers and render it capable of doing little injury.

This species has a very extensive range, being found from Nova Scotia to British Columbia, and from Hudson's Bay south nearly to the Ohio and North Carolina.

* Sable Island is one hundred miles from the mainland. There are no intervening islands.