SOME INDIANA ACRIDIDAE.—IV.

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Since the publication of the third paper of this series in the CANADIAN ENTOMOLOGIST for August and September, 1894, my time has been so fully occupied with other duties that but little opportunity has been presented for the collection and study of Indiana Orthoptera. Notes have been made and specimens taken only of such species as came readily to hand during field work in geology. A better knowledge of the distribution over the State of many of the Acrididae has, however, been gained, and seven species and one variety have been added to the number formerly listed, and to my private collection. Of these, one species and variety have been described as new by Prof. A. P. Morse, a second is described for the first time in the present paper, and a third has before been taken only in Montana and Nebraska.

The publication of McNeill's "Truxalinae of North America" and of Scudder's "Revision of the Melanopli," especially the latter, has made necessary a number of changes in the synonymy of the species previously accredited to the State. A new list of all Acrididae has, however, been and the former papers, with their present nomenclature, is, therefore, appended. It is to be hoped that the papers as published have added something of value to the knowledge of the habits and geographical distribution of this interesting group of insects.

ACRIDIDAE

TRUXALINAE.

1. ORPHULA PELIDNA (Burm).* The Spotted-winged Grasshopper.
Gomphocerus pelidnus Burm., Handbuch II., 1838, 650.
Stenobothrus pelidnus Thos., Syn. Acrid., 1873, 95.
Orphula pelidna Rev. Trux., N. A., 1897, 235.
Stenobothrus maculipennis Scudd., Bost. Jour. Nat. Hist., VII., 1862, 458.
Orphula maculipennis Morse, Psyche, VII., 1896, 326.
Stenobothrus propinquans Scudd., Bost. Journ. Nat. Hist., VII., 1862, 461.

This species has been described or mentioned under the above names by many different persons, and no attempt is made to give a com-

*When the author of a species referred it to a different genus from that to which it is now recognized as belonging, his name is enclosed in a parenthesis.

plete synonymy. That given by McNeill, loc. cit., is faulty and misleading to beginners, in that the name *Gomphocerus* is wrongly used for *Stenobothrus* in a number of the references.

Although it is said to occur in abundance in the United States east of the Rocky Mountains, I did not meet with this species in Indiana during ten years collecting until the 27th of last July, when I found it in abundance about the margins of a small lake in one of the valleys among the sand dunes of Lake County.

It uses both the wings and legs in flight, and when close pressed often burrows into the fallen grass in an attempt to escape detection. Of twenty-one specimens taken but three were females, and they were of the green variety. Five of the males were also partly green, the remainder being brown and fuscous.

2. *MECOSTETHUS LINEATUS* (Scudder.)

Arcyptera lineata Scudd., Bost. Jour. Nat. Hist., VII., 1862, 462.
Id., Am. Nat., II., 1868, 118. (Song of.)
Id., Proc. Bost. Soc. Nat. Hist., XI., 1868, 8.
(Note of set to music.)
Id., Dist. Ins. of N. Hamp., 1874, 373.
Smith, Rep. Conn. Bd. Agri., 1872, 381.
McNeill, Psyche, VI., 1891, 66.

Stetheophyma lineata Thos., Syn. Acrid., 1873, 98.
Id., Ninth Rep. St. Entom., Ill., 1880, 104.
Fernald, Orth. N. Eng., 1888, 38.
Bruner, List Neb. Orth., 1893, 23.
Morse, Psyche, VII., 1894, 105.

Mecostethus lineatus Morse, Psyche, VII., 1896, 327, 444, figs. 13-13b.
McNeill, Rev. Trux. N. Am., 1897, 254, figs. 22a, 22b.

The range of this species as given by McNeill is "N. Eng. to N. Ill. and Iowa." He also adds that it is a "rare species, reported but a few times." The above synonymy includes all references to it by American writers. Some of these references, as those of Thomas, Smith, and Fernald, were based on Scudder's writings, the author not having collected it in person. The only definite localities from which it has been recorded are: Norway, Me.; Williamstown and Andover, Mass.; Valley of the Red River of the North, by Scudder; North Haven and

Thompson, Ct., and Readville, Sherburn and Newtonville, Mass. ; by Morse ; and Iowa side of Mississippi, opposite Watertown, Ill., by McNeill. Bruner also reports it as "occurring in the timbered parts of the eastern half of Nebraska," a fact which McNeill seems to have overlooked.

It was noted for the first time in Indiana on July 13th, 1894, when a single male was secured from open ground near the side of a tamarack swamp, just north of Kewanna, Fulton Co. On the following day it was found in small numbers in a boggy meadow between two spurs of another tamarack swamp, just west of Lear's Lake, in the same county. The males were very wild, taking to flight when a person was a dozen yards or more away. They used the wings only in escaping, flying swiftly and noiselessly for 50 to 100 feet and alighting on the stems of tall grass. The only way in which I could effect their capture was by running after them and swooping them with the net as they arose or before they had time to arrange their legs for the upward impetus at the beginning of a new flight. But two females were seen. They were much darker and more bulky and lubberly than the males, and being in a more open place, where the grass was shorter, were easily taken. The species probably occurs in the vicinity of tamarack swamps and peat bogs throughout the northern half of Indiana, though it was not noted about several which have been visited in the last three years.

OEDIPODINAE

3. PSINIDIA FENESTRALIS (Serville.) The Long-horned Grasshopper.

Oedipoda fenestralis Serv., Hist. Nat. des Orth., 1839, 726.

Thos., Syn. Acrid., 1873, 118.

Locusta fenestralis Harris, Ins. Inj. Veg., 1862, 177.

Psinidia fenestralis Stal., Recens. Orth., I., 1873.

Sauss., Prd. Oedipod., 1884, 161.

Fern., Orth. N. Eng., 1888, 44.

Beut., Bull. Am. Mus. Nat. Hist., VI., 1894,
303, Pl. VIII.

Morse, Psyche, VIII., 1897, 111, fig. 28.

Locusta eucerrata Harris, Ins. Inj. Veg., 1862, 180.

Oedipoda eucerrata Scudd., Bost. Journ. Nat. Hist., VII., 1862, 472

This handsome little Acridian has been mentioned by numerous other writers under the names given above, but it is not thought best to give the full synonymy in this connection. The species evidently occurs

from the Atlantic to the Rocky Mountains, wherever there are extensive sand-covered areas, having been reported from Colorado and Canon Cities, by Uhler ; from north-west Nebraska, by Bruner ; from Illinois, by McNeill ; and from various points on the Atlantic coast between Maine and Louisiana, by Harris, Scudder, Smith, Morse, and others.

In Indiana, it has been noted only in Lake and Porter counties in the sandy area bordering Lake Michigan, where it was first taken July 27, 1897. It is most common along the beach within one-half mile of the lake, in company with *Trimerotropis maritima* (Harris) and *Spharagemon wyomingensis* (Thos.), though a few species were taken on sandy ridges five miles from the lake shore. It has a quick, short flight, and always chooses a bare, sandy spot on which to alight. Unless it is carefully "marked down" it is then very difficult to distinguish, since its colours harmonize so perfectly with its surroundings. By keeping an eye on it, and stealthily approaching, it can be readily taken by throwing the net quickly over it just as it is in the act of rising. The male makes a slight rattling sound as it flies, but the movement of the female is noiseless. The majority of the specimens seen had the inner wings a bright red at base, though variations in colour, from light yellow to deep red, were frequent.

ACRIDINAE.

4. MELANOPLUS EXTREMUS (Walker.)

Caloptenus extremus Walker, Cat. Dermap. Salt., IV., 1870, 681..

Melanoplus extremus Scudd., Proc. U. S. Nat. Mus., XX., 1897, 287, Pl. XVIII., fig. 10.

Pezotettix junius Dodge, Can. Ent., VIII., 1876, 9.

Melanoplus extremus Scudd., Proc. U. S. Nat. Mus., XX., 1897, 286.

Caloptenus junius Scudd., Can. Ent., XX., 1880, 75.

Caloptenus parvus Provancher, Nat. Canad., VIII., 1876, 110.

This species has also an extensive synonymy, the above being but a small portion, showing the names under which it has heretofore been known. It is an insect of northern range, Walker's type being recorded from Arctic America. According to Scudder "it probably occurs throughout the larger part of Canada and the northernmost United States. It has also been recorded from several points in Alaska."

Mr. C. H. Bollman evidently found it near Bloomington, Munroe County, Indiana, since Scudder mentions a specimen so labeled as

occurring in the U. S. Nat. Museum. It first came to my notice in the State on August 8, 1897, when it was found near DeLong, Fulton County, in an open peat bog which was surrounded on all sides by a heavy growth of tamarack, *Larix americana* Michx. But about a dozen specimens were secured, all of which were of the short-winged form, *M. e. junius*, the measurements of male being : length of body, 18 mm.; of tegmina, 11 mm.; of hind femora, 11.5 mm.

When disturbed they gave several short, quick leaps, and then burrowed as far as they could into the dense mass of sphagnum moss which everywhere covered the bog.

5. *MELANOPLUS ANGUSTIPENNIS* (Dodge.) The Narrow-winged Grasshopper.

Caloptenus angustipennis Dodge, Can. Ent., IX., 1877, 111.

Thos., Rep. U. S. Ent. Comm., I., 1878, 43.

Melanoplus angustipennis Bruner, Bull. Wash. Coll. Lab. Nat. Hist., I., 1885, 138.

Id., Bull. 28, U. S. Div. Ent., 1893, 24, fig. 12.

Scudd., Proc. U. S. Nat. Mus., XX., 1897, 305, Pl. XX., fig. 6.

This is a western species which has not heretofore been recorded east of Kansas and Iowa. According to Bruner, it ranges from North Dakota to Texas, and west to Yellowstone, Montana. He also states that it is increasing rapidly in numbers, and is likely in places to become a serious pest.

It is one of the most common grasshoppers about the south shore of Lake Michigan, occurring in company with *M. atlanis* (Riley), *Spharagemon wyomingensis* (Thos.), and others over a large part of the sandy area within five miles of the lake. It seems to prefer such barren localities to those more promising in plant food, since Bruner mentions its partiality for "old breaking and well-fed pastures of many years' use."

To a cursory observer *angustipennis* bears a general resemblance to *atlanis* (Riley), but may be readily distinguished by its blue tibiae, the lack of a notch at the apex of the last abdominal segment of the male, and the different shape of the male cerci. The dark spots along the middle line of the tegmina of the Indiana specimens are larger and more numerous than one would expect to find after reading the descriptions of Dodge

and Scudder. Its habits, moreover, are not arboreal, as observed by Bruner, since it was more often found on the ground than on the scant vegetation growing in the area which it inhabited.

6. *PAROXYA SCUDDERI*, sp. nov.

The smallest known member of the genus, the body of the male averaging but 17 mm. in length. Antennae relatively short, 9.5 mm. in both sexes. Tegmina reaching slightly beyond tip of abdomen in male, shorter than abdomen in female.

Male with posterior lobe of pronotum, tegmina, and upper and outer faces of all the femora a uniform light-wood brown; occiput and anterior lobes of pronotal disc darker. A broad black stripe extends from eye along the upper half of the lateral lobes of pronotum as far as the posterior transverse sulcus, where it ends abruptly, the posterior lateral lobe being uniform in colour with the disc. Below this black stripe is one of ivory white, brightest on the head. Metapleurite also ivory white. Face grayish olive, flecked or tinged with yellowish. Proximal two-thirds of antennae the colour of the tegmina; distal third darker. Palpi and prosternal spine yellow. Sternites of thorax olive brown; those of abdomen yellow, as also the lower face of all the femora. Hind tibiae pale glaucous (the proximal third sometimes light brown), with a black spot at geniculation; the spines eleven in number in the outer series, with their distal thirds black.

Female darker; the tegmina sometimes obscurely and sparingly flecked with fuscous, covering three-fourths or more of the abdomen; the yellow of under side dull or wanting.

Supra-anal plate of male very short, triangular, with a short, basal, triangular sulcus, in which rest the furcula. These consist of a pair of flattish, oblong, subequal plates with their inner edges attingent except at the apices, where they slightly diverge. Cerci strongly incurved, narrowed at the middle, the proximal half stouter than in *P. hoosieri*, the distal third flattened and rounded apically.

Average measurements: Length of body, male 17 mm., female 24 mm.; antennae, male and female, 9 mm.; tegmina, male 23 mm., female 14.5 mm.; hind femora, male 11.5 mm., female 13.5 mm. Five males, 4 females.

This graceful-bodied species was found in small numbers on July 27, 1897, about the grassy margins of a pond in the sand dune region

north of Miller's, Lake County, Indiana, and within one-half mile of the shore of Lake Michigan. On the following day a single pair were taken from a similar locality near Tolleston, in the same county, and about four miles from the lake, but still within the sand-covered area. It was usually found clinging to the stems of the tall rushes and grasses common in such locations, and when disturbed the males used the wings in a noiseless flight, while the females depended upon their leaping powers to escape. When closely followed, they would attempt to hide by burrowing into the fallen grass.

The form is more closely allied to *P. atlantica* Scudder, than to either of the other two known species of the genus, but its smaller size, longer cerci, and the different shape of the male furcula at once distinguish it. I take pleasure in naming it in honour of Mr. S. H. Scudder, who in the past has rendered me much aid in my study of the Acrididae, and who has done far more than any other man towards putting the study of North American Orthoptera on a substantial basis.

TETTIGINAE.

7. TETTIGIDEA ARMATA MORSE.

Tettigidea armata Morse, Journ. N. Y. Ent. Soc., III., 1895. 107.

This species was described from specimens collected by me in Vigo County. It was formerly confounded with *T. lateralis* Say, but is distinguished by having the anterior margin of the pronotum produced in a sharply pointed cusp, instead of being rounded or obtusely angulate, and in having the dorsum of pronotum strongly rugulose, with the median carina sharp and distinct. One pair, *in coitu*, were taken June 20, 1894, from the wooded margin of a large pond in the lowlands of the Wabash River. It has also been taken about the margin of a lake near Waterloo, DeKalb County, and, according to Morse, near Dallas, Texas.

7a. TETTIGIDEA ARMATA DEPRESSA MORSE.

T. armata depressa Morse, *loc. cit.* 107.

This differs from the above in that the pronotum only reaches the tip of the hind femora instead of much surpassing them. A single female in my collection from Vigo County served as one of Morse's types, the others being from Florida and Louisiana. According to Hancock (Trans. Am. Ent. Soc., XXIII., 1896, 242), *Tettigidea acuta* Morse, occurs at Chicago and Riverside, Illinois. It is therefore, doubtless, a resident of Indiana.

NOTES ON SOME OF THE SPECIES MENTIONED IN THE PREVIOUS
PAPERS

TRUXALIS BREVICORNIS (L) (C. E., XXIII., 75; XXVI., 221.)

This well-marked species occurs sparingly about the borders of marshes in Lake County, so that its range includes the whole State.

CHLOEALIS CONSPERSA Harris. (C. E., XXIII., 75; XXVI., 222.)

The males of this species, which before had been rarely met with, were found in numbers in low, rather dry woods along the borders of streams in Montgomery County, in July, 1895. A female was taken at dusk on the evening of July 21, in the act of ovipositing in the end of a partly decayed oak log. Three eggs were found in the bottom of the cavity in which the abdomen was inserted.

HIPPISCUS TUBERCULATUS (Pal d. Beauv.) (C. E., XXIII., 81.)

This is the *H. phoenicoptera* of my first paper. In Indiana it has been found only in the driftless limestone area of the southern half of the State, being especially common in Monroe and Franklin counties. Adults have been taken as early as April 20th, and as late as August 15th. It frequents timothy meadows, upland pastures, and roadsides, and when in flight is very conspicuous owing to its large size and bright red inner wings. In suitable localities, the young of this species, as well as those of *Arphia sulphurea* (Fab.) and *Chortophaga viridifasciata* (De Geer) are, on bright days in midwinter, often to be seen together in numbers jumping vigorously about. If their presence at such a season comes to the attention of a newspaper reporter, the press of the entire State is apt to teem with notices of a coming grasshopper plague, of which the youngsters are said to be the advance guard.

SPHARAGEMON WYOMINGENSIS (Thos.) (C. E., XXXVI., 218.)

The *Spharagemon oculatum* Morse, of my third paper has since been determined by Prof. Morse to be identical with the species described by Thomas under the above name. It occurs in sandy localities in the northern part of Indiana, being especially common in the immediate vicinity of Lake Michigan. It reaches maturity about July 10th, and may be taken until mid-October.

TRIMEROTROPIS MARITIMA (Harris.) (C. E. XXVI., 218.)

Since my former mention of this species it has been found to be very common along the south shore of Lake Michigan, in Lake, Porter, and

LaPorte counties. It flies rapidly for long distances, and unless carefully marked down, is very difficult to detect. It varies in colour from very light gray to a dark gray mottled with brown ; the darker specimens being found at some distance from the lake, where there was a scattering vegetation, the light-coloured ones on the pure sand of the immediate shore. It was seen nowhere more than a half mile back from the water margin, and then only on the bare crests of the highest sand ridges and dunes.

MELANOPLUS OBOVATIPENNIS (Blatchley.) (C. E., XXIII., 80; XXVI., 241.)

In Scudder's recent monograph of the Melanopli, this species is transferred from *Pezotettix* to *Melanoplus*. It has been recently found in Marion, Franklin, and Crawford counties, and therefore probably occurs in high, dry woodlands over the southern part of the State. It is also recorded by Scudder, from Kentucky, Missouri, and near Dallas, Texas.

MELANOPLUS BLATCHLEYI Scudder. (C. E., XXIII., 81 ; XXVI., 243.)

This is the species formerly known as *Pezotettix occidentalis* Bruner. In Scudder's revision it was also transferred to the genus *Melanoplus*, in which the name *occidentalis* was preoccupied.

It is found from June 15th to November 1st, in open woods. On October 25th, 1897, two specimens were taken in Marion County, from the side of a hackberry tree, *Celtis occidentalis* L. This is the most eastern point at which it has been noted in the State.

MELANOPLUS DIFFERENTIALIS (Uhler.) (C. E., XXIII., 99.)

The general range of this species is southern, but specimens have been taken in Lake County, in the extreme north-western part of the State. It is very common in the Wabash valley.

MELANOPLUS PUNCTULATUS (Uhler.) (C. E., XXIV., 30 ; XXVI., 245.)

This is the *M. griseus* Thos., of my former papers, Scudder having determined that to be a synonym of Uhler's species.

It has proven to be of more general distribution over the State than at first supposed, having been taken in Vigo, Putnam, Montgomery, Fulton, and Marion counties. With the exception of those formerly noted as found in the tamarack swamp in Fulton County, where it was frequent, but one or two specimens have been taken each season, and they in damp localities in late autumn. On October 25, 1897, two specimens were

secured from the trunks of trees in a low, dense woods in Marion County. They were about four feet from the ground, and one of them was beneath a chunk which was leaning against the tree.

PAROXYA HOOSIERI (Blatchley.) (C. E., XXIV., 31 ; XXVI., 244.)

On account of distinctive characters pertaining to the abdominal appendages of the male, Scudder regards this as a valid species. It has been taken about swamps in Vigo, Fulton, and Marshall counties, Indiana, and near Oberlin, Ohio. On September 22, 1894, I was much surprised to find, near the border of a marsh in Vigo County, a female of this species and also one of *Chloealtis conspersa* Harr., a few inches apart on the stump of a downy poplar, *Populus heterophylla* L., each with the abdomen buried to the full length in the wood, but no eggs could be discovered. Nothing has been recorded concerning the habits of oviposition of the members of the genus *Paroxya*, and it would be surprising if they, like the *Chloealtis* mentioned, should seek wood rather than earth as the receptive matrix for the eggs.

A REVISED LIST OF THE ACRIDIDAE KNOWN TO OCCUR IN INDIANA.

ACRIDIDAE.

TRUXALINAE.

1. *Truxalis brevicornis* (Linn.) Short-horned Grasshopper.
2. *Syrbula admirabilis* (Uhler.) Handsome Grasshopper.
3. *Chloealtis conspersa* Harris. Sprinkled Grasshopper.
4. *Dicromorpha viridis* (Scudder.) Short-winged Green Grasshopper.
5. *Orphula pelidna* (Burm.) Spotted-winged Grasshopper.
6. *Mecostethus lineatus* (Scudder.)
7. *Stenobothrus curtipennis* (Harris.) Short-winged Brown Grasshopper.
8. *Ageneotettix scudderi* (Bruner.)

OEDIPODINAE

9. *Arphia xanthoptera* (Burns.)
10. *Arphia sulphurea* (Fab.) Yellow-winged Grasshopper.
11. *Chortophaga viridifasciata* (DeGeer) Green-striped Grasshopper.
12. *Encoptolophus sordidus* (Burm.) Clouded Grasshopper.
13. *Hippiscus tuberculatus* (Pal. de Beauv.) Coral-winged Grasshopper.
14. *Hippiscus rugosus* (Scudder.) Clumsy Grasshopper.
15. *Dissosteira carolina* (Linn.) Quaker or Black-winged Grasshopper.
16. *Spharagemon bolli* Scudder.
17. *Spharagemon wyomingensis* (Thomas.)

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18. *Pseudia fenestralis* (Serville.) Long-horned Grasshopper.
19. *Trimerotropis maritima* (Harris.) Maritime Grasshopper.

ACRIDINAE

20. *Leptysma marginicollis* (Serville.) Slender-bodied Grasshopper.
21. *Schistocerca americana* (Drury.) American Grasshopper.
22. *Schistocerca alutaceum* (Harris.) Leather-coloured Grasshopper.
23. *Melanoplus atlantis* (Riley.) Lesser Grasshopper.
24. *Melanoplus scudderi* (Uhler.) Scudder's Short-winged Grasshopper.
25. *Melanoplus viridipes* Scudder. Green-legged Grasshopper.
26. *Melanoplus obovatipennis* (Blatchley.) Obovate-winged Grasshopper.
27. *Melanoplus femur-rubrum* (DeGeer.) Red-legged Grasshopper.
28. *Melanoplus extremus* (Walker.)
29. *Melanoplus angustipennis* (Dodge.) Narrow-winged Grasshopper.
30. *Melanoplus blatchleyi* Scudder.
31. *Melanoplus gracilis* (Bruner.) Graceful Grasshopper.
32. *Melanoplus minor* (Scudder.)
33. *Melanoplus collinus* Scudder.
34. *Melanoplus differentialis* (Uhler.) Lubberly Grasshopper.
35. *Melanoplus bivittatus* (Say.) Yellow-striped Grasshopper.
36. *Melanoplus punctulatus* (Uhler.) Mottled Grasshopper.
37. *Paroxya hoosieri* (Blatchley.) Hoosier Grasshopper.
38. *Paroxya scudderi* Blatchley.

TETTIGINAE

39. *Nomotettix cristatus* (Harris.) Crested Grouse Grasshopper.
39a. *Nomotettix cristatus carinatus* (Scudder.)
40. *Tettix ornatus* (Say.) Spotted Grouse Grasshopper.
40a. *Tettix ornatus triangularis* Scudder.
41. *Tettix granulatus* (Kirby.) Sprinkled Grouse Grasshopper.
42. *Tettix arenosus* Burm. Grizzly Grouse Grasshopper.
43. *Paratettix cucullatus* (Burm.) Hooded Grouse Grasshopper.
44. *Tettigidea lateralis* (Say.) Black-sided Grouse Grasshopper.
45. *Tettigidea parvipennis* (Harris.) Small-winged Grouse Grasshopper.
45a. *Tettigidea parvipennis pennata* Morse.
46. *Tettigidea polymorpha* (Burm.)
47. *Tettigidea armata* Morse.
47a. *Tettigidea armata depressa* Morse.