SOME NOTES ON THE ECOLOGY OF PRAIRIE INSECTS

BY

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Introduction

The native prairie of Iowa has nearly disappeared. Except for railroad right-of-ways, and ungraded roadsides, very few tracts of tillable native prairie can be found. But these few areas may be preserved for many years because of general interest in the native conditions of the state. Many insects were native to the prairie. Occasionally, conditions arise which enable or require a native insect species, heretofore considered of little or no economic importance, to become an annoying pest of a cultivated crop. Many native harmless species are with difficulty distinguished from the more injurious species of neighboring fields. Hence, it was thought that a study of insects native to a tract of prairie would be of interest and value to many workers in entomology. The objects of this study are, chiefly, to determine a list of insects native to a tract of original prairie in Iowa, to make further observations on the habits, food, and life-histories of prairie insects, and to obtain data on the climate seasonally associated with these species and the surveyed tract. It is expected that this study may become the basis for continued investigation into the factors of the relationships between the insect fauna and the flora of the original prairie of Iowa.

General Description of the Collecting Station

The locality chosen for the collecting is a five acre

tract of prairie preserve on the farm of Doctor Ada Hayden. The farm is in Story County, near the central part of the state. The southeast corner of the farm is three miles north and one mile west of the junction of Lincoln Way and Grand Avenue in the city of Ames. The surveyed tract is one-fourth of a mile west and one-fourth of a mile south of the southeast corner of the farm, and lies toward the northern edge of the terrace overlooking a valley which leads eastward toward the Skunk river, about one mile distant. This tract was chosen because it is known to have been original prairie for more than the last fifty years, because Doctor Ada Hayden has published several articles on the ecology of the plants of the preserve, and because it will probably remain a preserve for scientific investigation for a number of years.

Plant Features of the Station

Hayden (1919) has classified this tract in plant ecology as a Stipa-Bouteloua Formation in a Prairie Province, and has divided the Formation into Consocies Bouteloua and Consocies Stipa. She states that Consocies Bouteloua is located on the hilltops with gravelly loam soil, and has as "the principal species:

"Bouteloua curtipendula, Bouteloua hirsuta, Koeleria cristata, Carex pennsylvanica, Astragalus caryocarpus, Comandra

umbellata, Anemone cylindrica, Anemone patens var. Wolfgangiana, Agoseris cuspidata, Oenothera serrulata, Solidago speciosa, Liatris cylindrica, Euphorbia corollata, Lithospermum canescens, Lithospermum angustifolium, Petalostemum purpureum, Polygala verticillata.

"The societies of the seasonal aspects are: (1) Spring aspect. Anemone patens var. Wolfgangiana, Comandra umbellata, Agoseris cuspidata. (2) Summer aspect. Bouteloua curtipendula, Bouteloua hirsuta, Koeleria cristata, Polygala verticillata. (3) Fall aspect. Bouteloua hirsuta, Bouteloua curtipendula, Andropogon furcatus, Liatris cylindrica, Aster azureus, Solidago speciosa."

Doctor Hayden located the slopes of the hills with loam to sandy loam soil as the Consocies Stipa, with "the main species:

"Brauneria purpurea, Psoralea argophylla, Stipa spartea, Sporobolus, Coreopsis palmata, Liatris pycnostachya, Liatris squarrosa, Lespedeza capitata, Delphinium Penardi, Lilium philadelphicum, Phlox pilosa, Heuchera Americana, Pedicularis canadensis, Viola pedata, Baptisia bracteata, Eryngium yuccaefolium, Amorpha canescens, Gentiana puberula, Solidago speciosa, Solidago rigida, Petalostemum purpureum, Sisyrinchium angustifolium, Hypoxis hirsuta, Aster sericeus, Aster multiflorus.

"Societies: (1) Spring aspect: Viola pedata, Pedicularis canadensis, Phlox pilosa, Baptisia bracteata, Sisyrinchium angustifolium. (2) Summer aspect: Brauneria purpurea, Lilium

philadelphicum, Amorpha canescens, Heuchera Americana, Psoralea argophylla, Eryngium yuccaefolium, Desmodium illinoense, Lespedeza capitata, Lespedeza leptostachya. (3) Fall aspect: Aster multiflorus, Liatris pycnostachya, Liatris squarrosa, Gentiana puberula, Aster azureus, Aster sericeus."

The writer has observed these plants and agrees with the classification but wishes to add, that bluegrass (Poa sp.) is probably more prominent than it was in 1918 in Consocies Stipa. Very little bluegrass was observed in Consocies Bouteloua. This invasion of bluegrass may be due to pasturage which has been somewhat heavier during the winters of the past few years. The field has been mown yearly for many years, and the hay has been removed. The fertility of the soil probably has not been depleted greatly, because it has been fertilized with stable manure frequently to insure a continued good hay crop. The last application of stable manure was made in the spring of 1925 at a rate of about six tons per acre.

Crops of the Surrounding Fields

In 1925 oats were grown in the fields south and west of the station. These fields were in sweet corn and field corn in 1926. A permanent bluegrass pasture lies in the valley to the north. The field at the east was in timothy in 1925, but was put into field corn in 1926 except for a small corner at the northeast of the prairie preserve. An old apple orchard with

bluegrass lies along the east one-third of the south side.

Methods of Collecting Insects

The larger number of the insects were collected with the ordinary sweeping net. In 1925 very few insects were taken from individual species of plants. In 1926 more time was spent in attempts to collect from certain characteristic species of plants. This was very difficult because of the scattered arrangement of all the plant species. Practically no pure stands of even several square feet in area are found in the field. The number of species of plants is comparatively large in relation to the size of the tract. This tended to aid in collecting a large number of species of insects, but hindered the collection of large series of single species from one species of plant. In 1926 a number of species were secured from the surface of the soil. The collecting started in 1925 on June 18, and stopped on August 21 when the field was mown. In 1926 the first collection was made on March 21, and the last on October 9, three days after the field was mown. Collections were made about three times per week in each season, and usually in the forenoon from eight to eleven, or in the afternoon from two to five. Several night collections, and early morning collections were made in 1926.

Meteorological Data

No meteorological data were secured in 1925. In 1926 a recording hygrothermograph instrument was started at the station on April 19, and was stopped on October 11. The instrument house was located on the northwest slope of a hill at a point where the two Consocies seemed to meet, and was placed with the floor within two inches of the soil and kept in this position throughout the season. The data dealing with temperature and humidity has been summarized into a table showing the hours per week above 90°F., below 60°F., and between 60°F. and 90°F. in temperature, and the hours per week with humidity 90 per cent, below 40 per cent, and between 40 per cent and 90 per cent. The temperatures of 90°F. and 60°F. were chosen since nearly all of the collecting was done between these temperatures because of the difficulty in securing active insects in any numbers at higher and lower temperatures. The humidity percentage of 90 was chosen because at higher percentages the vegetation became too damp for net collecting, and insect activity was markedly decreased. Humidities lower than 40 per cent were sometimes associated with temperatures of 90°F. and over. Many insects were relatively inactive, or hidden, at lower humidities.

METEOROLOGICAL TABLE

Weeks In 1926 Season	TEMPERATURE			HUMIDITY		
	No. hours above 90°F.	No. hours between 60°F. and 90°F.	No. hours below 60°F.	No. hours above 90%	No. hours between 40% and 90%	No. hours below 40%
Apr.19-Apr.26#	0	52	68	5	78	37
Apr.26-May 3	3	83	82	4	102	62
May 3-May 10	0	132	36	0	110	58
May 10-May 17	0	86	83	0	94	74
May 17-May 24	0	87	81	8	108	52
May 24-May 31	1	149	18	11	136	21
May 31-June 7*	0	92	52	16	77	51
June 7-June 14*	9	112	23	33	86	25
June 14-June 21	0	102	66	18	145	5
June 21-June 28	0	96	72	26	87	55
June 28-July 5	7	153	8	20	139	9
July 5-July 12	0	168	0	4	153	11
July 12-July 19	14	129	25	9	128	31
July 19-July 26	18	136	14	1	146	21
July 26-Aug.2	0	162	6	27	141	0
Aug.2-Aug.9	0	154	14	11	133*	0
Aug.9-Aug.16	0	155	13	7	161	0
Aug. 16-Aug.23	0	161	7	11	157	0
Aug.23-Aug.30	5	141	22	15	150	3
Aug.30-Sept.6	0	132	36	35	133	0
Sept.6-Sept.13	0	93	75	23	145	0
Sept.13-Sept.20*	0	119	25	42	102	0
Sept.20-Sept.27	0	48	120	29	126	13
Sept.27-Oct.4	0	62	106	41	123	4
Oct.4-Oct.11	0	60	108	27	141	0

5 days
* 6 days

Annotated List of Insect Species

In this section the species that were collected are listed. Such data are included as were considered necessary to determine a list of common species of this preserve. Many published sources of information have been freely drawn upon to check, and to supplement the observations in the field. Specific references to these sources of information are made. Other ecological data in the list, the writer believes are largely new in publication.

Order Collembola

Sminthurus fuscus L. (Guthrie, det.)

Collected August 14, 1926. This species was taken on the ground among the light debris. Guthrie (1903) took it from under boards in a low, damp meadow.

Entomobrya sp. (Guthrie, det.)

Collected August 16, 1926. These specimens were taken from under a few small stones in several parts of the field.

Lepidocyrtus purpureus Lubbock (Guthrie, det.)

Collected August 14, 1926. This species was found on the ground among the light debris. Guthrie (1903) says that it is abundant under logs and stones.

Aphorura ambulans L. (Guthrie, det.)

Collected Aug. 16, 1926. These specimens were found under stones. Guthrie (1903) says that the species is quite abundant under bark and sticks in damp places.

Order Orthoptera.

The species of this order were identified by Doctor B. B. Fulton.

Diapheromera veliei Walsh

Collected July 6, Aug. 13, 14, 16, 1926. This species was more numerous at the sides of the hills among the taller grasses. At the first of the season all adults were green. Aug. 14, 1926 a female with a red streak on each side of the body, and quite reddish below and on the legs was taken. Aug. 16, 1926 a female quite red over all the body and appendages was taken. In the latter part of July the Andropogon species of grass start to become reddish and by the middle of August they are noticeably reddish in basal parts of the leaves and stems. Somes (1916) writes that this species tends to frequent tall grasses and low brush rather than tall shrubs and trees. He reports it frequent on Andropogon scoparius Michx. and Lespedeza capitata Michx.

Acridium ornatum Say

Collected June 18, 1925; Apr. 12, 1926. The one specimen of 1925 was taken in sweeping on a hillside. The specimen of 1926 was found by turning over dead grass gathered between the pole teeth of a buck rake at the southwest corner of the field. Blatchley (1920) writes that this species occurs usually along the edges of dry open woods and on gravelly hillsides.

Paratettix cucullatus Burm.

Collected June 22, 1925. The one specimen seen and taken was caught while the author was turning over the light debris in the ravine near the center of the station. Blatchley (1920) gives its favorite summer haunts as the damp sandy or muddy banks of ponds, lakes, and streams, where from mid-summer to late autumn it is found by hundreds.

Tettigidea lateralis parvipennis Harr.

Collected April 12, 1926. The one specimen was taken from debris in the ravine. Blatchley (1920) writes that it is a very common grouse locust throughout northern Indiana, frequenting dry upland woods, fence rows, and low marshy tracts.

Eritettix simplex Scudd.

Collected Apr. 21, 30, May 9, 28, June 25, 1926. This small grasshopper was most active May 28. A male was observed in stridulation. The insect rested on the ground with fore and middle legs. The notes were produced by rubbing both thighs simultaneously upon the tegmina. The notes were not audible at a distance of more than about eight feet. The song was interruped at three-second intervals with a pause of one second in duration. Fox (1917) reports this species frequent in pastures overrun with Andropogon species.

Orphulella speciosa Scudd.

Collected July 15, 21, 25, 27, 28, Aug. 5, 10, 15, 18, 21, 24, 1925; July 11, 14, 16, 26, 30, Aug. 7, Sept. 17, Oct. 1, 1926. Mating pairs were frequent from July 26, 1926 to Aug. 16, 1926 with the largest number seen Aug. 7. This species was most abundant on the higher ground among the shorter grasses such as the Bouteloua species. It seemed the most numerous Orthopteran of this field. Aug. 24, 1925 a specimen was taken from the mown field. Shelford (1913) lists it as one of the "usually common insects" of high prairie. Hart (1907) found it especially on dry soils, and took it at light.

Chloealtis conspersa Harr.

Collected June 18, 1925. Only one specimen, a male, was taken and seen. This species is reported by Blatchley (1920), "making its home in thickets, in grassy plots alongside old rail fences, and oftentimes along the borders of streams in woodland pastures, but nowhere in numbers". He has observed the females laying in decaying wood. Somes (1914) says "in Iowa this species is confined to woodlands or their immediate borders". Ball (1897) took adults June 7 to Sept. in a moderately shaded pasture.

Ageneotettix deorum Scudd.

Collected July 2, Aug. 7, 14, 1926. Four of the five specimens were taken on the most nearly barren part of the hill in the northwest quarter of the field. Blatchley (1920) writes of having taken the species from the sandy bed of the old Wabash

and Erie canal, and the side of a sandy hill covered with typical prairie grasses and plants.

Arphia sulphurea Fabr.

Collected June 20, 1925. Only one specimen was seen and taken. Blatchley (1920) reports the species from dry upland pastures and meadows, along roadsides, and on gravelly and rocky slopes. Somes (1914) says it is especially fond of rather open woodlands. Fox (1917) reports it as occasional in untilled areas in or near woodland. Ball (1897) found the species rather rare in Iowa.

Chortophaga viridifasciata De Geer.

Collected Apr. 21, 28, 30, May 1, 3, 28, 1926. In the latter part of April and first part of May this species was crackling almost continuously before the collector. May 28 found the numbers markedly decreased, and no specimens were seen after that date. A nymph was taken Sept. 9, 1926, and a second nymph was collected Oct. 9, 1926. Somes (1914) writes, "in Iowa have taken it a month earlier than in Minnesota" (Mar. 1). The first three specimens taken are brownish, and male. Greenish specimens, female, were first taken May 1. Somes (1914) found the two colors occurring simultaneously. He found the brown more common in woods and open fields, and the green more numerous in grassy places and along streams.

Encoptolophus sordidus Burm.

Collected Aug. 10, 15, 17, 18, 19, 21, 22, 1925; Aug. 7, 13, Oct. 1, 1926. The species seemed most numerous on the

hilltops among the Bouteloua grasses. They were most easily taken near a road running north and south across the field. This road shows very little bare earth. Fox (1917) found the species one of the most abundant grasshoppers in dry pastures of high intermountain valleys.

Hippiscus apiculatus Harr.

Collected May 15, June 4, 1926. The specimens were taken on the hilltop at the northwest corner of the field. The specimen of May 15 is female, and that of June 4 is male. Several females were seen in flight, but their concealing ability outwitted the collector. The species is probably more numerous than the number of specimens taken would indicate. Blatchley (1920) says the species frequents, especially, bare or scantily vegetated slopes and sandy plains.

Dissostiera carolina Linn.

Collected Aug. 6, 1925; July 11, 1926. The three specimens taken were swept from the wagon tracks running north and south across the area where there was some bare earth. Somes (1914) says it is an insect primarily of dusty places and may be found wherever bare earth, sand, or clay is exposed.

Pseudopomala brachyptera Scudd.

Collected June 23, July 28, Aug. 21, 1925; Aug. 2, 18, 25, 1926. All specimens are of the short-winged form. The individuals were most frequent toward the southwest one-fourth of the field where the more fertile soil supports a larger

ratio of Andropogon species. Somes (1914) writes, "as far as field experience goes, this species is associated with certain tall grasses, notably Andropogon scoparious Michx."

Melanoplus atlanis Ril.

Collected June 22, 1925; July 7, 1926. Both specimens are male with red tibiae. Ball (1897) took three specimens on a high gravel point. Vestal (1913) found it most abundant in ruderal dry grassland, or at least, more abundant in ruderal than in native vegetation.

Melanoplus bivittatus Say

Collected July 20, 30, 1925; Aug. 1, 1926. The three specimens were taken from taller grasses on the hillsides. The tibiae of the individuals are chiefly greenish-yellow with no red apparent. Blatchley (1920) found the species in both moist and dry localities.

Melanoplus confusus Scudd.

Collected June 18, 23, July 21, 1925; May 3, June 4, 5, 10, 19, 22, 28, July 1, 2, Aug. 14, 1926. Mating pairs were taken June 19, 22, 1926. This species was few in number in comparison with M. dawsoni Aug. 14, 1926. This species was the first mature member of the genus taken in this area in 1926. Morse (1898) found it the first of the genus to appear as mature in the spring in New England. Fox (1917) says it was the dominant grasshopper in late May and early June, although rather strictly limited to higher drier areas, and not

occurring in any considerable numbers on farm lands.

Melanoplus dawsoni Scudd.

Collected July 15, 21, 23, 28, 30, Aug. 5, 10, 15, 18, 24, 1925; June 24, July 3, 7, 14, 16, 30, Aug. 7, 13, Sept. 17, 24, Oct. 1, 9, 1926. This species appeared to be more numerous on the hilltops than on the hillsides. Two specimens were secured from the mown field Aug. 24, 1925. Somes (1914) says this species appears to be most abundant amid such brushy growth as Symphoricarpos, Corylus, and Taxus, though it is at home in widely varying habitats. Ball (1897) found adults in high, open woods.

Melanoplus differentialis Thom.

Collected Aug. 24, 1925; Aug. 14, 1926. These specimens were taken among the taller grasses at the base of a hillside. Blatchley (1920) says this grasshopper delights in low, damp waste places, and the margins of lowland cultivated fields, and that it has multiplied sufficiently to become a pest only after settlement of the country.

Melanoplus femur-rubrum De Geer.

Collected July 21, 28, Aug. 3, 10, 13, 18, 24, 1925; Aug. 13, 1926. This species was not as numerous as M. keeleri-luridus. Large numbers of grasshoppers were taken in 1926, but M. femur-rubrum seemed very scarce. Scudder (1897) says this species is rarely found upon dry hillsides while the opposite is true of other species.

Melanoplus keeleri-luridus Dodge

Collected June 23, July 28, Aug. 3, 5, 10, 13, 18, 21, 24, 1925; July 30, Aug. 1, 7, 9, 13, 14, 16, Sept. 17, Oct. 1, 9, 1926. This is the most abundant Melanoplus of this upland tract. McNeill (1891) found it closely restricted to the tops of hills and sides of ravines too barren for pasturage, and never so far as he was aware was it found in rich bottom lands. Ball (1897) took it abundantly from knolls during July and August.

Phoetaliotes nebrascensis Thom.

Collected August 15, 18, 21, 24, Sept. 17, 24, Oct. 9, 1926. The specimen dated Oct. 9 is a female. This insect seemed to be more numerous on the hillsides. Only the short-winged form was taken and seen. Somes (1914) records the species as occurring on tall grasses in upland meadow in Iowa.

Scudderia texensis Sauss.-Pict.

Collected July 28, Aug. 3, 15, 1925; Aug. 17, 1926. The four specimens were taken from tall grass on the hillsides. Blatchley (1920) found it among taller grasses near water and in damp ravines. Shelford (1913) found it on goldenrod (Solidago sp.) in high prairie.

Amblycorypha brachyptera Brun.

Collected Aug. 9, 1926. Only one specimen was secured, and from a goldenrod stem (Solidago sp.) near the lower end of the ravine. Ball (1897) found it on a few patches of prairie

grass at Ames.

Neoconocephalus ensiger Harr.

Collected Aug. 3, 13, 21, 1925; Aug. 7, 9, 16, 1926. A pinkish brown female was taken Aug. 13. Aug. 21, a female with more pink was secured. At those dates the prairie grasses, especially Andropogon species, are becoming noticeably reddish. On the night of Aug. 9, 1926 three males were seen in stridulation on rosin-weed (Silphium laciniatum L.), (Andropogon sp.), and goldenrod (Solidago sp.). Each was about three feet from the ground. This species provided the loudest singers of the night Aug. 16, 1926. Shelford (1913) found it "usually common" on high prairies.

Orchelimum vulgare Harr.

Collected Aug. 3, 5, 10, 13, 24, 1925. This species was rather scarce in 1925. None were seen in 1926. Ball (1897) reports it abundant in meadows and low woods where undergrowth is mainly grasses. Shelford (1913) took it from goldenrod (Solidago sp.) on high prairie.

Conocephalus fasciatus De Geer.

Collected Aug. 5, 18, 1925. Only two specimens were secured in 1925. None were seen in 1926. Blatchley (1920) states that this species is abundant especially in low ground, blue-grass pastures.

Conocephalus saltans Scudd.

Collected Aug. 10, 14, 16, 18, 24, 1925; Aug. 13,

Sept. 17, 24, Oct. 1, 9, 1926. This species appeared about a week later than C. strictus and gradually became more numerous. No females were taken in 1925, and the three females taken in 1926 required rather close collecting. The males probably outnumber the females. Blatchley (1920) says it occurs mainly on dry upland prairies and sandy barrens.

Conocephalus strictus Scudd.

Collected Aug. 5, 10, 11, 16, 18, 21, 24, 1925; Aug. 13, 1926. The males seemed to far outnumber the females. Shelford (1913) found this species on high prairie. Fox (1915) found it most frequent at higher elevations.

Nemobius fasciatus De Geer.

Collected Aug. 18, 1925; Aug. 13, 14, 16, Sept. 17, 24, Oct. 1, 9, 1926. The specimens of 1925 were taken about a rod from the southern edge of the field, and among the Andropogon and Bouteloua grasses, free from cover. In 1926 the species was seen at nearly all parts of the field except rarely on the nearly barren hilltops. A female was taken at light on the night of Aug. 16. No long-winged specimens were seen.

Gryllus assimilis Fabr.

Collected Aug. 5, 6, 13, 1925; Aug. 16, 1926. The specimens of 1925 were taken under small stones near the southern edge. The specimen of 1926 was taken under a small stone at the eastern edge. The chirping was heard along the edges

chiefly, where the Helianthus, Solidago, Andropogon, and Elymus species grew taller than the Bouteloua species of the main part of the area, and where the edges under fences permitted of debris collection.

Oecanthus nigricornis Walk.

Collected Aug. 13, 21, 24, 1925. None were seen in 1926. The specimens of 1925 were seen only along the southern edge where freedom from cultivation in the neighboring oat field permitted a more rank growth of goldenrod (Solidago sp.) and Helianthus sp. that the cultivation of corn in 1926 nearly eliminated.

Oecanthus quadripunctatus Beut.

Collected Aug. 3, 10, 18, 21, 24, 1925; Aug. 2, 9, 14, 1926. This species was seen most frequently on the hillsides where Andropogon sp. replace much of the shorter Bouteloua sp. grasses, and where the Compositae are more numerous. At about 9:30 P.M. Aug. 2, 1926 Dr. B. B. Fulton distinguished the song of this species, and with the aid of an electric flashlight the male was identified by him. The insect was on the ground on a hilltop, but the author muffed the catch.

Order Neuroptera

Chrysopa bipunctata Fh. (Banks, det.)

Collected Aug. 14, 1926.

Chrysopa chlorophana Burm. (Banks, det.)

Collected Aug. 24, 1925. Smith (1922) includes C. chlorophana Burm. as a variety under C. oculata Say, which, he states, is a garden and field species.

Order Odonata

Lestes unguicalata Hagen (Hoffman, det.)

Collected July 28, 1925. Hoffman states that this male specimen is very large for the species.

Argia tibialis Rambur (Hoffman, det.)

Collected June 23, 1925. The specimen taken is a male.

Order Thysanoptera

Aelothrips fasciatus Linnè (Hood, det.)

Collected May 17, 1926. The specimen was taken on the flower of wild strawberry (Fragaria sp.), and is female. Morgan (1914) states that species was taken in blossoms of wild tobacco.

Frankliniella tritici Fitch (Hood, det.)

Collected April 11, 19, 1926. The specimens of April 11 and 19 were taken on flowers of pasque flower (Anemone patens var. Wolfgangiana Koch.), and are female.

Order Hemiptera

The species of this order have been determined as cited in the list.

Homaemus aeneifrons Say (Knight, det.)

Collected Aug. 24, 1925; July 2, 1926. Stoner (1920) says it is most likely to be taken in prairie pastures. Parshley (1923) took this species in large numbers in late fall in the White Mountains by sweeping Solidago. He says it is very rare in lowlands.

Homaemus bijugis Uhl. (Knight and Barber, det.)

Collected June 18, 28, July 1, 2, Sept. 17, 1926. Blatchley (1926) says it occurs usually in sandy regions. Stoner (1920) says that most of his specimens had been taken from prairie and blue grass pastures along the edges of woods.

Homaemus parvulus Germ. (Barber, det.)

Collected June 29, 1926.

Galgupha atra A.&S. (Knight, det.)

Collected June 18, June 20, 1925. The specimen of June 18 is female, and that of June 20 is male. Blatchley (1926) says it occurs in summer on grass and weeds in moist soil along roadsides, forests, and borders of streams. Stoner (1920) reports this species on barley, ribwort (Plantago aristata Michx.), seeds of painted cup (Castilleja sessiliflora Pursh.), and blue grass.

Galgupha nitiduloides Wolff (Knight, det.)

Collected June 18, July 2, 1925; July 29, 1926. The

specimen of July 29, 1926 was taken on a flower of rosinweed (Silphium laciniatum L.). Blatchley (1926) says it occurs on vegetation, especially that of hazel and milkweed, along the edges of woodland and cultivated fields. Stoner (1920) says it is usually found in low places along the edge of woods, often on hazel, and prairie hillside pastures.

Corimelaena pulicaria Germ. (Knight, det.)

Collected July 8, 1925; May 9, 1926. Forbes (1905) says its favorite food plants seem to be Jersey tea (Ceanothus americanus L.), Spanish needles, and a small dooryard weed (Veronica peregrina L.). Stoner (1920) says almost any truck patch should yield numbers of this species, particularly if it be located in a more or less moist situation. He reports it from a number of plants such as potatoes, tansy, red clover, blue grass, cosmos, coreopsis, wheat, and summer lilacs.

Amnestus spinifrons Say (Knight, det.)

Collected Oct. 9, 1926. Stoner (1920) swept the species from blue grass on the sandy knolls immediately south and west of the Iowa Lakeside Laboratory, but found it very scarce elsewhere in the state.

Amnestus pallidus Zimmer (Knight, det.)

Collected Oct. 9, 1926. Stoner (1920) swept it in June from plantain-leaved everlasting (Antennaria plantaginifolia L.).

Peribalus limbolarius Stal (Knight, det.)

Collected July 15, 1925; Aug. 25, Oct. 1, 9, 1926. Blatchley (1926) writes that it occurs in summer and autumn on flowers of goldenrod and other Compositae, especially those growing in alluvial soils or along the margins of ponds. Stoner (1920) gives Solidago sp. as one of the commonest food plants.

Thyanta custator Fab. (Knight, det.)

Collected Aug. 1, 4, 7, 9, 1926. On Aug. 4, 1926 a specimen was taken from a leaf of purple coneflower (Brauneria purpurea Britton). Stoner (1920) took it from red clover in some numbers especially if fields were a little moist, occasionally from weeds and grasses of various kinds. Hart (1919) says the species is found especially on dry or sandy soil.

Euschistus variolarius P.B. (Knight, det.)

Collected June 20, 25, July 8, 25, 28, Aug. 7, 24, 1925; June 4, July 1, Aug. 9, 13, 16, Oct. 9, 1926. On June 4, 1926 a specimen was taken while feeding on a leaf of purple coneflower (Brauneria purpurea Britton). On July 1, 1926 an individual was observed with the beak in a disc flower of purple coneflower. On Aug. 13, 1926 an individual was taken while feeding on a leaf of Jersey tea (Ceanothus americanus L.). Blatchley (1926) says it occurs on foliage and flowers of numerous plants, frequenting for most part those

found along the margins of upland fields and in open woodland pastures. Stoner (1920) writes that fields of red clover and timothy are favorite haunts of this bug.

Coenus delius Say (Knight, det.)

Collected July 2, 1925; May 26, July 1, 2, Aug. 13, Sept. 9, Oct. 1, 1926. Stoner (1920) says timothy and clover fields, particularly those in more or less moist situations, are the places most frequently chosen by this insect.

Merocoris distinctus Dall. (Knight, det.)

Collected May 15, 1926. Blatchley says it is found in summer and autumn on flowers of the purple milkwort (Polygola viridescens L.), goldenrod, and other herbs growing along railways and roadsides. Uhler (1876) says that in Maryland, it is often common in corners of fields adjoining woods where the small weeds and shrubs grow luxuriantly. Parshley (1914) writes about several of these species disappearing within the carcass of a long dead fowl, but he did not learn for what purpose.

Euthochtha galeator Fab. (Knight, det.)

Collected Oct. 9, 1926. Blatchley (1926) says it occurs in summer and autumn on the foliage of shrubs and leaves along the slopes of hills and borders of thickets and roadsides.

Alydus conspersus Montd. (Knight, det.)

Collected July 28, 30, Aug. 10, 15, 1925; June 4, July 11, 29, Aug. 7, 13, 25, Sept. 17, 1926. On June 7, 1926 a nymph was placed on ground plum (Astragalus caryocarpus Ker.), and was observed to feed on the plant stem. It molted, and became adult June 8, 1926. It fed upon Astragalus several times during the next three days. On Aug. 13 one was seen feeding upon the flowers of purple prairie clover (Petalostemum purpureum Rydb.), one upon tick trefoil (Desmodium sp.) pods, and one upon bush clover (Lespedeza capitata Michx.) flowers. On Aug. 25, 1926 several nymphs and adults were observed feeding on the fruits of white prairie clover (Petalostemum candidum Michx.). Blatchley (1926) says it occurs on various plants growing in dry sandy localities.

Alydus eurinus Say (Knight, det.)

Collected Aug. 13, 14, 1926. Blatchley (1926) says it is taken most frequently on foliage and flowers of Jersey tea and other plants growing along the high dry sandy margins of streams and lakes. Fracker (1918) says the young have been bred on Astragalus in Colorado, and that the adults are numerous on goldenrod and other fall flowers.

Corizus bohemani Sign. (Knight and Barber, H. G., det.)

Collected May 30, July 1, 7, 1926. Blatchley (1926) says it is found in autumn on weeds along the margins of meadows and roadsides, and in early summer on flowers of shrubs along the borders of thickets, especially those of dogwood (Cornus alternifolia L.). Van Duzee (1894) found it abundant in fields and pastures.

Lygaeus kalmii Stal (Knight, det.)

Collected June 20, 1925. Blatchley (1926) gives Asclepias syriaca L. as its most common food plant.

Nysius ericae Schill. (Knight and Barber, H. G., det.)

Collected June 19, 28, 29, Aug. 3, 7, 1926. On the night of Aug. 3, several came to light. Blatchley (1926) took it by sweeping weeds and grasses in meadows and waste places. Riley (1873) gave it the common name of false chinch-bug, and recorded it as injurious to several vegetables and fruits.

Geocoris uliginosus Say (Barber, det.)

Collected June 2, 1926. A mating pair was taken. Blatchley (1926) says that in summer it occurs on flowers of Eupatorium and other Compositae along streams and marshes. Uhler (1877) says that it occurs on the ground in dark loamy spots, in woods and near streams, often in places exposed to the sun, and around the roots of Solanum carolinense L.

Phlegyas abbreviatus Uhl. (Knight, det.)

Collected Aug. 3, 1926. This specimen came to light on the night of Aug. 3. Blatchley (1926) writes that it was taken from April to October by sweeping weeds and grass in meadows, pastures, and waste places.

Ligyrocoris diffusus Uhl. (Knight, det.)

Collected June 20, July 15, 21, 28, 29, 30, Aug. 24, 1925; June 19, July 7, Aug. 5, 9, 13, Sept. 24, Oct. 1, 1926. On July 21, 1925, a specimen was taken while feeding on a Coreopsis palmata Nutt. flower. On July 28, an individual was taken from a flower of black-eyed Susan (Rudbeckia hirta L.). At eight o'clock in the evening, Aug. 9, 1926, an individual seemed active on a flower of prairie coneflower (Lepachys pinnata T. & G.). Blatchley (1926) took it by sweeping tall grasses and other herbage along the margins of wet meadows and marshes.

Perigenes constrictus Say (Knight, det.)

Collected Aug. 10, 1925. Blatchley (1926) says it has been taken on herbage along streams and on mullein in sandy localities in June and July and beneath sphagnum moss in August.

Pseudocnemodus canadensis Prov. (Knight, det.)

Collected Aug. 13, 14, 18, 25, Sept. 24, Oct. 1, 1926. The specimens of Aug. 13, 14, and 18 were found on the ground. On Aug. 25, an individual was taken from beneath a small stone. On Oct. 1, 1926 several were swept from the vegetation.

Sphragisticus nebulosus Fall. (Knight, det.)

Collected Aug. 3, 1926. The one specimen was taken at light on the night of Aug. 3. Blatchley (1926) says it is an European species and it was taken in one county in Indiana, where it hibernated beneath rubbish along the borders of sandy fields, especially those in which melons had been cultivated.

Piesma cinerea Say (Drake, det.)

Collected May 9, June 10, July 2, Aug. 18, Oct. 9, 1926. This species feeds on rough pigweed (Amaranthus retroflexus L.) and foliage of sycamore, buckeye, beech and various other plants according to Blatchley (1926).

Melanorhopala clavata Stal (Drake, det.)

Collected July 8, 15, 28, 1925; June 8, 1926. Drake (1923) collected several specimens on tall weeds near a small stream, and he places it in the Plain association which is defined as a series of openings having much the aspect of wet lowland.

Phymata erosa fasciata Gray (Knight, det.)

Collected July 8, 15, 30, Aug. 3, 1925; July 14, 26, 30, Aug. 5, 9, 13, 14, 24, 25, 26, Sept. 17, 1926. On July 30, 1925 a specimen was taken feeding on a bee (Halictus albipennis Robert). One was taken from a head of thistle (Cirsium lanceolatum Hill) on Aug. 13, 1926. On July 14, 1926 one taken on white prairie clover (Petalostemum candidum Michx.) appeared more nearly grayish green than one taken

from the flower of rosin-weed (Silphium laciniatum L.) which was more nearly yellowish green. On July 26, 1926, four mating pairs were taken on flowers of rattlesnake master (Eryngium yuccifolium Michx.). On July 30, 1926, three-fourths of more than fifty flowering stalks of rattlesnake master were inhabited by this species. Of thirty plants of rosin-weed (Silphium laciniatum L.), only two were found holding this species on the flowers. The Eryngium yuccifolium was in full bloom while Silphium laciniatum was just beginning to be supplied with disc flowers in full bloom. Many were seen clinging to the stalks just below the buttons of E. yuccifolium. On Aug. 5, 1926 two specimens were seen on fourteen flowering stalks of goldenrod (Solidago), four on nineteen plants of rosin-weed (Silphium laciniatum L.), and seven on twelve plants of E. yuccifolium. Bees, and flies were much more numerous at rattlesnake master (Eryngium yuccifolium Michx.). On the night of Aug. 9 none were found on plants, on the bare ground, or about the bases of plants. On Aug. 14, 1926 this species was seen on flowers of mountain mint (Pycnanthemum sp.), blazing star (Liatris pycnostachya Michx.), rosin-weed (Eryngium yuccifolium Michx.), and were mating on goldenrod (Solidago). On thistle (Cirsium lanceolatum Hill) an individual walked over the very sticky involucre of the flower-head without hesitation. The species was most frequently seen on goldenrod (Solidago) flowers

Aug. 25, and Sept. 17, 1926. On Oct. 9, one specimen was taken, but it seemed quite inactive.

Nabis ferus Linn. (Harris, det.)

Collected June 20, and each collecting date to Aug. 24, 1925; Mar. 23, 1926 and each collecting date to Oct. 9, 1926. On April 21, 1926 an individual was observed feeding on a tarnished plant bug (Lygus pratensis oblineatus Say). Drake (1923) states that this insect prefers open grassy areas and feeds largely upon grass-destroying insects. Harris (1925) took N. ferus, "on most all vegetation, but most commonly in meadows, along roadsides, fences, etc., where vegetation is relatively short".

Lyctocoris campestris Fabr. (Harris, det.)

Collected Oct. 9, 1926. Uhler (1878) found the species beneath loose bark of decaying trees, and he saw them running over the fruit of raspberry.

Triphleps insidiosus Say (Knight, det.)

Collected July 15, 1925; Aug. 13, 25, Sept. 17, 24, Oct. 1, 9, 1926. On Oct. 1, 1926 several specimens were taken from flowers of Gentiana puberula Michx. Blatchley (1926) says that it lives in or on the heads of various flowers where it feeds on plant lice and other small, soft-bodied insects and their eggs and larvae.

Stenodema vicinum Prov. (Knight, det.)

Collected June 25, 1925; June 24, 1926. Blatchley (1926) states that it occurs usually in abundance in June and July

on grasses in low moist meadows.

Miris dolabratus Linn. (Knight, det.)

Collected June 10, 1926. Blatchley (1926) says it occurs by myriads in pastures, meadows and waste places on bluegrass, timothy and other forage grasses, and doubtless doing much damage to them, and it is an introduced European species known as the meadow plant-bug.

Adelphocoris rapidus Say (Knight, det.)

Collected June 20, July 8, 15, 16, 28, Aug. 24, 1925; May 28, June 19, 28, July 11, Aug. 14, 21, 25, Oct. 1, 1926. The specimen of July 29, 1926 was taken on a flower of rattlesnake master (Eryngium yuccifolium Michx.). On Aug. 14, 1926 one was taken on a flower of mountain mint (Pycnanthemum sp.) and on Aug. 25, 1926 one was caught on the flowers of a goldenrod (Solidago sp.). Knight (1923) found it breeding on Rumex in northern states. Blatchley (1926) says that it occurs on various plants, especially those of moist localities.

Capsus ater semiflavus Linn. (Knight, det.)

Collected May 28, 1926. Knight (1923) gives Poa compressa, Agropyron repens, and probably other grasses as food plants of C. ater.

Capsus simulans Stal. (Knight, det.)

Collected June 5, 1926.

Lygus plagiatus Uhl. (Knight, det.)

Collected April 12, Oct. 9, 1926. Knight (1917) found

it usually occurring on great ragweed (Ambrosia trifida L.) and (1923) breeding on great ragweed.

Lygus pratensis L. (Knight, det.)

Collected July 28, 1925; May 12, 1926. This species is found on various plants.

Lygus pratensis oblineatus Say (Knight, det.)

Collected June 20, 1925, and all collecting days to Aug. 24, 1925; Mar. 23, 1926 to Oct. 1926 on all collecting dates. This insect was seen on nearly every species of plants observed in this area, and was most numerous at the flowers. Knight (1917) states that it is found everywhere frequenting many kinds of plants, and that it is a pest on nursery stock, ornamental plants, and cultivated crops.

Lygus pratensis strigulatus Walk. (Knight, det.)

Collected June 18, Aug. 14, Sept. 17, 24, 1926. The specimen of Aug. 14 was taken from a flower of mountain mint (Pycnanthemum sp.), and that of Sept. 17 from flowers of golden-rod (Solidago sp.). This variety is not so common as oblineatus.

Lygus campestris Linn. (Knight, det.)

Collected July 7, Aug. 13, 25, 1926. Blatchley (1926) says this is an European species. Knight (1923) found it breeding on Conium maculatum L., and other Umbelliferae.

Strongylocoris stygicus Say (Knight, det.)

Collected June 5, 8, 1926. Blatchley (1926) says it occurs on great ragweed (Ambrosia trifida L.), and Virginia

creeper, in alluvial soil along streams and on grasses and low herbage in dense woodlands. He also writes that it breeds on goldenrod and probably on wild sunflower and other Compositae. Knight (1923) gives Solidago species as the food plants of this species.

Ilnacora chloris Uhl. (Knight, det.)

Collected June 7, 1926.

Lopidea media Say (Knight, det.)

Collected June 18, 1925; July 9, 1926. Knight (1918) reports having found this species breeding on goldenrod (Solidago rugosa Mill.). He is of the opinion, judging from its distribution, that it breeds on other plants also.

Lopidea minor Knight (Knight, det.)

Collected June 20, July 2, 30, Aug. 18, 19, 1925; June 24, Aug. 16, 25, 1926. On Aug. 18, 1925 several were taken by sweeping lead plant (Amorpha canescens Pursh.). Specimens mounted Aug. 19, 1925 had been kept for several days in a cage with purple prairie clover (Petalostemum purpureum Rydb.), lead plant (Amorpha canescens Pursh.), and bush clover (Lespedeza capitata Michx.). They showed a preference for Petalostemum purpureum.

Lopidea teton Knight (Knight, det.)

Collected June 18, 20, 1925; May 26, June 4, 5, 1926. On May 12, 1926 two nymphs were brought in and placed on ground plum (Astragalus caryocarpus Ker.). They became adults,

after molting twice, on May 26. On June 4 the species was numerous on the fruit of ground plum. The fruit shrivelled, and did not develop many seeds.

Deraeocoris histrio Reut. (Knight, det.)

Collected Aug. 4, 1926. This specimen came to light on the night of Aug. 4, 1926. Knight (1923) states that it frequents borders of ponds, and is probably predaceous.

Plagiognathus davisi Knight (Knight, det.)

Collected July 14, 1926.

Chlamydatus associatus Uhl. (Knight, det.)

Collected July 2, Aug. 18, May 9, 12, 15, June 24, Aug. 13, 25, 1926. Blatchley (1926) writes that it is frequent locally on both great and common ragweeds, flowers of Crataegus, etc. Knight (1923) gives ragweed (Ambrosia) as its food plant.

Order Homoptera

The species of this order have been determined as cited in the list.

Okanagana balli Davis (Davis, det.)

Collected June 18, 1925; June 8, 21, 26, 28, 1926. On June 21, 1926 a male and a female were observed on golden-rod (Solidago). The female was seen to flutter her wings slightly, make a slight ruffled sound, and move away from the male. The male, that had been determined by his singing a few moments before, followed the female. This performance was kept up for about fifteen minutes, and then each went an opposite way. On June 28 seven were heard singing at one time. July 1, 1926 several were heard, but none were seen.

Melampsalta calliope Walk. (Knight, det.)

Collected June 2, 1925; July 2, 1926.

Ceresa bubalus Say (Ball, det.)

Collected Aug. 24, 1925. Funkhouser (1923) writes concerning this species as being injurious to apple and elm trees, and records a number of trees and plants as its hosts and none of these are numerous in this field.

Stictocephala inermis Walk. (Ball, det.)

Collected July 27, 1925; July 7, 24, Aug. 13, 25, 1926. Funkhouser (1923) gives sweet clover, red clover, white clover, timothy, and apple as hosts of this species.

Stictocephala lutea Walk. (Ball, det.)

Collected May 7, 9, June 4, 1926. Funkhouser (1923) states that this species is found chiefly on trees, particularly various species of oaks, and that it is less common on grasses than S. inermis.

Publilia concava Say (Ball, det.)

Collected May 15, 1926. Funkhouser (1923) gives goldenrod, skunk-cabbage, New England aster, wormwood and alder as its preferred host plants.

Campylenchia latipes Say (Knight, det.)

Collected June 20 and each collecting date thereafter to Aug. 24, 1925; June 28, and each collecting date thereafter to Oct. 9, 1926. Funkhouser (1923) says it is a grass-inhabiting species, common in pastures, and seems to prefer leguminous plants.

Agallia novella Say (Ball, det.)

Collected Aug. 13, 18, 1926. De Long (1923) says that this species feeds on grasses and herbaceous plants and is abundant in fields and open woods.

Agallia 4-punctata Prov. (De Long, det.)

Collected June 25, 1925. According to De Long (1923) this species has a great variety of food plants, and is commonly taken in fields, among weeds, in gardens, etc.

Agallia sanguinolenta Prov. (De Long, det.)

Collected July 2, 28, Aug. 3, 1925; June 19, July 11, Aug. 25, Sept. 17, Oct. 1, 1926. De Long (1923) states that this is a pest of forage crops, especially abundant on clover and alfalfa, and seems able to exist under varied circumstances, whether meadows or dry sandy areas.

Draeculacephala mollipes Say (De Long, det.)

Collected June 25, July 25, Aug. 10, 15, 24, 1925; June 19, 28, Aug. 3, Sept. 24, Oct. 1, 9, 1926. De Long (1923) writes this species is found on numerous grasses and sedges in swamps and uplands.

Gypona melanota Spangb. (De Long, det.)

Collected July 21, 23, 27, 30, Aug. 10, 13, 21, 1925; Aug. 13, 25, 1926. According to De Long (1923) this species is grass-feeding and found in meadow, pasture, and prairie situations.

Gypona cinerea var. kansana Ball (Ball, det.)

Collected June 18, July 2, 1926. De Long (1923) says this is apparently a grass-feeding species.

Xerophloea viridis Fab. (Ball, det.)

Collected Aug. 7, 1926. This specimen was taken from the high, nearly barren part of a hilltop. De Long (1923) writes that the species is often found in dry upland grassy areas, and occurs on Aristida gracilis society.

Stroggylocephalus agrestis Fall. (De Long, det.)

Collected July 8, 1925; July 7, 1926. De Long (1923) says this species occurs in moist grassy areas.

Parabolocratus flavidus Sign. (De Long, det.)

Collected July 6, 1925.

Platymetopius cinereus O. & B. (De Long, det.)

Collected June 20, July 21, Aug. 21, 1925; June 19, June 24, Aug. 13, 14, 18, 1926. Osborn (1912) says this species appears to develop especially on Andropogan scoparius, Bouteloua hirsuta, and B. curtipendula, the latter two being probably its most common hosts.

Platymetopius frontalis Van D. (Ball, det.)

Collected Aug. 14, 18, 1926. De Long (1923) states this species to be common in damp meadows and a pest of herbaceous plants and grasses.

Deltocephalus albidus O. & B. (De Long, det.)

Collected June 23, July 28, 1925; July 7, 11, Aug. 7, 18, 1926. Osborn & Ball (1897) state that no definite food habit could be assigned, as there was a rich variety of native grasses where it occurred so abundantly. It was not, however, found on a field of Andropogan scoparius, or where Bouteloua predominated.

Deltocephalus reflexus O. & B. (Ball, det.)

Collected Aug. 18, 1926. Osborn & Ball (1897) report this species well distributed over the prairies but had not been found on the field of Andropogan scoparius.

Deltocephalus abbreviatus O. & B. (De Long, det.)

Collected Aug. 15, 1925. Osborn and Ball (1897) took the species from Bouteloua hirsuta on a high gravelly pasture.

Deltocephalus configuratus Uhl. (De Long, det.)

Collected July 2, 8, 1925; June 19, 28, July 7, 1926. De Long (1923) states that this species is very common on grasses in pastures, meadows, and swampy areas throughout New England in July, August, and September.

Deltocephalus inimicus Say (De Long, det.)

Collected June 18, July 15, 21, 27, 28, 29, Aug. 10, 15, 18, 21, 1925; June 19, Aug. 18, Sept. 17, Oct. 1, 9, 1926. De Long (1923) says that this species is one of the few species of greatest economic importance, and has a great variety of food plants. It is a common grass feeder, but is also important in its relation to garden, cereal, and forage crops as well as a pest of pasture and meadow.

Deltocephalus minimus O. & B. (Ball, det.)

Collected Aug. 18, 1926. Osborn and Ball (1897) state that this species occurred chiefly where Sporobolus and Stipa were very plentiful.

Deltocephalus unicoloratus G. & B. (De Long, det.)

Collected June 18, 20, July 2, 28, Aug. 5, 1925; June 19, Aug. 18, 1926.

Deltocephalus oculatus O. & B. (Ball, det.)

Collected June 4, Oct. 1, 1926. Osborn and Ball (1897) found it everywhere on Andropogan scoparius to which it seemed strictly confined.

Deltocephalus striatus Linn. (De Long, det.)

Collected Aug. 10, 21, 25, 1925; Sept. 24, 1926. De Long (1923) writes that it is a very common and widely distributed form throughout the summer feeding in pastures and meadows on field and swamp grasses.

Euscelis exitiosus Uhl. (De Long, det.)

Collected Aug. 15, 24, 1925; Aug. 18, 1926.

Euscelis striolus Fall. (De Long, det.)

Collected July 16, 1925. De Long (1923) states that this species occurs in swampy and boggy places and is found in great numbers on Juncus along moist margins of ponds and lagoons.

Euscelis anthracinus Van D. (Ball, det.)

Collected Aug. 25, 1926. The species is more numerous than collecting dates would indicate. Nymphs were taken June 19, 1926 and observed several times, but no adults were seen before Aug. 25, 1926. De Long (1923) says it was collected in high and dry meadows where it feeds in abundance on very short grasses.

Euscelis striatulus Fall. (De Long, det.)

Collected June 18 and each collecting date to Aug. 24,

1925; June 19 and each collecting date to Sept. 17, 1926. This is the most common member of the Homoptera taken in the field. The numbers were much larger on the tops of the hills than elsewhere. De Long (1923) states that it is a common form in bogs on blueberry and allied plants in August and September.

Euscelis comma Van D. (De Long, det.)

Collected June 20, 25, July 2, 28, 1925; June 19, 28, July 7, 16, 30, 1926. Osborn (1923) states that in Iowa this species was taken on Elymus.

Euscelis curtisii Fh. (De Long, det.)

Collected July 2, 8, 30, Aug. 3, 24, 1925; July 7, 14, 30, Aug. 16, 1926. De Long (1923) writes that it occurs in grassy pastures and meadows.

Phlepsius irroratus Say (Ball, det.)

Collected Aug. 18, 25, Sept. 17, 24, Oct. 1, 9, 1926. De Long (1923) says this species is especially found on grasses in pastures and meadows.

Chlorotettix unicolor Fh. (De Long, det.)

Collected June 23, July 15, 25, 1925; Aug. 25, 1926. De Long (1923) states that this species is common on blue-grass and allied grasses in pastures and meadows throughout the summer.

Chlorotettix spatulatus O. & B. (De Long, det.)

Collected July 27, 28, 30, Aug. 4, 5, 7, 10, 13, 15,

23, 1925; Aug. 18, 1926. According to De Long (1923) it is often found in grassy pastures and meadows.

Cicadula sexnotata Fall. (De Long, det.)

Collected June 25, 27, July 21, 28, 30, Aug. 5, 1925; Aug. 3, Sept. 24, 1926. De Long (1923) states that this is a cosmopolitan feeder taken usually on herbaceous plants and common on grasses in pastures and meadows throughout the summer, and that it is often a pest on cultivated grasses and truck crops.

Eugnathodus abdominalis Van D. (Ball, det.)

Collected June 24, 1926. De Long (1923) writes that this is a common pasture and meadow form, sometimes swept from shrubs.

Empoasca obtusa Walsh. (Ball, det.)

Collected Aug. 3, 1926. De Long (1923) states this species is common on willows in early spring and summer.

Empoasca mali Le B. (De Long, det.)

Collected July 15, 1925. De Long (1923) says that this species is a cosmopolitan feeder being a pest of apple, alfalfa, grain and truck crops, and attributed with the carrying of fungus diseases.

Scolops sulcipes Say (Ball, det.)

Collected June 20 and each collecting date thereafter to Aug. 24, 1925; July 6, 9, 11, 14, 16, 30, Aug. 7, 13, 1926. Mating pairs were frequently seen July 14, 1926 to July 30,

1926 two individuals were feeding on a leaf of purple coneflower (Brauneria purpurea Britton). Osborn (1923) states that Scolops sulcipes Say is a common species in meadow associations of eastern United States.

Scolops desiccatus Uhl. (Ball, det.)

Collected Aug. 21, 1925.

Bruchomorpha dorsata Fitch (Ball, det.)

Collected Sept. 24, Oct. 9, 1926.

Kelisia parvula Ball (Ball, det.)

Collected July 15, 1925; Aug. 18, 1926.

Aphis monardae Oest. (Hottes, det.)

Collected July 15, 1926. Taken from horsemint (Monarda fistulosa L.).

Order Coleoptera

The species of this order have been identified by the author unless credit is given to another worker.

Cicindela punctulata Fabr. (Wickham, det.)

Collected Aug. 2, 1925; Aug. 3, 7, 9, 1926. The specimens of Aug. 2, 1925, and Aug. 7, 1926 were taken on the hilltop where the grass is short and thin. The specimens of Aug. 3 and Aug. 9, 1926 were taken at light. Blatchley (1910) found this species in Indiana along dry upland roads and especially pathways in open woods. He took it frequently at electric lights.

Pasimachus elongatus Lec.

Collected June 22, 1926. The specimen of June 22 was taken running among the grasses at the center of the field. This species was seen at each time of collection from June 20, 1926 to Aug. 25, 1926 after stones at the east edge of the field were turned over. These small stones were placed in the field in the spring of 1926 when a neighboring meadow was plowed for corn.

Evarthus sp. (Wickham, det.)

Collected May 12, 1926. This specimen was taken running in the grass at dusk.

Lebia pumila Dej. (Wickham, det.)

Collected May 12, 1926. This species is probably scarce on high prairie since only one specimen was secured and no

others were seen.

Stenolophus conjunctus Say (Wickham, det.)

Collected Mar. 23, April 21, May 1, Oct. 9, 1926. The early and late appearance might indicate a hibernating habit of the part of this species. Blatchley (1910) speaks of this species as being common in sandy localities, and as hibernating.

Philonthus fusiformis Melsh. (Wickham, det.)

Collected Apr. 12, 1926. This specimen was taken from beneath rubbish in the shallow ravine.

Philonthus lomatus Erichs. (Wickham, det.)

Collected Mar. 21, 1926. This specimen was taken from beneath rubbish. Blatchley (1910) says this species occurs beneath cover, more commonly in low moist places.

Stenus sp. (Wickham, det.)

Collected June 23, 1925. Blatchley (1910) writes that the Stenids occur for the most part along muddy or sandy borders of lakes, ponds, and streams.

Mycetoporus sp. (Wickham, det.)

Collected Apr. 28, 1926.

Megilla maculata De Geer (Wickham, det.)

Collected May 9, Sept. 9, 1926. This species is probably scarce on this type of prairie as only two individuals were taken.

Hippodamia parenthesis Say.

Collected May 12, 17, June 10, 19, 28, July 1, 7, 15, 30, Aug. 7, 9, 13, 14, Oct. 1, 1926. The species was very numerous on July 15, 1926 when three to four were taken with each ten sweeps of a net. By July 30, 1926 the number per ten sweeps of the net was decreased to one or two. Only three were seen on Oct. 1, 1926.

Hippodamia glacialis Fabr. (Wickham, det.)

Collected May 19, June 18, 1926. This species seemed very scarce as only two specimens were seen and taken during the two seasons.

Hippodamia convergens Guer.

Collected Aug. 24, 1925; June 8, July 1, 7, 13, 14, Aug. 25, Oct. 9, 1926. On July 14, 1926 one or two were taken in every sweeping. The species was most numerous on that date. Webster (1910) found H. convergens with aphids on plums until July 29, 1910. He states that they may migrate to grasses after that date.

Coccinella 9-notata Herbst.

Collected Aug. 10, Oct. 9, 1926. Blatchley found this especially in cultivated ground. The species was scarce in this prairie field.

Coccinella sanguinea Linn.

Collected June 25, 30, 1925; May 25, 1926. Blatchley (1910) reports it as common on goldenrod flowers. Webster (1917) found this species feeding on the box elder aphis

(Chaitophorus negundidis Thos.).

Hyperaspis undulata Say (Rodney Cecil, det.)

Collected June 20, July 28, 1925; May 9, June 4, July 1, Aug. 16, 25, Oct. 9, 1926. Blatchley (1910) writes that it occurs on herbage in low, moist ground. Collections show it rather common in this prairie field.

Hyperaspis pratensis Lec. (Rodney Cecil, det.)

Collected June 4, 1926. This species is scarce since only one specimen was seen and taken.

Languria trifasciata Say (Wickham, det.)

Collected Mar. 24, May 3, Sept. 24, 1926. Blatchley (1910) found this especially on the foliage of wild lettuce (Lactuca conadensis L.), and often on flowers of buttercup (Ranunculus).

Languria mozardi Latr. (Wickham, det.)

Collected July 30, Aug. 13, 1925; May 3, 12, 17, Oct. 9, 1926. The specimen mounted July 30, 1925 became an adult July 27 after spending six days in the pupal stage among its castings in a flower stalk of the purple coneflower (Brauneria purpurea Britton). A cut about two inches below the involucre in the stalk may have been the place of oviposition for this larva. As the larva grew it worked up into the receptacle of the flower. About three-fourths of the purple coneflowers appeared infested in 1925 with this insect. The flowers were little more than one-half of their normal diameter. No larvae

were seen at work on B. purpurea Britton in 1926.

Telephanus velox Hald. (Wickham, det.)

Collected July 21, 1925. Blatchley (1910) reports this species from beneath stones, chunks, and dead leaves. Lack of rubbish may account for its absence from the prairie field at the present time.

Hister sp. No. 1.

Collected Mar. 24, April 30, May 3, Aug. 7, 1926. This was much more numerous than Hister sp. No. 2.

Hister sp. No. 2.

Collected June 19, 1926. This species is probably scarce since only one specimen was secured.

Carpophilus brachypterus Say (Wickham, det.)

Collected April 29, July 28, 1926. The specimen of July 28 was taken from between achenes of a head of purple coneflower (Brauneria purpurea Britton).

Melanopthalma sp. (Wickham, det.)

Collected June 18, 27, July 2, 8, 1925; Apr. 26, 1926. The specimen of June 27, 1925 was found in a decaying unrecognized flower head.

Melanotus communis ? Gyll. (Wickham, det.)

Collected July 8, 1925. Wickham states that this specimen is rather small for the species. It measures 11.5 mm. in length. Blatchley (1910) states that the larvae of this species are among the most injurious wireworms preying upon corn.

Limonius griseus Beauv. (Wickham, det.)

Collected June 30, 1925. This specimen was feeding on the involucre of a flower of Coreopsis palmata Nutt.

Acmaeodera pulchella Herbst. (Wickham, det.)

Collected June 23, 25, 27, 30, 1925; June 28, July 11, 14, 1926. On June 25, 1925 an individual was taken while feeding on a flower of black-eyed Susan (Rudbeckia hirta L.). On June 27, 1925 several were feeding on the flower of the purple coneflower (Brauneria purpurea Britton). A single specimen was taken from a flower of rosin-weed (Silphium laciniatum L.) on July 14, 1926. Blatchley (1910) reports this species from flowers of Jersey tea (Ceanothus americanus L.).

Chauliognothus pennsylvanicus De G.

Collected Aug. 18, 25, Sept. 24, Oct. 1, 1926. On Aug. 18, several were observed on flowers of goldenrod (Solidago sp.). On Aug. 25 specimens were secured from flowers of mountain mint (Pycnanthemum sp.), and goldenrod (Solidago sp.). Blatchley (1910) gives this species as occurring most abundantly in autumn upon flowers of goldenrod (Solidago sp.) and allied plants.

Telephorus sp. (Wickham, det.)

Collected May 17, 21, 1926. Blatchley (1910) says that the members of this genus occur mostly on the foliage of low herbs and shrubs especially in moist lowlands.

Telephorus bilineatus Say (Wickham, det.)

Collected May 9, 1926. Blatchley (1910) says it occurs abundantly on flowers of the red haw (Crataegus) and the foliage of many shrubs.

Ditemnus bidentatus Say (Wickham, det.)

Collected Aug. 5, 1925; May 9, 12, Aug. 18, 1926. This species is the most common Lampyrid of the field. Blatchley (1910) took it from low herbs along roadsides.

Collops quadrimaculatus Fabr.

Collected July 27, 1925; May 30, June 19, 28, July 7, 9, 14, Aug. 16, 1926. This species according to Blatchley (1910) is found more frequently in damp localities.

Hydnocera tricondylae Lec. (Wickham, det.)

Collected June 25, 27, July 2, 28, Aug. 10, 1925; Aug. 1, 7, 11, 16, 1926. On Aug. 1, 1926 this species was the most numerous and active insect in the field. They were seen on nearly every species of plants. Several were seen eating a leaf of purple coneflower (Brauneria purpurea Britton).

Onthophagus hecate Panz. (Wickham, det.)

Collected Aug. 13, 1925. Blatchley (1910) found this species beneath dead birds, snakes and other carrion, and in dung.

Onthophagus pennsylvanicus Harold (Wickham, det.)

Collected June 30, 1925. Blatchley (1910) says this species occurs in carrion, fungi, and dung.

Ataenius cognatus Hald. (Wickham, det.)

Collected Apr. 29, 1926. Blatchley (1910) reports this species hibernating under cow dung, and frequenting fungi.

Aphodius inquinatus F. (Wickham, det.)

Collected Mar. 24, Apr. 3, 1926. The specimens of Mar. 24 were picked up from the ground where they were covered by light debris. On Apr. 3 the species was very numerous on wing, especially near the south edge. According to Blatchley (1910), this is an introduced species from Europe, and it hibernates in cow dung. Cooley (1916) found it at work on horse dung.

Diplotaxis frondicola Say (Wickham, det.)

Collected May 12, June 7, 1926. The specimens of May 12 were taken at dusk. Blatchley (1910) writes that it occurs beneath stones and logs.

Phyllophaga sp. fusca group (Wickham, det.)

Collected May 7, July 2, 1926. The specimen of May 7 was taken at dusk while flying.

Anomala innuba Fabr. (Wickham, det.)

Collected June 18, 20, 1925; June 4, 19, 24, 1926. This species was most numerous in 1926 on June 19. A mating pair was taken June 4, 1926. Blatchley (1910) writes that it occurs especially on the flowers of wild rose and Jersey tea.

Strigoderma arboricola Fab.

Collected June 18, 20, 23, 30, 1925; July 11, 1926. All specimens of 1925 were taken on flowers of the wild rose

(Rosa pratincola Greene). The species were as numerous on wild rose in 1926 as in 1925. On July 11, 1926 an individual was secured feeding on flowers of the lead plant (Amorpha canescens Pursh.). Blatchley (1910) says the species occurs most commonly on the flowers of wild rose, blackberry, and the water willow (Dianthera americana Linn.).

Euphoria inda Linn. (Wickham, det.)

Collected April 12, 1926. The several specimens were taken in the sheltered ravine of the field. Their bee-like buzzing aided in locating them. The second brood, said to occur in Sept. (Blatchley - 1910) was not observed. Blatchley (1910) says the adults are often found sucking the juices of roasting ears, peaches, grapes, and apples, and that the larvae live in rotten wood, beneath chips, and other woody debris.

Cremastochilus knochii Lec.

Collected May 3, 1926. Blatchley (1910) found this beetle rather frequent beneath rubbish along the beach of Lake Michigan, and borders of other lakes. Forbes (1905) writes that it occurs in ants' nests and that he has taken it more than once on fallen ears of corn.

Typocerus sinuatus Newm.

Collected June 25, 30, 1925; June 30, July 14, 1926. On June 25, 1925, the first specimen was found upon a black-eyed Susan (Rudbeckia hirta L.) flower. June 30, 1925 the

species was numerous on flowers of Coreopis palmata Nutt. July 14, 1926 a mating pair was taken from the rattlesnake master (Eryngium yuccifolium Michx.).

Eupogonius vestitus Say (Wickham, det.)

Collected June 18, 1925. Blatchley (1910) writes that this species is said to breed in dead hickory limbs.

Tetraopes femoratus Lec.

This species according to Blatchley (1910) favors milkweed (Asclepias sp.) entirely.

Anomoea laticlavia Forst.

Collected June 18, 20, 1925; June 18, 1926. On June 18, 1926 several were taken in every sweeping of the net.

Babia quadriguttata Oliv. (Wickham, det.)

Collected May 31, June 4, 24, 28, 1926. On May 31 and June 4 a number were seen feeding on leaves of lead plant (Amorpha canescens Pursh.).

Cryptocephalus venustus Fabr. (Wickham, det.)

Collected June 30, July 2, 25, 1925; June 24, Aug. 14, 1926. Blatchley (1910) states that it occurs on "white-top" (Erigeron) in timothy meadows, also on ironweed, wild sweet potato, etc.

Cryptocephalus venustus cinctipennis Rand.

Collected June 23, 1925. Blatchley (1910) says this species occurs especially on foliage of dwarf birch (Betula pumila L.) along the border of marshes.

Cryptocephalus mutabilis Melsh.

Collected Aug. 10, 1925. Blatchley (1910) writes that this beetle occurs on foliage of birch and hazel, on flowers of sprirea, Jersey tea, etc.

Pachybrachys othonus Say

Collected June 18, 20, July 6, 1925. Blatchley (1910) found it frequent on herbage along roadsides.

Pachybrachys spumarius Suff.

Collected July 29, 1925. Blatchley (1910) says it occurs on flowers of wild hydrangea and Jersey tea.

Paria aterrima Oliv. (Wickham, det.)

Collected June 20, July 8, 21, 30, 1925; June 28, 1926. Blatchley (1910) says this species occurs especially on the foliage of wild grape.

Graphops pubescens Melsh. (Wickham, det.)

Collected Apr. 21, 1926. Blatchley (1910) took this beetle in May by sweeping and on evening primrose in summer.

Graphops curtipennis Melsh. (Wickham, det.)

Collected June 18, July 2, 8, 1925; May 9, July 7, 1926. This species was taken on the foliage of evening primrose (Oenothera) several times. The species may be accountable for the small holes in the leaves.

Colaspis brunnea Fab. (Wickham, det.)

Collected July 8, 1925. Blatchley (1910) writes that the larvae are said to feed on the roots of grapes.

Colaspis favosa Say (Wickham, det.)

Collected June 23, 1925. This species is probably scarce in this area as only one specimen was secured.

Nodonota tristis Oliv. (Wickham, det.)

Collected June 18, 1925. Blatchley (1910) found it on various herbs and shrubs in dry upland localities.

Nodonota puncticollis Say (Wickham, det.)

Collected June 18, 1925; May 31, June 19, 1926. On June 19, 1926 many were observed feeding on the leaves of the lead plant (Amorpha canescens Pursh.).

Zygogramma suturalis Fabr.

Collected Aug. 13, 1925; June 5, 1926. Blatchley (1910) found it occurring on flowers of goldenrod in autumn.

Trirhabda canadensis Kirby

Collected June 23, 25, 27, July 2, 8, 21, 1925; July 2, 7, Aug. 13, 25, 1926. July 2, 1925 two specimens were taken from leaves of Silphium laciniatum. July 21, 1925 a specimen was taken from goldenrod (Solidago sp.) leaves. July 2, 13, several were seen eating leaves of sunflower (Helianthus sp.).

Galerucella americana Fabr.

Collected June 20, 23, July 15, 1925; Apr. 28, May 1, 2, 3, 9, 12, 15, 17, 19, 22, June 5, 24, 28, 1926. This species was frequently seen on sunflower (Helianthus) foliage. It was never observed to be feeding.

Diabrotica 12-punctata Fabr.

Collected Aug. 3, 5, 13, 1925; June 7, Aug. 5, 7, 13, 16, 25, Sept. 17, Oct. 9, 1926. Aug. 25, 1926 one was found dead and caught in the sticky involucre of a head of thistle (Cirsium lanceolatum Hill). The other specimens were taken from various flowers where they appeared to be feeding.

Diabrotica longicornis Say

Collected Aug. 15, 16, 1925; Aug. 25, Sept. 13, 17, 24, Oct. 1, 9, 1926. On Sept. 13, 1926 several mating pairs were taken from flowers of thistle (Cirsium lanceolatum Hill). On Oct. 9, 1926 several were seen at south edge of the mown field.

Diabrotica vittata Fabr.

Collected June 20, 1925. Only one specimen was seen, and taken by sweeping in two seasons.

Oedionychis thyamoides Crotch (Wickham, det.)

Collected May 3, 9, 1926. This species was not common in this field. The few seen and taken were on, or near lousewort (Pedicularis canadensis L.) which is not plentiful in the area.

Disonycha quinquevittata Say (Wickham, det.)

Collected Aug. 18, 1925; May 20, June 4, 1926. On June 4, 1926 a female was taken on the ground, and placed in a vivarium with goldenrod (Solidago sp.). During the night of June 5, 1926 she laid 32 eggs under a small clod of earth. All

of these eggs hatched June 14. Some larvae crawled onto the goldenrod, but did not eat any of the leaf. None were noticed going into the soil. On June 15, 8 were placed in a dish with Coreopsis palmata Nutt., Solidago sp., Koeleria cristata Pers., Petalostemum sp., Brauneria purpurea Britton, Erigeron sp. leaves. Leaves of willow (Salix sp.) were also tried. No signs of feeding were observed on any leaf of these various plants. June 18 none were left alive. June 24 the goldenrod plant was dug up, but there was no sign of work on the roots, and several dead larvae were seen. No live larvae were seen.

Disonycha triangularis Say (Wickham, det.)

Collected Mar. 21, 23, Apr. 3, May 21, Aug. 13, 1926. Blatchley (1910) writes that it occurs on Chenopodium and other herbs in moist places, and that adults are said to be injurious to beets and spinach.

Longitarsus testaceous Lec. (Wickham, det.)

Collected July 2, 1925; Apr. 12, 19, 20, May 9, 15, 17, 1926. On May 15, 1926 a specimen was taken while it was eating on the upper surface of a leaf of purple coneflower (Brauneria purpurea Britton).

Longitarsus sp. No. 1. (Wickham, det.)

Collected Apr. 3, 1926.

Longitarsus sp. No. 2. (Wickham, det.)

Collected Mar. 23, Apr. 28, May 9, 1926.

Glyptina spuria Lec. (Wickham, det.)

Collected June 27, July 8, 1925. This species was taken by Blatchley (1910) in summer by sweeping roadside herbage.

Phyllotreta vittata Fabr. (Wickham, det.)

Collected June 19, 1926. Blatchley (1910) says this species occurs on cruciferous plants.

Haltica sp. (Wickham, det.)

Collected May 7, 30, 1926.

Luperaltica fuscula Lec. (Wickham, det.)

Collected July 28, Aug. 3, 10, 13, 15, 24, 1925; Aug. 16, 25, 1926. On July 28 several were taken from flowers of the rattlesnake master (Eryngium yuccifolium Michx.). On Aug. 25, 1926 this species seemed very numerous, and many mating pairs were seen.

Chaetocnema sp. (Wickham, det.)

Collected May 3, June 19, 1926.

Chaetocnema denticulata Ill. (Wickham, det.)

Collected June 20, 23, 25, July 28, 1925. Blatchley (1910) says it occurs on sedges and grasses in moist meadows.

Psylliodes punctulata Melsh. (Wickham, det.)

Collected Mar. 22, 23, 24, Apr. 3, 12, 21, May 3, 9, 1926. Blatchley (1910) writes that it is said to occur on rhubarb and garden weeds.

Microrhopala vittata Fabr. (Wickham, det.)

Collected July 2, 6, 8, Aug. 5, 10, 1925; June 6, Aug. 9, 1926. July 2, 1925 several specimens were taken while feeding on the leaves of the rosin-weed (Silphium laciniatum L.). The larvae are leaf miners of this plant for the adults having been reared from them by the author.

Jonthonota nigripes Oliv. (Wickham, det.)

Collected May 15, 1926. Blatchley (1910) says it occurs on wild morning-glory and sweet potato vines.

Metriona bicolor Fabr. (Wickham, det.)

Collected June 24, 1926. This beetle, according to Blatchley (1910) occurs on several nightshade species.

Bruchus sp. (Wickham, det.)

Collected July 30, 1925. The larva of these beetles (Blatchley, 1910) live in leguminous seeds.

Mordellistena sp. No. 1. (Wickham, det.)

Collected June 18, 20, 1925; June 10, 1926. Specimens were taken from flowers of various plants.

Notoxus anchora Hentz.

Collected June 19, 24, 28, 1926. Gentner (1924) found this species apparently feeding on a live blister beetle (Macrobasis unicolor Kirby).

Anthicus cervinus Laf. (Wickham, det.)

Collected May 1, 3, June 19, 1926. Blatchley (1910) states that it occurs beneath rubbish.

Nemognatha piezata Fab.

Collected July 21, 1925; July 9, 1926. The specimen of July 21, 1925 was feeding on the disc flowers of prairie coneflower (Lepachys pinnata T. & G.).

Macrobasis unicolor Kirby

Collected June 27, 1925; May 26, Aug. 25, 1926. On May 26, 1926 about fifty individuals were seen feeding on the leaves of false indigo (Baptisia bracteata Muhl.). Blatchley (1910) reports this species from false indigo, and other legumes.

Epicauta trichrus Pall.

Collected June 23, 30, July 8, 1925; June 28, 30, July 11, 1926. The specimens of June 30, 1925 were taken on flowers of Coreopsis palmata Nutt. Blatchley (1910) found this species especially on Convolvulus sepium L., Jersey tea, sweet potatoes, etc.

Epicauta marginata Fab.

Collected Aug. 24, 1925. The one specimen was taken from the mown field. Blatchley (1910) says that this species occurs on Clematis, especially, but also on beets, tomatoes, etc. Fulton, Wright, and Gregg (1911) report it as one of the most common of all beet enemies in Pennsylvania.

Epicauta pennsylvanica De Geer

Collected June 25, 30, July 8, 30, Aug. 10, 13, 21, 24, 1925; Aug. 25, Sept. 17, 24, 1926. Several were taken from

the mown field Aug. 24, 1925. On Aug. 25 and Sept. 17, 1926 several were taken from goldenrod (Solidago, sp.) flowers. Blatchley (1910) reports this species as favoring goldenrod (Solidago). Webster (1915) found it abundant usually in Sept. and Oct. in Iowa.

Rhipiphorus dimidiatus Fab.

Collected July 24, 1926. This specimen was taken from a flower of Eryngium yuccifolium Michx. Blatchley (1910) states this species occurs especially on the flowers of the narrow-leaved mountain mint, (Pycnanthemum linifolium Pursh.). A small patch of Pycnanthemum sp. was observed, and collected from frequently in 1926, but no other R. dimidiatus was seen in this field.

Brachytarsus sticticus Boh. (Wickham, det.)

Collected June 20, July 25, 1925; Apr. 21, 1926. The specimen of Apr. 21, 1926 was feeding on the flower of pasque flower (Anemone patens var. Wolfgangiana Koch.). Blatchley (1916) says it breeds in smut of corn and wheat.

Rhynchites bicolor Fab.

Collected June 18, 20, 23, 1925; June 6, 22, 1926. All the specimens were taken from the flowers and foliage of wild roses (Rosa sp.). Blatchley (1916) reports this species from blossoms and foliage of cultivated and wild roses.

Rhynchites (niger) Boh. (Wickham, det.) = aeneus Boh.

Collected June 20, 27, 30, July 2, 1925; June 14, 24, July 1, 14, 1926. June 20 and 27, specimens were taken from

the purple coneflower (Brauneria purpurea Britton). Several on these dates were observed gnawing crosswise grooves on the stems of the B. purpurea about two inches below the flower heads. July 2, 1925 an individual was seen to be gouging the stem of rosin weed (Silphium laciniatum L.) about two inches below a flower head. June 14, 1926 the first specimens of 1926 were taken on B. purpurea. July 1 a mating pair were observed on B. purpurea. The female was gouging the stem about three inches below the head. This pair was placed on B. purpurea stalks in the laboratory, but no egg laying was observed. Larvae of a weevil appearance were seen in many flowers of B. purpurea and S. laciniatum. A number of these were taken indoors, but the larvae died before pupating. The heads of the attacked plants wilt and droop soon after the gouging of the stem. The stem is gouged probably to check the rosin-like compound in S. laciniatum, and in B. purpurea, and prevent the drowning of the larvae.

Apion sp. (Wickham, det.)

Collected June 18, 27, July 6, 21, 1925; May 3, Aug. 25, 1926. July 21, 1925 several mating pairs were seen. Most of the specimens were taken from achenes and seeds of various plants.

Epicaerus imbricatus Say (Wickham, det.)

Collected July 8, 15, Aug. 10, 1925; May 5, 9, 15, July 1, Aug. 5, 16, 1926. A specimen taken July 1, 1926 was eating the foliage of Lespedeza sp. On Aug. 5, 1926 an

individual was taken while feeding on leaves of the lead plant (Amorpha canescens Pursh.). This is known in economic literature as the imbricated snout-beetle, and attacks a large number of trees, forage crops, field crops, grasses, and vegetables according to Blatchley (1916).

Lepidocricus herricki Pierce (Wickham, det.)

Collected July 25, 1925; May 9, 17, 1926. Drury (1923) found it abundant on Ambrosia trifida L. along the edge of an old channel of the Little Miami River, and he reports it as injurious to cotton at a short distance.

Hypera punctata Fab. (Wickham, det.)

Collected July 21, Aug. 24, 1925. Blatchley (1916) writes that it is an introduced species injurious to cultivated legumes. It is known as the clover-leaf beetle.

Phytonomus nigrirostris Fab. (Wickham, det.)

Collected April 30, May 3, 9, June 26, 1926. This species is known as the lesser clover-leaf weevil, and according to Blatchley (1916) has spread eastward and westward after being found in the United States prior to 1873.

Baris striata Say (Wickham, det.)

Collected June 18, 23, 1925; July 1, 1926. Blatchley (1910) says it has been collected on ragweed (Ambrosia psilostachya D.C.) and on sneezeweed (Helenium tenuifolium Nutt.)

Order Lepidoptera

The species of this order have been determined as cited in the list.

Danaus archippus Fabr. (The writer, det.)

On June 22, 1926 more than twenty were seen at flowers of purple coneflower (Brauneria purpurea Britton). One or two were seen on many collecting dates. No larvae were seen in the field.

Cercyonis alope olympus Edw. (Forbes, det.)

Collected Aug. 13, 18, 1925. This species was frequently seen throughout both the 1925 and the 1926 seasons.

Argynnis idalia Dru. (Forbes, det.)

Collected June 20, 1925. From June 20 to Aug. 24, 1925 and from June 19 to Aug. 25, 1926 one to several of this species were seen at this field on each collecting date. Holland (1901) states that the larvae feed upon the leaves of violets.

Vanessa cardui L. (The writer, det.)

Collected July 23, 1926. The thistle (Cirsium lanceolatum Hill) was first observed infested with larvae of V. cardui on May 17, 1926. The butterflies were fairly common throughout most of the summer.

Chrysophanus dione Scud. (Forbes, det.)

Collected June 21, 1925; July 2, 1926. This species was fairly common for several weeks in June and July, 1926.

Chrysophanus hypophlaeus Bdv. (Forbes, det.)

Collected Sept. 24, 1926. Holland (1901) writes that the larva feeds upon the common sorrel (Rumex acetosella L.). The species was not commonly seen in this area.

Pamphila metea Scud. (Forbes, det.)

Collected June 23, 1925. This species was rather common in the latter part of June, 1925, and appeared to be rather common in June of 1926.

Eubaphe laeta Guer. (Forbes, det.)

Collected June 24, 1925. Only one specimen was seen and taken.

Hyphantria cunea Dru. (Forbes, det.)

Collected June 24, 1925. This, according to Holland (1903) is the fall web-worm adult whose larvae are destructive to deciduous trees. The species was seldom seen in this tract.

Estigmene acraea Dru. (Forbes, det.)

Collected July 30, 1925; Aug. 16, 1926. Comstock (1924) writes that this species infests a great variety of grasses and garden crops. The species was comparatively rare in this area.

Euxoa tessellata Harris (Forbes, det.)

Collected June 23, 1925. Forbes (1905) reports that this species will feed freely on grass.

Leucania unipuncta Haw. (Forbes, det.)

Collected June 23, 1925. Jaques (1920) says the army worm (Leucania unipuncta Haw.) seemed to confine itself in choice of food very largely to plants of the grass family.

Papaipema nitela Gn. (The writer, det.)

Collected June 18, 22, 1926. On these dates the larvae were seen at work in stalks of purple coneflower (Brauneria purpurea Britton). This species is a widely distributed stalk-borer injurious to a large number of wild and cultivated plants.

Tarachidia tortricina Zell. (Forbes, det.)

Collected July 2, 1926. The writer believes, from comparisons made with identified specimens, that this species was rather common on this tract.

Tarachidia candefacta Hbn. (Forbes, det.)

Collected May 21, 1926. This species was quite common in the latter part of May and early part of June, and individuals were most frequently seen at flowers of golden Alexanders (Zizia aurea Koch.).

Catocala whitneyi Dodge (Forbes, det.)

Collected July 24, 1925. This specimen was reared from a larva that was found upon goldenrod (Solidago sp.). The larva was light gray with a white line running lengthwise on each side. It span a brown net-like cocoon in which it spent fourteen days.

Drasteria crassiuscula Haw. (Forbes, det.)

Collected July 2, 1926. Holland (1903) says that this species frequents grassy places.

Lipocosma sicalis Walker (Braun, det.)

Collected June 24, 1925. Individuals appearing like this species were common in June and July of both seasons.

Blepharomastix ranalis Gn. (Braun, det.)

Collected June 24, 1925. This species was not commonly seen in either season.

Crambus vulgivagellus ? Clem. (Forbes, det.)

Collected June 17, 1925. Ainslie (1916) notes this species as injurious to meadow and pasture grasses.

Crambus trisectus Walker (Braun, det.)

Collected June 21, 1925. Ainslie (1916) writes concerning injury to meadow and pasture grasses by this species.

Crambus praefectellus Zinck. (Braun, det.)

Collected July 30, 1925. Webster (1923) reports this species injurious in blue grass pastures in 1918.

Argyria argentana Hartyz. (Braun, det.)

Collected July 25, 30, 1925. This species was common in the midsummers of 1925 and 1926.

Homeosoma electellum Hulst (Dyar, det.)

Collected Aug. 26, 1925; Aug. 14, 1926. The specimen of Aug. 26, 1925 was reared from a larva that fed upon the disc flowers of blazing star (Liatris squarrosa Willd.). In 1926 several adults were reared from larvae feeding upon the disc flowers of rosin-weed (Silphium laciniatum L.), and mounted Aug. 14. Larvae of similar appearance were found feeding on disc flowers of purple coneflower (Brauneria purpurea Britton), prairie coneflower (Lepachys pinnata T.&G.), and oxeye (Heliopsis scabra Dunal.). Forbes (1923) states that the larvae have been found on tar-weed (Grindelia) and in seeds of

sunflower.

Trichoptilus labidactylus Fitch (Forbes, det.)

Collected May 30, June 6, 1926. On May 17, 1926 a pale greenish, somewhat hairy worm was observed buried in the top of a growing stalk of goldenrod (Solidago sp.). It was brought to the laboratory on that date. A molted skin was observed May 21. The larva pupated May 30. The chrysalis was yellow in color with a red saddle-like mark on one side. The adult appeared June 6, 1926. About thirty percent of the Solidago stems were somewhat retarded by this species in 1926.

Trichotaphe alacella var. ? Clem. (Forbes, det.)

Collected May 27, 1926. This specimen was reared from a larva that fed on the foliage of false indigo (Baptisia bracteata Ell.). The larvae tied several of the upper leaves together, and hid in this nest. The pupa was formed May 19, and the adult appeared May 27, 1926. The insect pupated in a light web among its castings, and between two leaves.

Sparganothis puritana Rob. (Forbes, det.)

Collected June 10, 1926. Dr. Forbes says that this is not a typical specimen. On May 27, 1926 a light green, smoothish larva was observed in a nest of web and leaves on the lead plant (Amorpha canescens Pursh.). It was taken to the laboratory, and it pupated June 4. On June 10, the adult appeared. Nearly every lead plant was partially defoliated

by this species in the 1926 season.

Sparganothis sulfureana Clem. (Braun, det.)

Collected Aug. 20, 1925. This specimen was reared from a larva that fed upon the disc flowers of oxeye (Heliopsis scabra Dunal.). The disc flowers were somewhat tied together by a web. Three rays of the outer flowers were tied down over the disc by the larva. It was brought in July 25, pupated Aug. 11, and the adult appeared Aug. 20. Forbes (1923) states that the larva is a general feeder.

Tortrix pallorana Rob. (Forbes, det.)

Collected May 27, 1926. A light green leaf-rolling larva was taken from the top of bastard toad-flax (Comandra umbellata Nutt.) to the laboratory, and was fed on bastard toad-flax leaves. It pupated May 14, two days after bringing the larva indoors, in a light web at the side of the cage. The adult appeared May 27, 1926.

Scythris eboracensis Zell. (Braun, det.)

Collected June 20, Aug. 3, 5, 1925. The specimens of Aug. 3 and 5 were reared from dark greenish larva feeding upon the foliage of Coreopsis palmata Nutt. The larva ties several upper leaves together, and spends much of its time in this nest. One larva was brought in July 13, pupated July 23, and the adult appeared Aug. 3. A second larva was taken July 13, pupated July 21, and the adult appeared Aug. 5. This species was common from June 15, 1926 to Aug. 25, 1926.

Order Diptera

The species of this order have been determined as cited in the list.

Nephrotoma ferriginea Fabr. (Hine, det.)

Collected June 27, 1925.

Aedes sylvestris Theob. (Hine, det.)

Collected June 27, July 21, 1925. Howard (1917) says that this apparently is a wood species.

Geron sp. No. 1. (Hine, det.)

Collected Aug. 5, 13, 1925.

Geron sp. No. 2. (Hine, det.)

Collected June 30, July 21, Aug. 25, 1925. The specimen of June 30 was feeding on a disc flower of Coreopsis palmata Nutt.

Psilocephala frontalis Cole (Hine, det.)

Collected July 8, 21, 28, 30, 1925. Williston (1908) writes that the food of the adults of this genus is chiefly other Diptera.

Leptogaster murinus Loew. (Hine, det.)

Collected June 18, 1925; May 28, June 19, 1926.

Erax aestuans L. (Hine, det.)

Collected June 18, 27, 30, July 6, Aug. 3, 1925; June 18, 28, 29, July 11, 15, 16, 26, 30, 1926. On June 29, 1926 a female was observed with the ovipositor in a disc flower of a purple coneflower (Brauneria purpurea Britton) head. This

position was held for 15 seconds. Two other disc flowers of the same head were visited, and treated in a similar manner. At each disc flower the abdomen was raised and lowered several times. No eggs were seen in the flowers, which had not as yet set the seed. July 11, 1926 a female spent about one minute at a head of Brauneria purpurea with the ovipositor in a disc flower. Eggs were found at the top of the developing achene. On July 15, 1926 a female was observed ovipositing in three disc flower achenes during a period of seven minutes. July 26, 1926, four females were seen to oviposit on disc flowers of Brauneria purpurea. Three eggs were seen at one side of an achene. On July 30, 1926, seven females were observed to oviposit in heads of Brauneria purpurea. Two females on that date were seen to visit the same flower. One oviposited on six achenes during a period of four minutes. On July 15, 1926 eggs were taken into the laboratory on heads of Brauneria purpurea. The eggs hatched on July 18. The larvae were not observed to feed upon the flower head parts, weevil larvae, or thrips. The larvae left the head soon after hatching, and many crawled into soil placed in the bottom of the vessel. Williston (1908) says the Asilidae lay eggs about grass stems, or in crevices of decaying logs and trees infested by the larvae of other insects.

Promachus vertebratus Say. (Hine, det.)

Collected July 6, 1925; Aug. 13, 14, 15, 25, Sept. 24, 1926. On Aug. 13, 1925 a female was seen with ovipositor

in a disc flower of purple coneflower (Brauneria purpurea Britton). The flower head with eggs was taken to the laboratory, and the larvae hatched Aug. 17. The maggots crawled away from the head, and went into moist sand within thirty minutes after the sand was placed in the hatching cage. The specimen of Sept. 24, 1926 was carrying an insect that appeared to be a honey bee. The bee was lost in the sweeping.

Asilus erythocnemius Hine (Hine, det.)

Collected July 6, 1925; June 19, 1926. This species belongs to a predaceous family, and is probably more numerous than the collecting dates indicate.

Asilus paropus Walker (Hine, det.)

Collected June 18, 20, 23, July 30, 1925; June 5, 24, 1926. This species was not observed to be on the field in the latter part of the summer. It seemed to be the most prominent robber-fly in the earlier part of the summer.

Psilopodinus sipho Say (Hine, det.)

Collected July 30, 1925. Comstock (1924) says the members of this genus hunt for smaller flies and other soft-bodied insects.

Dolichopus bifractus Loew. (Hine, det.)

Collected June 25, July 8, 15, 21, 28, Aug. 5, 13, 1925. The members of this genus feed upon smaller flies and other soft-bodied insects, according to Comstock (1924).

Syneches simplex Walker (Hine, det.)

Collected July 21, 1925.

Dolichopus ramifer Loew. (Hine, det.)

Collected July 21, Aug. 5, 1925. This species is scarce, apparently, while D. bifractus was more frequently observed.

Pipunculus sp. (Hine, det.)

Collected July 15, 1925; Aug. 25, Sept. 24, 1926. Williston (1908) writes that Pipunculus larvae are parasitic, as far as their habits are known.

Mesogramma marginata Say (Hine, det.)

Collected July 21, 28, Aug. 7, 13, 14, 1925; July 14, 1926. On July 14, 1926, one was taken while feeding on a flower of false indigo (Baptisia bracteata Muhl.), and one was feeding on the disc flowers of black-eyed Susan (Rudbeckia hirta L.).

Tachinophyta indecisa Townsend (Reinhard, det.)

Collected Aug. 21, 1925.

Paradidyma singularis Townsend (Reinhard, det.)

Collected Aug. 3, 1925.

Phorichaeta sp.? (Reinhard, det.)

Collected July 8, 1925.

Coquillettina plankii Walt. (Reinhard, det.)

Collected Aug. 13, 1925.

Ptilodexia harpasa ? Walker (Hine, det.)

Collected Aug. 3, 1925.

Sarcophaga hunteri H. (Reinhard, det.)

Collected Aug. 21, 1925. Morgan (1901) bred this species from a maggot that parasitized the differential grasshopper (Melanoplus differentialis Thom.).

Sarcophaga sp. No. 1. (Reinhard, det.)

Collected Aug. 13, 1925. On Aug. 3, 1925 a Conocephalus nymph was taken with two maggots inside. The maggots pupated in sand Aug. 4. The specimens hatched Aug. 13, and Aug. 14.

Sarcophaga sp. No. 2. (Reinhard, det.)

Collected July 8, 1925.

Cryptolucilia caesarion Mg. (Hine, det.)

Collected Aug. 21, 1925. Brues (1902) reared this species from brilliant blue larvae that worked in cow-dung. Aldrich (1905) writes that this species is common and widespread.

Coenosia denticornis Malloch (Hine, det.)

Collected July 15, 28, Aug. 10, 1925. Williston (1908) states that larvae of species of Coenosia have been found in dung.

Coenosia lata Walker (Hine, det.)

Collected July 21, 1925. Howard (1901) bred this species from cow-manure.

Rivellia flavimana Loew. (Hine, det.)

Collected June 23, 1925.

Rivellia viridulans R. D. (Hine, det.)

Collected June 18, 1926. Fitch (1856) reports this species attending the apple aphis.

Ensina humilis Loew. (Hine, det.)

Collected June 19, 20, 23, 21, 25, 27, July 6, 28, 1925. On June 21, a mating pair was taken.

Euaresta bella Fitch. (Hine, det.)

Collected June 25, July 7, 15, 21, 28, 1925. On July 28, 1925 this species was numerous on flowers of golden-rod (Solidago sp.).

Euaresta festiva Loew. (Hine, det.)

Collected July 21, Aug. 7, 1925. The specimen of Aug. 7, 1925 was being carried alive across the grass by an ant. The ant escaped the collector's net.

Meromyza americana Fitch. (Hine, det.)

Collected July 21, Aug. 21, 24, 1925. The specimen of Aug. 24 was taken from the mown field. Webster (1903) discusses the life-history of this species which is known as the wheat stem maggot in the larval stage. He says that adults have been reared from maggots in stems of Agropyron, Elymus, and Poa grasses.

Diplotoxa versicolor Loew. (Hine, det.)

Collected July 2, 8, 21, Aug. 24, 1925. The specimen of Aug. 24 was taken from the mown field.

Chloropisca glabra Mg. (Hine, det.)

Collected July 28, 1925.

Oscinis sp. (Hine, det.)

Collected Aug. 3, 1925.

Limnia saratogensis Fitch. (Hine, det.)

Collected June 20, 23, 30, July 28, Aug. 13, 1925.

Agromyza coquilletti Malloch (Hine, det.)

Collected July 28, 1925. Some members of this genus are known to burrow and bore into roots and stems, and mine leaves of plants, according to Aldrich (1905).

Agromyza platyptera Thomp. (Hine, det.)

Collected July 28, 1925. This species is not probably as rare as the collecting dates would indicate. A large number of small flies have been too difficult for the author to place by comparison, and are still in the hands of specialists.

Agromyza pusilla Mg. (Hine, det.)

Collected July 8, 1925. This specimen was reared from a leaf mining larva that worked on purple coneflower (Brauneria purpurea Britton). The larva pupated July 4, 1925 and became an adult July 8, 1925. The mined portion was about eight millimeters in diameter, circular in outline, and located near the tip of a basal leaf.

Agromyza virens Loew. (Hine, det.)

Collected July 28, 1925. This species was reared from

the disc flowers of a head of oxeye (Heliopsis scabra Dunal.).

Pholeomyia indecora Loew. (Hine, det.)

Collected June 18, 20, 23, 25, 27, July 2, 21, 1925; June 4, 1926. On June 25, 1925 this species was frequent about the fleabane (Erigeron sp.). On July 2, 1925 several were taken from flowers of rosin-weed (Silphium laciniatum L.).

Exorista nigripalpis Townsend (Reinhard, det.)

Collected July 7, 1926.

Lispidea palpigera Coq. (Reinhard, det.)

Collected July 21, 1926.

Leucostoma sp. (Reinhard, det.)

Collected July 29, August 13, 1926. The specimen of August 13, 1926 when taken was being held by the ambush bug (Phymata erosa var. fasciata Gray) which was on a flower of rattlesnake master (Eryngium yuccifolium Michx.).

Stomoxys calcitrans L. (Reinhard, det.)

Collected June 18, Sept. 24, 1926. This species is known as the stable-fly, and may breed wherever decaying vegetation occurs.

Order Hymenoptera

The species of this order have been determined as cited in the list.

Cardiochiles apicalis Cress. (Gahan, det.)

Collected June 20, 1925.

Apanteles cacoeciae Riley (Gahan, det.).

Collected June 27, 1925. Muesebeck (1921) states this species has been reared from larvae of a moth (Tortrix sp.)

Apanteles harti Vier. (Gahan, det.)

Collected July 21, 27, Aug. 24, 1925. The specimen of July 27, 1925 came from a cage containing a Lepidopterous larva which fed upon the foliage of false indigo (Baptisia bracteata Ell.). This species of moth did not complete the life cycle in 1925. In 1926 the adults were reared, but have not been identified. The A. harti pupated in a white silky cocoon that was attached to a B. bracteata leaflet July 20, and appeared as an adult July 27.

Apanteles trachynotus Vier. (Gahan, det.)

Collected July 6, 1925.

Neamphaloidella irvingi Gir. (Gahan, det.)

Collected June 25, 1925.

Microbracon mellitor Say (Gahan, det.)

Collected July 21, 1925. Dickerson and Weiss (1920) reared this species from larvae of a moth (Mompha stellela

Busck.) that fed on evening primrose (Oenothera).

Microbracon nuperus Cress. (Gahan, det.)

Collected July 28, 1925.

Bassus texanus Cress. (Gahan, det.)

Collected June 20, July 8, 1925.

Bassus simillimus Cress. (Gahan, det.)

Collected July 28, 1925. Britton (1916) states that this species is on record as a parasite of a moth (Eucosma strenuana Wlk.) and a ragweed weevil (Lixus scrobicollis Boh.).

Bracon nigrosternum Morr. (Gahan, det.)

Collected June 20, 23, 1925.

Aenigmostomus longipalpus Cress. (Gahan, det.)

Collected June 30, 1925.

Amicroplitis plesius Vier. (Gahan, det.)

Collected July 8, 1925.

Ascogaster carpocapsae Vier. (Gahan, det.)

Collected July 2, 21, Aug. 5, 1925. Britton (1916) gives this as parasitic on the codling moth (Carpocapsa pomonella Linn.).

Ascogaster erythrothorax Vier. (Gahan, det.)

Collected July 21, 1925.

Chelonus connectens Cress. (Gahan, det.)

Collected July 21, Aug. 13, 1925.

Schizoprymnus phillipsi Vier. (Gahan, det.)

Collected June 18, 1925.

Anomalon ejuncidum Say (Cushman, det.)

Collected July 28, 1925.

Trychosis rufoannulatus Prov. (Cushman, det.)

Collected June 27, 1925.

Euderus columbianus Ashm. (Gahan, det.)

Collected Aug. 13, 1925. On Aug. 7, 1925 several upper leaves of a goldenrod (Solidago) stalk were seen to be stuck together. The leaves were taken in, and Aug. 13, 1925 the two specimens of this species appeared in the cage.

Pleurotropis sp. (Gahan, det.)

Collected July 15, 1925.

Zatropis sp. (Gahan, det.)

Collected June 18, 1925. The specimen taken is a male.

Rileya cecidomyiae Ashm. (Gahan, det.)

Collected June 20, 1925. Britton (1916) says it has been bred from a Cecidomyid gall on groundsel tree (Baccharis halimifolia L.).

Bruchophagus funebris How. (Gahan, det.)

Collected July 28, 1925. This species is known as the clover-seed chalcis that is very injurious to the seeds of red clover and alfalfa.

Eurytoma sp. (Gahan, det.)

Collected July 8, 1925.

Perilampus hyalinus Say (Gahan, det.)

Collected Aug. 24, 1925. Britton (1916) states this

species has been bred from an Ichneumon-fly (Campoplex fugitivus Say).

Basalis utahensis Ashm. (Gahan, det.)

Collected July 21, 1925.

Crematogaster lineolata Say (Smith, det.)

Collected May 3, 1926. Wheeler (1916) says that it nests under stones in open places, under stumps, boards, the bark of old logs, etc. Smith (1922) reports this species as occurring in houses in Mississippi.

Aphaenogaster fulva Roger (Smith, det.)

Collected Aug. 13, 1925; Mar. 23, 1926. Five wingless specimens were taken. Wheeler (1916) states that it nests in rotten wood in rather dense forests.

Dorymyrmex pyramicus var. niger Pergande (Smith, det.)

Collected June 19, 1926. Smith (1924) states that this species nests in sunny places.

Dorymyrmex sp. (Smith, det.)

Collected July 15, 28, 1925.

Tapinoma sessile Say (Smith, det.)

Collected June 18, April 3, May 3, 1926. Wheeler (1913) says that it nests under stones, dead leaves, logs, bark, etc., usually in sunny places.

Prenolepis sp. (Smith, det.)

Collected July 2, 1925.

Prenolepis imparis Say (Smith, det.)

Collected June 4, 1925. Wheeler (1916) says that this species nests in shady oak woods in soil usually containing more or less clay.

Prenolepis parvula Mayr. (Smith, det.)

Collected May 17, 21, 30, 1926. Smith (1918) states that this species inhabits fields.

Lasius niger var. near americanus Emery (Smith, det.)

Collected July 21, 1925. This species, according to Wheeler (1916), is the most common ant and insect of the United States, and nests from the timber-lines on the highest mountains to seashores. It is much given to the cultivation of root aphids, and thus is injurious to maize.

Lasius niger var. reoniger Emery (Smith, det.)

Collected June 19, 1926.

Formica fusca var. subsericea Say (Smith, det.)

Collected July 28, 1925; June 4, 1926. Wheeler (1916) states that this ant prefers sunny, grassy places, attends aphids, and feeds upon the dead bodies of insects.

Formica pallide-fulva var. incerta Emery (Smith, det.)

Collected July 15, 1925; June 19, 1926.

Formica pallide-fulva schaufussi var. near incerta Emery (Smith, det.)

Collected July 8, 1925; May 30, June 19, 1926.

Formica pallide-fulva nitdivendris Emery (Smith, det.)

Collected May 30, 1926. Wheeler (1916) says that this species prefers sunny and grassy fields.

Formica pallide-fulva var. Latr. (Smith, det.)

Collected June 25, 1925; May 30, June 4, 19, 1926.

Formica neogagates var. Emery (Smith, det.)

Collected Aug. 21, 24, 1925; May 30, 31, 1926.

Formica neogagates lasioides var. vetula Whlr. (Smith, det.)

Collected Aug. 21, 24, 1925; May 30, 31, 1926.

Formica rufa subsp. obscuripe var. melanotica Emery (Smith, det.)

Collected June 8, 1926.

Formica rufa subsp. obscuripe ? Forel. (Smith, det.)

Collected July 2, 1925.

Formica sanguinea var. or subsp. Latr. (Smith, det.)

Collected June 23, 1925.

Formica sp. (Smith, det.)

Collected July 8, 1925. The specimen is a male.

Camponotus sp. (Smith, det.)

Collected June 10, 1926. The specimen is a male.

Elis quinquecincta Fabr. (Rohwer, det.)

Collected July 21, 27, Aug. 10, 1925. On July 27, about twenty of this species were noticed on the flower buds of one blazing star (Liatris) plant.

Tiphia punctata Robt. (Rohwer, det.)

Collected July 8, 1925.

Tiphia sp. (Rohwer, det.)

Collected Aug. 21, 1925.

Dasymutilla sp. (Rohwer, det.)

Collected Aug. 10, 1925.

Cryptocheilus fulvicornis Cress. (Rohwer, det.)

Collected Aug. 15, 1925.

Ammobia pennsylvanica Linn. (Rohwer, det.)

Collected Aug. 13, 1925.

Larropsis distincta Smith (Rohwer, det.)

Collected Aug. 13, 1925. Rohwer (1916) states that this species has been taken on goldenrod and fireweed (Erechtites hieracifolium Raf.).

Cerceris alaope Bks. (Rohwer, det.)

Collected July 8, 1925.

Halictus albipennis Robt. (Sandhouse, det.)

Collected July 2, 15, 21, 28, 29, 1925.

Halictus coreopsis Robt. (Sandhouse, det.)

Collected June 25, 1925.

Bombus pennsylvanicus De Geor. (Sandhouse, det.)

Collected Aug. 21, 1925.

Halictus pruinosus Robt. (Sandhouse, det.)

Collected June 23, July 15, July 28, Aug. 3, 1925.

Tetralonia atriventris Smith (Sandhouse, det.)

Collected Aug. 5, 1925.

Discussion of Annotated List

The annotated list contains three hundred and forty-five insects determined to species, and thirty named only to genera. About one hundred and thirty-five species of insects, thought by the writer to be different from the species in the list, have not yet returned from specialists.

This will, in part, account for the few species in some families such as Carabidae. Several night collections in 1926 yielded about twenty species of Carabidae apparently different from those identified in the 1925 collection, and they are, at present, with a specialist in Carabidae. Several other families such as Staphylinidae are poorly represented because of difficulty in securing the services of other workers. In the Lepidoptera the number of species in the collection is small. Specialists in the order advised consideration of only those which were present in large numbers, and those which were reared from the common plants of the tract. The Orthoptera, Hemiptera, and Homoptera of this small preserve are thought to be well represented in the collection. The Diptera are not well represented because of difficulty in identification. Several leading specialists have been too hard pressed with work to render assistance until later. Nearly all of the specimens of Hymenoptera collected in 1926 are with specialists.

Through study of the habits, food, life-histories, and habitats so far as known from personal observations and in

literature that has been cited, the writer desires to propose a list of species of insects common to this tract of Stipa-Bouteloua Formation of a Prairie Province. Except in the Hymenoptera the word common is employed to designate those species that were collected on at least five different days of either season, or were collected in numbers of ten or more when the collecting dates were less than five in either season. Because of difficulties that are mentioned in the previous paragraph, a few Hymenoptera are given as common when literature and personal observations indicate preference for this area though the rules of the foregoing sentence were not met.

Common Insects

COLLEMBOLA

Entomobryidae

Lepidocyrtus purpureus Lubbock.

Aphoruridae

Aphorura ambulans L.

ORTHOPTERA

Phasmidae

Diapheromera velilei Walsh.

Acrididae

Eritettix simplex Scudd.

Orphulella speciosa Scudd.

Chortophaga viridifasciata De Geer.

Encoptolophus sordidus Burm.

Acrididae (continued)

Pseudopomala brachyptera Scudd.

Melanoplus confusus Scudd.

Melanoplus dawsoni Scudd.

Melanoplus femur rubrum De Geer.

Melanoplus keeleri-luridus Dodge.

Phoetaliotes nebrascensis Thom.

Tettigoniidae

Neoconocephalus ensiger Harr.

Orchelimum vulgare Harr.

Conocephalus saltans Scudd.

Conocephalus strictus Scudd.

Gryllidae

Nemobius fasciatus De Geer.

Oecanthus quadripunctatus Beut.

THYSANOPTERA

Aelothripidae

Aelothrips fasciatus Linn.

Thripidae

Frankliniella tritici Fitch.

HEMIPTERA

Scutelleridae

Homaemus bijugis Uhl.

Pentatomidae

Euschistus variolarius P. B.

Pentatomidae (continued)

Coenus delius Say.

Coreidae

Alydus conspersus Montd.

Lygaeidae

Nysius ericae Schill.

Ligyrocoris diffusus Uhl.

Tingididae

Piesma cinerea Say.

Melanorhopala clavata Stal.

Phymatidae

Phymata erosa fasciata Gray.

Nabidae

Nabis ferus Linn.

Anthocoridae

Triphleps insidiosus Say.

Miridae

Adelphocoris rapidus Say.

Lygus pratensis oblineatus Say.

Lopidea minor Knight.

Lopidea teton Knight.

Chlamydatus associatus Uhl.

HOMOPTERA

Cicadidae

Okanagana balli Davis.

Membracidae

Stictocephala inermis Walk.

Campylenchia latipes Say.

Cicadellidae

Agallia sanguinolenta Prov.

Draeculacephala mollipes Say.

Gypona melanota Spangb.

Platymetopius cinereus O. & B.

Deltocephalus albidus O. & B.

Deltocephalus inimicus Say.

Deltocephalus unicoloratus G. & B.

Euscelis striatulus Fall.

Euscelis comma Van D.

Euscelis curtisii Fh.

Chlorotettix spatulatus O. & B.

Phlepsius irroratus Say.

Cicadula sexnotata Fall.

Fulgoridae

Scolops sulcipes Say.

Aphididae

Aphis monardae Oest.

LEPIDOPTERA

Danaidae

Danaus archippus Fabr.

Satyridae

Cercyonis alope olympus Edw.

Nymphalidae

Argynnis idalia Dru.

Vanessa cardui L.

Lycaenidae

Chrysophanus dione Scud.

Hesperiidae

Pamphila metea Scud.

Noctuidae

Tarachidia tortricina Zell.

Tarachidia candefacta Hbn.

Pyralidae

Lipocosma sicalis Walker.

Crambus trisectus Walker.

Argyria argentana Hartyz.

Homeosoma electellum Hulst.

Pterophoridae

Trichoptilus lobidactylus Fitch.

Colechiidae

Trichotaphe alacella var. ? Clem.

Tortricidae

Sparganothis puritana Rob.

Tortrix pallorana Rob.

Scythrididae

Scythris oboracensis Zell.

COLEOPTERA

Cicindelidae

Cicindela punctulata Fabr.

Carabidae

Stenolophus conjunctus Say.

Coccinellidae

Hippodamia parenthesis Say.

Hippodamia convergens Guer.

Hyperaspis undulata Say.

Erotylidae

Languria mozardi Latr.

Buprestidae

Acmaeodera pulchella Herbst.

Lampyridae

Ditemnus bidentatus Say.

Canthoridae

Chauliognothus pennsylvanicus De G.

Malachiidae

Collops quadrimaculatus Fabr.

Cleridae

Hydnocera tricondylae Lec.

Scarabaeidae

Aphodius inquinatus Fussl.

Anomala innuba Fabr.

Strigoderma arboricola Fabr.

Cerambycidae

Typocerus sinuatus Newm.

Chrysomelidae

Anomoea laticlavia Foral.

Babia quadriguttata Oliv.

Nodonota puncticollis Say.

Trirhabda canadensis Kirby.

Galerucella americana Fabr.

Diabrotica 12-punctata Fabr.

Diabrotica longicornis Say.

Disonycha triangularis Say.

Longitarsus testaceous Lec.

Luperaltica fuscula Lec.

Chaetocnema denticulata Ill.

Psylliodes punctulata Melsh.

Microrhopala vittata Fabr.

Meloidae

Macrobasis unicolor Kirby.

Epicauta pennsylvanica De Geer.

Curculionidae

Rhyncites bicolor Fab.

Rhyncites niger Boh.

Epicaerus imbricatus Say.

DIPTERA

Therevidae

Psilocephala frontalis Cole.

Asilidae

Erax aestuans L.

Promachus vertebratus Say.

Asilus paropus Walk.

Dolichopodidae

Dolichopus bifractus Loew.

Syrphidae

Mesogramma marginata Say.

Sciomyzidae

Limnia saratogensis Fitch.

Trypetidae

Ensina humilis Loew.

Euaresta bella Fitch.

Oscinidae

Meromyza versicolor Loew.

HYMENOPTERA

Vipionidae

Apanteles harti Vier.

Braconidae

Ascogaster carpocapsae Vier.

Formicidae

Aphaenogaster fulva Roger.

Dorymyrmex pyramicus var. niger Pergande.

Tapinoma sessile Say.

Prenolepis parvula Mayr.

Formica fusca var. subsericea Say.

Formicidae (continued)

Formica pallide-fulva var. incerta Emery.

Formica pallide-fulva nitdivendris Emery.

Formica pallide-fulva var. Latr.

Formica neogagates var. Emery.

Formica neogagates lasioides var. vetula Whlr.

Scoliidae

Elis quinquecincta Fabr.

Halictidae

Halictus pruinosus Robt.

Halictus albipennis Robt.

Bombidae

Bombus pennsylvanicus De Geer.

Further study of the habits, food, life-histories, and habitats so far as known from personal observations and in literature suggested a list of insects that were not common to this tract, but were probably more scarce in other Formations. These insects are designated as scarce to the Stipa-Boutcloua Formation.

Scarce Insects

ORTHOPTERA

Acrididae

Ageneotettix deorum Scudd.

Hippiscus apiculatus Harr.

COLEOPTERA

Chrysomelidae

Pachybrachys spumarius Suffr.

Nodonota tristis Oliv.

Anthicidae

Notoxus anchora Hentz.

Anthicus cervinus Laf.

HEMIPTERA

Scutelleridae

Homaemus parvulus Germ.

Cydnidae

Amnestus spinifrons Say.

Amnestus pallidus Zimmer.

Coreidae

Alydus eurinus Say.

HOMOPTERA

Cicadidae

Melampsalta calliope Walk.

Cicadellidae

Deltocephalus abbreviatus O. & B.

Deltocephalus minimus O. & B.

Deltocephalus oculatus O. & B.

Euscelis anthracinus Van D.

Fulgoridae

Scolops dessiccatus Uhl.

HYMENOPTERA

Halictidae

Halictus coreopsis Robt.

Insects of the annotated list, not included among the common or scarce insects, are considered as visitors, or as inhabitants of several Formations in nearly equal numbers, until more data has been collected to prove them otherwise.

Summary

1. Approximately five hundred species of insects were collected from a five-acre preserve of a Stipa-Bouteloua Formation of a Prairie Province.

2. The species of Insects which seem to be more closely associated with a Stipa-Bouteloua Formation in Iowa than with any other Formation are:

Orthoptera

Orphulella speciosa Scudd.

Eritettix simplex Scudd.

Ageneotettix deorum Scudd.

Encoptolophus sordidus Burm.

Pseudopomala brachyptera Scudd.

Hippiscus apiculatus Harr.

Melanoplus confusus Scudd.

Melanoplus keeleri-luridus Dodge.

Melanoplus dawsoni Scudd.

Phoetaliotes nebracensis Thom.

Conocephalus saltans Scudd.

Hemiptera

Homaemus bijugis Uhl.

Alydus conspersus Montd.

Alydus eurinus Say.

Lopidea minor Knight.

Lopidea teton Knight.

Homoptera

Okanagana balli Davis.

Melampsalta calliope Walk.

Platymetopius cinereus O. & B.

Deltocephalus abbreviatus O. & B.

Deltocephalus minimus O. & B.

Euscelis anthracinus Van D.

Euscelis comma Van D.

Coleoptera

Cicindela punctulata Fabr.

Stenolophus conjunctus Say.

Ditemnus bidentatus Say.

Anomala inmuba Fabr.

Babia quadriguttata Oliv.

Pachybrachys spumarius Suff.

Nodonota puncticollis Say.

Anthicus cervinus Laf.

Macrobasis unicolor Kirby.

Rhyncites niger Boh,

Epicaerus imbricatus Say.

Lepidoptera

Trichotaphe alacella var. ? Clem.

Sparganothis puritana Rob.

Scythris eboracensis Zell.

Diptera

Erax aestuans L.

Ensina humilis Loew.

Agromyza pusilla Mg.

Hymenoptera

Dorymyrmex pyramicus var. niger Perg.

Halictus albipennis Robt.

Halictus coreopsis Robt.

3. During 170 days between April 19, 1926, and October 11, 1926, a hygrothermograph, with its base two inches above the soil, recorded 1.3% of the hours with above 90°F., 70.1% between 60°F. and 90°F., and 28.4% below 60°F. in temperature. During 169 days of the same period the instrument recorded 9.3% of the hours with above 90%, 76.7% between 40% and 90%, and 15.8% below 40% in relative humidity.

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Plate I.

View of Hayden Prairie Preserve toward the Northwest in August.

Plate II.

View of Hayden Prairie Preserve toward the Northeast in August.

Plate II.