A SURVEY OF THE INSECT FAUNA OF GOLDENROD, (SOLIDAGO spp.)

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This is to certify that the

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A Survey Of The Insect
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A SURVEY OF THE INSECT FAUNA OF GOLDENROD, (SOLIDAGO spp.)

By

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INTRODUCTION

Much attention has been given in the past to insects affecting plants of economic importance. Scattered references, it is true, may be found regarding insects on weeds, but little has been done in the way of exhaustive surveys of the insects found on a particular weed.

That such a survey might prove useful can be attested by the records of important insect pests which have been observed as facultative parasites of weeds. Metcalf and Flint (22), for instance, report having seen numbers of flea beetles and tomato hornworms feeding on jimson weed, horse nettle, and morning glories. Later in the season, these insects began foraging on potato, tomato and tobacco plants in adjoining fields. A few other insects which have the known habit of moving from weeds to crop plants are:

common stalk borer	(*Papaipema nebris* Guen.)
bean aphis	(*Aphis rumicis* L.)
spinach flea beetle	(*Disonycha xanthomelaens* Dalman.)
chinch bug	(*Blissus leucopterus* Say)
four-lined leaf bug	(*Poecilocapsus lineatus* Fab.)
tarnished plant bug	(*Lygus pratensis* L.)
meadow plant bug	(*Miris dolabratus* L.)
rapid plant bug	(*Adelphocoris rapidus* Say.)

The role of insects in the transmission of plant diseases is a subject which has caught the interest of both entomologists and plant pathologists. The possibility of transmission of plant pathogens from a weed reservoir has not been overlooked. A nice illustration of this has been furnished by Wellman (32) in his work with southern celery mosaic virus on vegetable crops in Florida. This virus affects many species of plants. One of the most susceptible happens to be a weed, Commelina nudiflora L. This perennial serves as the winter host of the virus. "When plants die or are chopped down, aphids leave and carry the virus back to nearby pernnials, reestablishing themselves on old plants, or colonizing and infecting the young perennials, which act as reservoirs of the virus over periods unsuited to the growth of the more tender plant species. It is upon advent of new growth of many of the annuals that dissemination of the disease becomes noticeable. The virus carrying aphids migrate back from the less succulent and palatable reservoir hosts to annual crops and weeds and the virus then becomes economically significant."

The various species of goldenrod have not as yet been shown to serve as reservoirs or alternate hosts for plant pathogens of a serious economic nature. The close relationship, taxonomically, between the members of the

genus Solidago and the China aster, Callistephus chinensis Nees., might suggest the presence of the virus of aster yellows, but no confirmation of this is to be found in the literature. Rust diseases are not uncommon on goldenrod and one of them, Coleosporium solidagninis Schw., goes from goldenrod to various species of pine. One of the more susceptible pines is the red pine, and seedling plantations of it in the vicinity of large patches of Solidago are likely to be so severely attacked by the fungus that there is a considerable loss of needles and stunting in growth. (7)

THEORY

Concentrated collecting of insects from a certain weed might prove of value from the strictly scientific point of view. Carried on over a period of two or three seasons, a fairly thorough list of the foragers on that weed could be obtained. Such collecting may produce new records as to the fauna of an area. For instance, among the flies secured in this study as determined by Sabrosky (30) was a specimen of Bombyliidae, Systropus macer Lw., with no previous record from this state.

To the serious student of entomology, such concentrated collecting, can prove of value whether he makes new finds or not. In order to obtain as much knowledge as possible about the insect pests of a weed, one has to

examine the underground parts as well as the aerial portions of a weed, keep records and consult the literature.

METHODS

The chief method by which specimens were obtained in this survey was sweeping with the collecting net. Of course, sweeping with a net entailed the danger of obtaining insects from other plants than goldenrod. In order to obtain as accurate a sampling as possible, most of the sweeping was done in patches consisting entirely of goldenrod. Isolated plants were examined also and the insects were either knocked directly into the cyanide jar or captured by separate sweeps of the net. Roots and other underground parts were examined throughout the spring, summer and fall of 1947.

Some rearing of leaf-feeding Lepidoptera was carried on. At first, goldenrod plants were taken from the field and placed in pots in the greenhouse to provide food for the larvae, but the abundance of the plant in the neighborhood of the college was such that it was just as easy to place freshly cut stalks in the cages when needed.

The stem galls so common on the various species of goldenrod have always attracted attention. The moth

and fly larvae found inside furnish, an excellent bait fought by the votaries of ice fishing. Winter birds have been observed drilling into the galls and extracting their insect contents and this may be an important source of food for them since many galls were found in the field with large areas gouged out of them. During March, April and the early part of May, eight hundred galls were collected and placed in jars which were kept in an outside insectary. Five galls were placed in each jar and labeled to indicate the date and locality of collection. The mouths of the jars were covered witha a double layer of gauze. These cages were examined from time to time until the insects began to emerge and then they were examined every other day. The insects were killed, mounted and labeled the day they emerged.

Collecting from the plants in the field was done in a variety of habitats. Areas bordering woodlots seemed to provide the greatest variety of insects. Margins of fields in which grain crops had been harvested seemed to harbor the greatest number and variety of hemipterans. Some collecting was done among the sand dunes of Berrien county, but the variety of insects obtained was not great. Collecting was carried out along creeks, in swampy areas, along the Red Cedar and Grand Rivers, in pasture land and in waste places in the cities of Grand Rapids and Lansing.

Following is a list of counties and the towns in those counties near which collecting was done:

Allegan -------- Allegan
Barry -------- Hastings
Berrien -------- South Haven, Lakeside
Calhoun -------- Battle Creek
Clinton -------- St. Johns
Eaton -------- Charlotte, Olivet, Eaton Rapids
Ingham -------- East Lansing, Mason, Okemos
Jackson -------- Jackson, Rives Junction
Kent -------- Grand Rapids
Shiwassee ------ Owosso
Saginaw -------- Saginaw
VanBuren ------- Kalamazoo

There are 31 species of goldenrod in Michigan (29) and 56 in the United States. (15) To complicate their taxonomy is the factor of hybridization which is said to occur readily among closely related species. Collecting for this survey was not restricted to a single species but the bulk of the specimens obtained came from Solidago canadensis var. gilvocanescens Rydb. and S. altissima L.

Weather conditions have a great effect on the variety and number of insects present in a given area. The number and variety of insects present would of course have an important effect on the data obtained from such a sur-

vey as this. Therefore, a summary of weather conditions in Michigan from January to October 1947 is included. The early spring and summer months were extremely unseasonable. The month of May was the fourth coldest and fifth wettest on record. There was even a light but general snowfall over the state on the 6th, 7th, and 8th. To counterbalance this slow start for a growing season, the state enjoyed a long, a very mild fall. October was the warmest on record and it was the only October in 61 years in which no snow fell.

Average monthly temperature, snowfall and rainfall in Michigan for 1947. (Temperature in degrees Fahrenheit)*

Month	Temperature	Snowfall	Rainfall
January	23.9° or 2.9° above average.	18.4 inches, 4.1 above average	
February	Coldest since 1936, 18.7°.	22.3 inches 10.5 above average	
March	27.2° or 2.8° below normal.	11.9 inches, 2.7 above average.	
April	4016° or 2.2° below average.		4.8 inches 2.4 above average.
May	49.5° or 4.6° below average.		4.91 inches 1.6 above average.
June	61.6° or 2.7° below average.		2.9 inches, .20 below average.
July	67.7° or 1.5° below average.		2.68 inches, about average.

*Climatological Data, U.S. Department of Commerce, Weather Bureau

Month	Temperature	Snowfall	Rainfall
August	Warmest August on record in Michigan. 74.1° or 6.8° above average.		2.52 inches, slightly less than average.
September	61.7° or 1.3° above average.		4.48 or 1.27 inches above average.
October	57.7° or 8.8° above average.		1.08 or 1.59 inches lower than average.

DATA

The arrangement of families, orders, genera, and species in the following list of insects secured in the manner detailed is according to Leonard's List of the Insects of New York. The common names, unless otherwise indicated, are taken from C.F.W. Muesebeck's Common Names of Insects Approved by the American Association of Economic Entomologists. (Reprint from the Journal of Economic Entomology, 39: (4): 427.)

ORTHOPTERA

Family: Phasmidae

1. Diapheromera femorata Say. Walking stick

   E. Lansing, 17,24, Aug., Berrien Co., 19 Sept.

Family: Tettigoniidae

2. Scudderia furcata Brunner. Fork-tailed bush katydid

   Grand Rapids, 31 Aug., E. Lansing, 3 Sept., VanBuren Co., 14 Sept., Berrien Co., 19 Sept.

3. Amblycorypha oblongifolia DeG. no common name

Mason, 24 Aug., E. Lansing, 5 Sept., Grand Rapids, 31 Aug., Jackson Co., 7 Sept.

4. Conocephalus brevipennis Scud. no common name

Mason, 24 Aug., Jackson Co., 7 Sept., Berrien Co., 19 Sept.

5. Conocephalus ensiger Harris. no common name

E. Lansing, 17 Aug.

Family: Gryllidae

6. Gryllus abreviatus Serv. no common name

Jackson Co., 7 Sept., Allegan Co., 14 Sept.

7. Nemobius fasciatus var. vittatus Harris no common name

Allegan Co., 14 Sept.

"When occuring in abundance, it would be able to cause a large amount of loss and may very properly be associated with the common locusts as a destructive meadow insect." (28)

8. Oecanthus fasciatus Fitch. tree cricket

Mason, 24 Aug., Grand Rapids, 31 Aug.

The two species listed have not been designated as injurious, but another, O. nevus DeG., causes damage to fruit trees and bramble berries by puncturing twigs and canes in the egg laying process. (22) This same insect is also instrumental in the spread of apple tree canker, Leptosphaeria coniothyrium Sacc. (19)

9. Oecanthus quadripunctatus Bent. tree cricket

Mason, 24 Aug., Grand Rapids, 31 Aug., E. Lansing, 17 Aug.

Family: Locustidae

10. Melanoplus femur-rubrum DeG. red-legged grasshopper

Mason, 24 Aug., Grand Rapdis, 31 Aug., Berrien Co., 19 Sept.

"Along with other species of grasshoppers, this species has b en a serious pest in legumes ....." (22) It was the only locustid observed feeding on goldenrod and during the blooming season great numbers were seen crawling about over the blossoms.

Family: Tettigidae

11. Tettigidea parvipennis pennata Morse. no common name

Allegan Co., 14 Sept.

Not common.

12. Tettigidea polymorpha Scudder. no common name

Jackson Co., 7 Sept.

Not common.

13. Tettix granulatum varigatus Charpentier. no common name

Jackson Co., 7 Sept.

Not common.

NEUROPTERA

Family: Chrysopidae

14. Chrysopa occulata Say. golden-eye lacewing

Found on plants throughout the season from June until

October. Very common.

THYSANOPTERA

Family: Phlaeothripidae

15. Idolothrips armata Hood. no common name

Saginaw, 9,11 June, Kalamazoo, 29 June.

Found in empty moth gall.

HETEROPTERA

Family: Cydnidae

16. Corimelaena pulicaria Germar. negro bug

E. Lansing, 10 Aug., Jackson Co., 7 Sept., Eaton Co., 7 Sept.

"Outbreaks of the bug in Michigan and Ohio have destroyed thousands of dollars worth of celery, but the pest occurs only sporadically." (22)

Family: Pentatomidae

17. Peribalus limnobalarius Stal. no common name

Mason, 24 Aug., Jackson Co., 7 Sept.

18. Mormidea lugens, Fab. no common name

VanBuren Co., 14 Sept.

19. Euschistus euschistoides Voll. no common name

Mason, 24 Aug., E. Lansing, 4 Sept., Jackson Co., 7 Sept., Allegan Co., 14 Sept., Calhoun Co., 7 Sept.

20. Euschistus tristigmus Say. no common name

E. Lansing, 26 July, Grand Rapids, 1 Sept., Clinton Co., 31 Aug.

21. Coenus delius Say. no common name

Allegan, 14 Sept.

22. Cosmopepla bimaculata Thomas. no common name

E. Lansing, 10,17 Aug., Jackson Co., 7 Sept.

Has been taken on raspberry, blackberry, mint, potato, and currant.

Damage not mentioned. (6)

23. Stiretrus fimbriatus Say. no common name

Mason, 24 Aug.

Family: Coreidae

24. Harmostes reflexulus Say. no common name

Clinton Co., 31 Aug., Jackson Co., 17 Sept., E. Lansing, 4 Sept.

Family: Lygaeidae

25. Lygaeus kalmii Stal. small milkweed bug

E. Lansing, 4 Sept., Jackson Co., 17 Sept.

26. Nysius ericae Schill. false chinch bug

E. Lansing, 17 Aug.

"The false chinch bug feeds in most part upon purslane, amaranth and other weeds in which it may be found in large numbers although it may occasionally damage such crops as potatoes and strawberries, and injure grape vines, young grafts and various cruciferous plants." (28)

27. Ligyrocoris sylvestris L. no common name

Clinton Co., 31 Aug., Jackson Co., 7 Sept., VanBuren Co., 14 Sept.

Family: Tingitidae

28. Corythuca marmorata Uhl. Chrysanthemum lace bug (6)

Clinton Co., 31 Aug., E. Lansing, 4 Sept.

"Known as the chrysanthemum lace bug, and breeds on ragweed and allied Compositae, often doing damage to cultivated froms .... By far the most abundant Tingid in Berrien county Michigan, occurring on goldenrod but rarely taken on other plants." (6)

Family: Phymatidae

29. Phymata fasciata Gray. ambush bug (6)

Clinton Co., 31 Aug., Jackson Co., 7 Sept., Berrien Co., 19 Sept.

30. Phymata wolffii Stal. ambush bug (6)

E. Lansing, 4 Sept., Jackson Co., 7 Sept., Allegan Co., 14 Sept., Berrien Co., 19 Sept.

Family: Reduviidae

31. Sinea spinipes H. Schr. no common name

E. Lansing, 27 July, 10 Aug., Mason, 24 Aug., Allegan Co., 14 Sept.

Very common.

Family: Nabidae

32. Nabis ferus L. no common name

Jackson Co., 7 Sept., but very common throughout the summer in all areas in which collecting was done.

33. Nabis subcoleoptratus Kirby. no common name

E. Lansing, 25 July, 10 Aug.,
Jackson Co., 7 Sept.

Family: Anthocoridae

34. Orius insidiosus Say. no common name

Grand Rapids, 1 Sept., but very common throughout the summer in all areas in which collecting was done.

"It has been recorded by Garmand and Jewett (1914) as frequenting young corn ears, where it feeds on the corn ear worm and deposits its own eggs in the strands of corn silk, its injuries made in oviposition furnishing a place for the entrance for the spores of the disease known as corn ear rot." (6)

Family: Miridae

35. Plagionathus obscurus Uhl. no common name.

Mason, 24 Aug., Clinton Co., 31 Aug.

Very common.

36. Miris dolabratus L. meadow plant bug

E. Lansing, 29 June, 8 July.

The meadow plant bug is generally present from June until late September.

"That the species is of considerable importance is certain from the method of its feeding and the great numbers often observed, but there is probably much greater loss than is appreciated because the insect works upon the bloom and seed

and doubtless causes an important reduction in the seed crop." (28)

37. Lygus pratensis var. oblineatus Say. tarnished plant bug

E. Lansing, 12 June, 10 Aug., Mason, 24 Aug.

Generally present from early spring until the first frost. "Plants attacked: Beet, chard, celery, bean, potato, cabbage, cauliflower, turnip, salsify, cucumber, cotton, tobbaco, alfalfa, many flowering plants and most deciduous and small fruits --- more than 50 economic plants, besides many weeds and grasses." (22)

38. Adelphocoris rapidus Say. rapid plant bug

Mason, 24 Aug., Clinton Co., 31 Aug., Jackson Co., 7 Sept., Eaton Co., 7 Sept.

"This species occurs at times very abundantly in clover and may be observed on the blossoms and there can be no question but that it is injurious, although the extent of injury is difficult to determine." (28) In Michigan, it is known to cause "dimple" bean.

39. Adelphocoris lineolatus Goeze. alfalfa plant bug (18)

E. Lansing, 17 Aug., Mason, 24 Aug., Clinton Co., 31 Aug., VanBuren Co., 14 Sept.

Hughes (18) states that the alfalfa plant bug is one of the most important factors in the reduction of alfalfa seed yields in Minnesota.

HOMOPTERA

Family: Cercopidae

40. Aphrophora quadrinotata Say. no common name

E. Lansing, 26 July, 10, 17 Aug.

41. Philaenus leucopthalmus Fab. meadow spittlebug

E. Lansing, 20,26,27,29, July, 10 Aug.

This species has been mentioned as one of those infesting strawberries, but no account of the damage has been included. (25)

42. Philaenus leucopthalmus var. marginellus Fab. meadow spittlebug

E. Lansing, 10,20,26,27, July, Mason, 24 Aug., Clinton Co., 31 Aug., Calhoun co., 7 Sept., Jackson Co., 7 Sept.

Family: Membracidae

43. Ceresa diceros Say. no common name

E. Lansing, 3,4 Sept.

44. Ceresa bubalus Fab. buffalo treehopper

E. Lansing, 26 July, 17 Aug., Clinton Co., 31 Aug.

Causes damage to "apple, pear, peach, quince, cherry, elm, locust, cottonwood and many other trees" by puncturing twigs in the process of egg laying. (22)

45. Campylenchia latipes Say. no common name

E. Lansing, 10 Aug., Mason, 24 Aug., Grand Rapids, 1 Sept.

46. Acutalis semicrema Say. no common name

Clinton Co., 31 Aug.

47. Cyrtolobus maculifrontis Cmm. no common name

Jackson Co., 7 Sept., Berrien Co., 19 Sept.

Family: Cicadellidae

48. Graphocephala coccinea Forst. no common name

E. Lansing, 10 Aug., 4 Sept., Jackson Co., 7 Sept.

49. Draeculacephala mollipes Say. no common name

Clinton Co., 31 Aug.

"It has been taken upon wheat, oats, rye and the list of grasses affected includes many species." (28)

50. Cypona octolineata Fitch. no common name

E. Lansing, 10, 17 Aug., 9 Sept., Mason, 24 Aug., Clinton Co., 31 Aug.

51. Platymetopius frontalis VanD. no common name

Clinton Co., 31 Aug.

52. Platymetopius acutus Say. no common name

Mason, 24 Aug., Clinton Co., 31 Aug., Jackson Co., 7 Sept.

Family: Fulgoridae

53. Scolops sulcipes Say. no common name

E. Lansing, 10, 17 Aug.
Common in all areas in which collecting was done.

54. Acanalonia bivittata Say. no common name

E. Lansing, 10,17 Aug., Clinton Co., 31 Aug., Calhoun Co., 7 Sept.

55. Oremenis pruinosa Say. mealy lantern fly (20)

E. Lansing, 10,20, 31 Aug.

56. Oremenis septentrionalis Spinola. no common name

Calhoun Co., 7 Sept.

Family: Chermidae

57. Psylla sp.

E. Lansing, 10, 17 Aug.,
Berrien Co., 19 Sept.

Family: Aphiidae

58. Macrosiphum rudbeckiae Fitch. goldenglow aphid (17)

South Haven, 25 July.

59. Prociphilus erigeronensis Thomas. aster root aphid (11)

E. Lansing, 27 July1

A root aphid which has been known to wipe out plantings of asters. (11)

COLEOPTERA

Family: Carabidae

60. Lebia tricolor Say. no common name

Mason, 24 Aug., Clinton Co., 31 Aug., Grand Rapids, 1 Sept.

61. Lebia viridis Say. no common name

E. Lansing, 4 Sept.

62. Lebia lobulata Lec. no common name

E. Lansing, 9 Sept.

Family: Lycidae

63. Calopteron reticulatum Fab. no common name

Grand Rapids, 1 Sept.

Family: Lampyridae

64. Lucidora corrusca L. no common name

E. Lansing, 4 Sept., Jackson Co., 7 Sept.

Family: Cantharidae

65. Chauliognathus pennsylvanicus DeG. soldier beetle (4)

Present in all areas in which collecting was done from mid-August until the first frost. It was the commonest beetle observed on goldenrod.

Family: Meloidae

66. Epicauta pennsylvanica DeG. black blister beetle

E. Lansing, 17 Aug., Mason, 24 Aug., Clinton Co., 31 Aug.

67. Epicauta marginata Fab. no common name

E. Lansing, 4 Sept., Calhoun Co., 7 Sept.

Has been reported on beets and tomatoes; no account given of damage. (4)

Family: Coccinellidae

68. Hippodamia parenthesis Say. no common name

Clinton Co., 31 Aug., Jackson Co., 7 Sept.

69. Hippodamia 13-punctata L. no common name

Mason, 24 Aug.

70. Coccinella sanguinea L. no common name

E. Lansing, 26 July, Jackson Co., 7 Sept.

71. Coccinella trifasciata L. no common name

E. Lansing, 1 Aug., Calhoun Co., 7 Sept., Jackson Co., 7 Sept.

72. Coccinella novemnotata Herbst. no common name

E. Lansing, 4 Sept., Jackson Co., 7 Sept., Allegan Co., 14 Sept., Berrien Co., 19 Sept.

73. Megilla maculata DeG. no common name

Calhoun Co., 7 Sept.

Family: Cerambycidae

74. Cyllene robiniae Forst. locust borer

E. Lansing, 1,3,4,5, Sept., Allegan Co., 14 Sept., Clinton Co., 31 Aug., Jackson Co., 7 Sept., Berrien Co., 19 Sept.

"This insect is so numerous throughout most of the eastern United States as to prevent the profitable growing of black locust. If this insect could be controlled, the black locust would become of much greater value as a farm woodlot tree." (22)

75. Oberea tripunctata Swed. dogwood twig borer

E. Lansing, 10 Aug.

"Breeds in the twigs of cottonwood, also in those of blackberry." (4)

Only two were found in goldenrod.

Family: Chrysomelidae

76. Lema trilineata Oliv. three-lined potato beetle

E. Lansing, 10 Aug.

"Occurs on th foliage of various Solonaceous herbs, especially the potato." (4)

77. Exema dispar Lac. no common name

Clinton Co., 31 Aug., E. Lansing, 4 Sept.

The larvae were also observed on goldenrod.

78. Pachybrachys trinotatus Melsh. no common name

E. Lansing, 10,17 Aug.

79. Labioderma clivicollis Kirby. no common name

Clinton Co., 31 Aug. Calhoun Co., 7 Sept.

80. Calligrapha multipunctata bigsbyana Kirby. no common name

E. Lansing, 12,13 July.

81. Calligrapha similis Rogers. no common name

E. Lansing, 26 July, Jackson Co., 7 Sept., Allegan Co., 14 Sept., Van Buren Co., 14 Sept.

82. Anomoea laticlavia Forst. no common name

E. Lansing, 20 July.

83. Trirhabda canadensis Fab. no common name

E. Lansing, 12,20,26,27 July, 17 Aug.

This species was the commonest chrysomelid on goldenrod this summer.

84. Diabrotica duodecimpunctata Oliv. spotted cucumber beetle
southern corn root worm

Clinton Co., 31 Aug., Jackson Co., 7 Sept., VanBuren Co., 14 Sept.

"This insect has been taken from a very large number of plants, including more than 200 of the common weeds, grasses and cultivated crops." (22)

It has also been shown to be a carrier of bacterial wilt of corn and of cucurbits. (19)

85. Oedionychis sub-vittata Horn. no common name

Jackson Co., 7 Sept., E. Lansing, 29 July.

86. Chalepus dorsalis Thun. locust leaf miner

E. Lansing, 3 Sept.

87. Chalepus nervosa Panz. no common name

E. Lansing, 10 Aug.

Family: Curculionidae

88. Hypera punctata Say. the clover leaf weevil

Mason, 24 Aug., Grand Rapids, 1 Sept., E. Lansing, 3 Sept.

"The damage by this insect is most apparent in clover fields during the early spring. In late, cool, dry springs, red clover and alfalfa plants are frequently totally destroyed." (22) Two or three adults were collected on each collecting trip.

89. Polydrusus sericeus Schall. no common name

E. Lansing, 25 June.

This weevil is fairly common on weeds throughout southern Michigan.

90. Madarellus undulatus Say. no common name

Grand Rapids, 1 Sept.

91. Sitona flavescens Marsham. clover root curculio (23)

E. Lansing, 4 Sept.

"They may destroy from 60 to 80 percent of the plants on young stands of alfalfa. In most years,

they are not of much importance. Clover or alfalfa plants infested by these insects wilt and often die, especially during periods of dry weather." (22)

LEPIDOPTERA

Family: Gelechiidae

92. Epicorthylis flavocostella Clem. no common name

E. Lansing, 27 July.

Reared from the plant.

Family: Yponomeutidae

93. Atteva aurea Fitch. no common name

Berrien Co., 19 Sept.

Family: Tortricidae

94. Epiblema scudderiana Clem. no common name

E. Lansing, 27 July.

Reared from the plant.

95. Archips purpurana Clem. no common name

E. Lansing, 27 July.

Family: Pterophoridae

96. Platyptilia pallidactyla Haw. no common name

E. Lansing, 10 June.

Chrysalis found attached to the leaves of goldenrod.

Family: Noctuidae

97. Cucullia asteroides Gn. no common name

E. Lansing, 10 Aug.

Reared from the plant.

98. Feltia ducens Wlk. dingy cutworm (20)

Grand Rapids, 1 Sept., E. Lansing, 5 Sept., Jackson Co., 7 Sept.

Very common on the flowers in late August and September. This genus of cutworms has some very destructive species, but this particular insect has not been recorded as economically significant.

99. Scepsis fulvicollis Hubner. no common name

Grand Rapids, 1 Sept., Jackson Co., 7 Sept.

Common on the flowers in late August and September.

Family: Papilionidae

100. Papilio ajax L. black swallowtail, celerworm, parsleyworm

One adult taken on goldenrod.

Family: Nymphalidae

101. Nymphalis milberti Godart. American tortoise shell (21)

E. Lansing, 17, 25 Aug.

102. Danaus plexippus L. monarch butterfly

Berrien Co., 19 Sept.

Although the monarch butterfly is one of our commoner butterflies, it does not seem to be attracted to goldenrod. The specimens taken in this survey occured in what might be termed a swarm in low lying, wet ground a few miles south of South Haven. It was late in the afternoon and the butterflies were settling down on all the trees, shrubs and

weeds in the vicinity.

103. Vanessa cardue L. — painted lady

E. Lansing, 29 Aug.

104. Argynis cybele Fab. — great spangled fritillary (21)

E. Lansing, 5 Sept.

HYMENOPTERA

Family: Argidae

105. Sterictiphora zabriskiei W and S. — no common name

Mason, 24 Aug.

Family: Tenthredinidae

106. Dolerus similis Nort. — no common name

E. Lansing, 24 June.

Family: Braconidae

107. Cheloneus sericeus Say. — no common name

Clinton Co., 31 Aug.

108. Bassus bicolor Prov. — no common name

Jackson Co., 7 Sept.

109. Bassus perforator Prov. — no common name

Mason, 24 Aug.

110. Bassus tibiator Prov. — no common name

Clinton Co., 31 Aug.

Family: Ichneumonidae

111. Lissonota rufipes Cr. — no common name

Calhoun Co., 7 Sept., Allegan Co., 14 Sept.

112. Pterocormus caliginosus Cr. — no common name

Allegan Co., 14 Sept.

113. Pimplopterus punctatus Cr. no common name

E. Lansing, 3 Sept.

114. Campoplex sp. no common name

Clinton Co., 31 Aug.

115. Zaleptopygus rostratus Cush. no common name

Clinton Co., 31 Aug.

116. Ceratogastra ornata Say. no common name

Clinton Co., 31 Aug.

Family: Gasteruptionidae

117. Gasteruption incertum Cr. no common name

E. Lansing, 27 July, 9 Sept.

Family: Chalcidae

118. Leucopsis affinis Say. no common name

E. Lansing, 3 Sept.

119. Spilochalcis albifrons Walsh. no common name

E. Lansing, 9 Sept.

Family: Perilampidae

120. Perilampus ovaneus Brulle. no common name

Clinton Co., 31 Aug., Jackson Co., 7 Sept.

Family: Psammocharidae

121. Pompilius atrox Dahlb. no common name

Allegan Co., 14 Sept.

122. Pompilius biguttatus Fab. no common name

E. Lansing, 3 Sept.

123. Pompilius scelestrus Cr. no common name

E. Lansing, 5,9 Sept.

124. Pompilius marginatus Say. no common name

Clinton Co., 31 Aug., E. Lansing, 3,5 Sept.

125. Pompilius sp. no common name

Mason, 24 Aug.

Family: Chrysididae

126. Chrysis nitidula Fab. no common name

Saginaw, 9,22 June.

This insect emerged from an old mothegall.

127. Notozus viridicyaneus Nort. no common name

E. Lansing, 20 July.

Family: Tiphiidae

128. Elia quinquecincta Fab. no common name

E. Lansing, 5 Sept., Allegan Co., 14 Sept.

129. Elia interrupta Say. no common name

Jackson Co., 7 Sept.

Family: Formicidae

130. Lasius sp.

E. Lansing, 27 July.

Taken from the roots of Solidago canadensis var. gilvocanescens (Rydb), upon which it seemed to be attending the aster root aphid, Prociphilus erigeronensis Thomas.

131. Formica pallidefulva incerta Emry no common name

Jackson Co., 7 Sept.

132. Camponotus sp.

E. Lansing, 12 Aug.

133 Family: Vespidae

133. Eumenes globosus Sauss. no common name

Mason, 24 Aug., E. Lansing, 5 Sept.

134. Monobia quadridens L. no common name

Grand Rapids, 31 Aug.

135. Ancistrocerus capra Sauss. no common name

E. Lansing, 3,4 Sept.

136. Odynerus catskilli Sauss. no common name

Saginaw, 22 June, Grand Rapids, 1 Sept.

Emerged from an old Eurosta solidaginis (Fitch) gall.

137. Polistes fuscatus variatus Cr. no common name

Clinton Co., 31 Aug., E. Lansing, 3 Sept., Allegan Co., 14 Sept., Berrien Co., 19 Sept.

Very common on the flowers.

138. Vespa maculata L. white faced hornet (10)

E. Lansing, 3 Sept.

Common on the flowers.

139. Vespula arenaria Fab. no common name

Clinton Co., 31 Aug., E. Lansing, 4 Sept.

Common on the flowers.

Family: Sphecidae

140. Larropsis distincta Smith. no common name

E. Lansing, 4,5 Sept., Jackson Co., 7 Sept.

141. Chlorion pennsylvanicum L. no common name

Allegan Co., 14 Sept.

142. Chlorion atratum Lep. no common name

E. Lansing, 3 Sept.

143. Chlorion ichneumoneum L. no common name

E. Lansing, 3,4 Sept., Allegan Co., 14 Sept.

144. Sphex kennelyi Murray. no common name

Clinton Co., 31 Aug., E. Lansing, 3 Sept.

145. Ammophila intercepta St. Farg. no common name

E. Lansing, 4 Sept.

146. Psen (Mimesa) cressoni Pack. no common name

Mason, 24 Aug.

147. Philanthus gibbosus Fab. no common name

Clinton Co., 31 Aug.

148. Bicyrtes ventralis Say. no common name

Calhoun Co., 7 Sept.

149. Bembex spinolae Fab. no common name

E. Lansing, 1,3 Sept., Grand Rapids, 1 Sept., Allegan Co., 14 Sept.

150. Cerceris nigriscens Sm. no common name

Clinton Co., 31 Aug., E. Lansing, 5 Sept.

Family: Andrenidae

151. Andrena fimbriata Sm. no common name

Jackson Co., 7 Sept.

152. Andrena robertsonii D.T. no common name

E. Lansing, 9 Sept.

153. Epeolus mercatus Fab. no common name

Grand Rapids, 31 Aug.

154. Halictus occidentalis Cress. no common name

Grand Rapids, 1 Sept., Berrien Co., 19 Sept.

155. Halictus rubicundus Christ. no common name

Jackson Co., 7 Sept., Allegan Co., 14 Sept.

156. Halictus striata Prov. no common name

E. Lansing, 9 Sept., Allegan Co., 14 Sept.

157. Halictus versatus Robt. no common name

Clinton Co., 31 Aug., Mason, 24 Aug., Eaton Co., 7 Sept.

158. Agopostemon radiatus Say. no common name

Allegan Co., 14 Sept.

159. Mellisodes desponia Sm. no common name

E. Lansing, 17 Aug.

160. Ceratina dupla Say. no common name

Clinton Co., 31 Aug., E. Lansing, 4,9 Sept., Mason, 24 Aug.

Family: Megachilidae

161. Megachile latimanus Say. no common name

Clinton Co., 31 Aug., E. Lansing, 4 Sept.

162. Megachile perplexa Sm. no common name

E. Lansing, 9 Sept.

163. Litomegachile brevis Say. no common name

Grand Rapids, 31 Aug.

Family: Bombidae

164. Bombus affinis Beq. no common name

Grand Rapids, 31 Aug., E. Lansing, 3 Sept., Allegan Co., 14 Sept.

Family: Apidae

165. Apis mellifica L. honeybee

Present in large numbers in all areas in which collecting was done from the time flowering began until the first frost.

DIPTERA

Family: Itonidae

166. Neolasioptera sp. (near ambrosiae) no common name

Shiwasee Co., 29 June.

Family: Lycoriidae

167. Lycoria (Sciara) sp.

Clinton Co., 31 Aug.

Family: Bibionidae

168. Philia stigmatera Say. no common name

Jackson Co., 7 Sept.

Family: Bombyliidae

169. Exoprosopa fasciata Macq. no common name

Jackson Co., 7 Sept., Allegan Co., 14 Sept.

170. Sparnopolius fulvus Wd. no common name

Grand Rapids, 1 Sept., E. Lansing, 3 Sept., Jackson Co., 7 Sept., Berrien Co., 19 Sept.

171. Villa lateralis Say. no common name

Grand Rapids, 1 Sept.

172. Villa sp.

Allegan Co., 14 Sept.

173. Systropus macer Lw. no common name

Jackson Co., 7 Sept.

This specimen represents a new genus of this family from Michigan. (30)

Family: Therevilidae

174. Psilocephala frontalis Cole. no common name

E. Lansing, 10 Aug.

Family: Asilidae

175. Machimus notatus Macq. no common name

Family: Dolichopodidae

176. Sciapus scintillans Loew. no common name

E. Lansing, 10 Aug.

177. Gymnopternus sp.

Berrien Co., 19 Sept.

Family: Phoridae

178. Mequselida straminae Mall. no common name

Clinton Co., 31 Aug.

Family: Syrphidae

179. Microdon conflictus Big. no common name

E. Lansing, 4 Sept.

180. Pipizia pisticoides Will. — no common name

Mason, 24 Aug.

181. Paragus angustifrons Lowe. — no common name

Mason, 24 Aug.

182. Syrphus ribesii L. — no common name

VanBuren Co., 14 Sept.

183. Syrphus ribesii var. vittifrons Shann. — no common name

VanBuren Co., 14 Sept., Berrien Co., 19 Sept.

184. Metasyrphus wiedmanii Johnson. — no common name

VanBuren Co., 14 Sept.

185. Epistrophe umbellatarum Schin. — no common name

E. Lansing, 3 Sept.

186. Sphaerophoria cylindrica Say. — no common name

Jackson Co., 7 Sept.

187. Tubifera tenax L. — drone-fly, one of the rat tailed maggots. (10)

VanBuren Co., 14 Sept.

188. Xylota ejuncida Say. — no common name

Mason, 24 Aug.

189. Helophilus fasciatus Walk. — no common name

E. Lansing, 3,9 Sept., Grand Rapids, 1 Sept.

190. Spilomyia quadrifasciata Say. — no common name

E. Lansing, 4 Sept.

191. Spilomyia longicornis Lw. — no common name

E. Lansing, 1, 4 Sept.

Family: Conopidae

192. Occemyia loraria Lw. no common name

Clinton Co., 31 Aug.

193. Occemyia nigripes Camras. no common name

E. Lansing, 9 Sept.

Family: Calliphoridae

194. Pollenia rudis Fab. cluster fly

Clinton Co., 31 Aug., Allegan Co., 14 Sept.

195. Bufolucilia sp. no common name

VanBuren Co., 14 Sept.

Family: Muscidae

196. Hylemya cilicrura Rond. seed-corn maggot

Clinton Co., 31 Aug., Jackson Co., 7 Sept., Berrien Co., 19 Sept.

The seed-corn maggot in the larval stage attacks "corn, beans, peas, cabbage, turnip, beets, radish, seed potatoes and several others." (22)

197. Morellia micans Maq. no common name

Allegan Co., 14 Sept.

198. Coenosia (Limosia) sp.

Clinton Co., 31 Aug.

199. Lispocephala erythrocera R.D. no common name

Berrien Co., 19 Sept.

Family: Sarcophagidae

200. Sarcophaga importuna Walk. no common name

Jackson Co., 7 Sept.

201. Sarcophaga rapax Walk. no common name

Mason, 24 Aug., Jackson Co., 7 Sept.

202. Sarcophaga ventricosa V.d.W. no common name

Allegan Co., 14 Sept.

Family: Larvaevoridae

203. Myiophasia metallica Tns. no common name

Allegan Co., 14 Sept.

204. Trichopoda pennipes F. no common name

E. Lansing, 3 Sept.

205. Hyalomyodes triangulifera L.W. no common name

Grand Rapids, 1 Sept.

206. Chaetogaedia analis V.d.W. no common name

Clinton Co., 31 Aug.

207. Peleteria sp.

Grand Rapids, 1 Sept., E. Lansing, 3 Sept., Allegan Co., 14 Sept.

208. Archytas aterrima K.D. no common name

VanBuren Co., 14 Sept.

209. Lydna areos Walk no common name

Mason, 24 Aug., Clinton Co., 31 Aug., Allegan Co., 14 Sept.

210. Phrynofrontina discalis Coq. no common name

Clinton Co., 31 Aug.

211. Cylindromyia argentea Tns. no common name

E. Lansing, 20 July.

212. Cylindromyia vulgaris Ald. no common name

Grand Rapids, Sept. 1.

Family: Scopeumatidae

213. Scopeuma stercorarium L. no common name

E. Lansing, 9 June, Grand Rapids, 1 Sept., Clinton Co., 1 Sept.

Family: Ottidae

214. Chrysomyza demandata Fab. no common name

Calhoun Co., 7 Sept., Allegan Co., 14 Sept.

Family: Trypetidae

215. Euaresta bella Lw. no common name

Mason, 24 Aug., Clinton Co., 31 Aug.

Family: Sepsidae

216. Saltella scutellaris var. ruficoxa Macq. no common name

E. Lansing, 9 Sept.

Family: Lauxanidae

217. Minettia lupulina Fab. no common name

E. Lansing, 17 Aug.

Family: Ephydridae

218. Hyadina binotata Cr. no common name

Clinton Co., 31 Aug.

Family: Chloropidae

219. Chlorops cinerapennis Adams. no common name

Clinton Co., 31 Aug., Jackson Co., 7 Sept., E. Lansing, 9 Sept.

220. Chaetochlorops inquilina Coq. no common name

Clinton Co., 31 Aug., E. Lansing, 4 Sept.

221. Hippelates pallipes Lw. no common name

Clinton Co., 31 Aug.

222. Oscinella melancholica Beck. no common name

Clinton Co., 31 Aug.

Family: Milichiidae

223. "Madiza" glabra Fallen. no common name

Clinton Co., 31 Aug. Jackson Co., 7 Sept.

Family: Chamaemyiidae

224. Chamaemyia polystigma Mq. no common name

E. Lansing, 17 Aug., Clinton Co., 31 Aug.

INSECTS COLLECTED FROM GALLS

COLEOPTERA

Family: Mordellidae

225. Mordella scutellaris Fab. no common name

E. Lansing, 9 June, 4,5,13,15,19 July, Grand Rapids, 13,17,19,July, Hartford, 29 June, 4 July, Kalamazoo, 4,13,19 July, Saginaw 13,19 July, Shiwassee Co., 13,19 July

LEPIDOPTERA

Family: Gelechiidae

226. Gnorimoschema gallaesolidaginis Riley
solidago gall moth (10)

Clinto Co., 31 Aug., E. Lansing, 18 Aug.

The larvae of this moth are commonly used as bait by

ice fishermen.

HYMENOPTERA

Family: Braconidae

227. Microbracon furtivus Fyles. no common name

Grand Rapids, 15 June.

228. Heteropsilus languriae Ashm. no common name

E. Lansing, 24 June.

229. Microgaster gelechiae Riley. no common name

Saginaw, 9 June.

Emerged from a moth gall.

230. Microplitis sp. no common name

Clinton Co., 31 Aug.

231. Apantales crassicornis Prov. no common name

Clinton Co., 31 Aug.

232. Meteorus hyphantriae Riley. no common name

Jackson Co., 7 Sept.

233. Schizoprymnus sp. no common name

Grand Rapids, 13 July, Kalamazoo, 9,13 July.

Emerged from a fly gall.

234. Schizoprymnus sp. no common name

E. Lansing, 4 July.

Emerged from a fly gall.

Family: Ichnemonidae

235. Campoplex depressus Vier. no common name

Saginaw, 9 June.

Emerged from a moth gall.

Super-family: Cynipoidea

Sub-family: Eucoilinae

236. Eucoila sp. no common name

E. Lansing, 10 June.

Emerged from a fly gall.

Family: Bethylidae

237. Perisierola cellularis Say. no common name

E. Lansing, 3,9 June, Saginaw, 15 June.

Emerged from fly gall.

Family: Eurytomidae

238. Eurytoma gigantea Walsh. no common name

Grand Rapids, 13 July, Shiwassee Co., 19 July.

These specimens emerged from both fly and moth galls.

239. Eurytoma sp. no common name

Kalamazoo, 4 July.

Emerged from a fly gall.

Family: Eulophidae

240. Tetrastichus solidaginis Burks. no common name

Saginaw, 19 July.

Emerged from a moth gall.

DIPTERA

Family: Trypetidas

241. Eurosta solidaginis Fitch. no common name

Hartford, 3,4,9 June, Grand Rapids, 3,4,5,6,9,12 June, E. Lansing, 3,4, 9.12 June, Saginaw Co., 3,4,6,9 June, Shiwassee Co., 3,5,6 June.

This is the fly larva commonly used by ice fishermen.

DISCUSSION

It has been already noted in the data that some of the insects found on goldenrod are known to be injurious to crop plants. Some of them such as the tarnished plant bug, clover leaf beetle and locust borer have long been recognized as insects of economic importance. Others, such as the rapid plant bug (Adelphocoris rapidus) and the meadow plant bug (Miris dolabratus) did not attract much attention in the early days of economic entomology. It was Osborn (28) who suggested that these two were of greater importance than generally realized and subsequent investigation has proved him to be right.

Some of the members of the hemipteran family Miridae are among the most important insects listed as injurious. It was this family that had more individuals of the same species present on goldenrod than any other taken in this survey. The tarnishes plant bug occured in the greatest numbers, followed in order by Plagionathus obscurus (no common name), the meadow plant bug, the alfalfa plant bug and the rapid plant bug.

This group of insects (mirids) was most abundant in patches of goldenrod at the margins of fields in which grain crops had been harvested. Except for P. obscurus, these mirids are fairly well known and their importance

as pests has been recognized. P. obscurus has not been listed as yet as an insect of economic importance, although a closely related species, P. politus Uhler., has been "reared from apples where the nymphs fed on tender foliage." (6) Records of the feeding habits of P. obscurus indicate that it shows a preference for Compositae. Since the insect is so numerous in goldenrod, it is a species that might assume economic significance if it happened to be feeding in a patch of goldenrod bordering a field in which a composite crop were under cultivation. For instance, lettuce being grown as a seed crop might well be subject to attack by it. It is also possible that P. obscurus, like many other mirids does not confine its feeding to Compositae alone.

Itshould also be mentioned that the anthocorid, Orius insidiosus Say, ranked close to the mirids in point of number of individuals present. This insect, although predacious, injures corn by puncturing the strands of silk in laying its eggs, and in doing so provides a place of entry for corn ear rot.

Large numbers of goldenrod plants harbored immature spittlebugs in the spring and the adults were common on them all summer. Strawberries were badly infested with cercopids in Michigan this year, as is often the case in wet years, and it was noticed that the char-

acteristic froth produced by nymphs was present on the succulent young weeds, including goldenrod growing along the margins of the plantings. The life histories of the members of the family Cercopidae are still somewhat obscure so that the significance of their relationship to weeds is not as yet fully understood.

It is not supposed that all of the species of insects that feed upon the tissues or visit the flowers of goldenrod growing in Michigan were obtained in this survey. One year of collecting and rearing was, of course, not long enough to accomplish so much. However, the number of species obtained, and the known destructiveness of some of them, would indicate that goldenrod is indeed one of the important weeds in which insects maintain their populations. This, taken together with the fact that goldenrod grows so luxuriantly throughout the state, would indicate that further study of the relationship between goldenrod, insects and crop plants would be worthwhile

SUMMARY

During the spring, summer and early fall of 1947, insects were collected from goldenrod in 12 counties in lower Michigan.

Nine orders, 85 families, 198 genera and 241 species and varieties of insects were obtained. Dates of abundance and remarks concerning the economic importance of the various species are included in the data.

Thirteen of the specimens taken have been cited as injurious by authorities.

One of the specimens of Diptera, Systropus macer Lw., provides a record of a new genus from this state.

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