

Vol. 25, No. 2

Summer 1992

*THE
GREAT LAKES
ENTOMOLOGIST*



PUBLISHED BY

THE MICHIGAN
ENTOMOLOGICAL
SOCIETY



HOLARCTIC INSECTS ADVENTIVE IN MICHIGAN:
NEW AND ADDITIONAL RECORDS
(HOMOPTERA, HETEROPTERA, COLEOPTERA, NEUROPTERA)

A. G. Wheeler, Jr.¹

ABSTRACT

Fourteen European insects in the Homoptera (4 species), Heteroptera (5), Coleoptera (4), and Neuroptera (1) are reported from Michigan. Ten are new state records (one new Ohio record is given). The point of entry for most of the species is assumed to be the northeastern United States or Maritime Provinces of Canada. Possibilities of dispersal (natural and human-assisted) from centers of introduction in the Northeast, multiple introductions from Europe, and direct entry into the Great Lakes region are discussed.

The adventive component of the New World fauna has long interested both basic and applied entomologists. Initially, all invading species merit attention, and those that appear to threaten North American agriculture (or be of biocontrol or medical significance) are monitored. Insects that pose little or no economic risk, however, are often forgotten soon after their detection. Spread from apparent points of entry is not tracked. New records accumulate unsystematically and merely tend to reflect the activity of collectors and identifiers.

Records of nonindigenous species are most useful if based on intensive, systematic surveys over a wide area. But even isolated records can be important, for they provide data potentially useful in assessing pathways of entry and dispersal from centers of introduction. If records of subsequent spread are not documented soon after detection, it becomes increasingly difficult to determine whether a particular insect is adventive or naturally Holarctic in the New World. If previously innocuous species common to the Old and New World should assume economic importance, then information on their North American distribution and their biogeographic status (naturally Holarctic or adventive) becomes critical.

Herein, Michigan records (and one from Ohio) of 14 adventive species (4 orders, 10 families) are listed; new state records are indicated by an asterisk. Arrangement of taxa below the ordinal level is alphabetical. All species were collected by the author (except the lygaeid *Stygnocoris rusticus*) during 14-25 July 1991. Unless otherwise indicated (by numbers in parentheses or noting that a species was common or abundant), only one adult was collected at each locality. Voucher specimens have been deposited in the insect collections of Cornell University, Ithaca, New York (CUIC), and the National Museum of Natural History, Washington, D.C. (USNM).

¹Bureau of Plant Industry, Pennsylvania Department of Agriculture, Harrisburg, PA 17110.

For each species, reference is made to the first North American record, and the current Nearctic distribution is summarized. In most cases, biological studies in North America are mentioned. Literature cited in these papers can be used to obtain information on seasonal history and habits in the Old World.

Homoptera: Cercopidae

Aphrophora alni (Fallén). Moore's (1956) records from Ontario were the first for this European spittlebug in North America, although one specimen had been collected in 1927. Abundant in southern Ontario, *A. alni* occurs mainly within a 260-km radius of Toronto (Hamilton 1982). The first U. S. record was that of Hanna and Moore (1966) from Monroe County, Michigan, where it occurred along roadsides and edges of woods, especially on goldenrod. Hanna (1970) observed nymphs on various herbaceous plants in Monroe County and suggested that this cercopid had been introduced with European nursery stock.

CHIPPEWA Co: Rotary Park, Sault Ste. Marie, 21-VII, on *Alnus rugosa*.

****Lepyronia coleoptrata*** (L.). The first verified Nearctic records of this common Old World spittlebug were those of Russell (1962) from New York. It has since been reported from Ontario, Pennsylvania, Quebec, Vermont (Hoebeke and Hamilton 1983), and New Hampshire (Wheeler 1991). In Pennsylvania, this polyphagous immigrant develops mainly on roadside vegetation, particularly naturalized Eurasian composites such as Canada thistle (*Cirsium arvense*) and spotted knapweed (*Centaurea maculosa*), and also crownvetch (*Coronilla varia*) (Wheeler 1991).

BARAGA Co.: junc. Rts. 28 and 41 S. of Alberta, 24-VII. GOGEBIC Co.: Rt. 64, 2.4 mi. N. of Rt. 2, 24-VII. HOUGHTON Co.: Rt. 28, 2 mi. W. of Kenton and Rt. 28 E. of Kenton, 24-VII. ONTONAGON Co.: Rt. 64, 2 mi. E. of Silver City, 24VII. Common along roadsides at all sites.

Homoptera: Cicadellidae

****Grypotes puncticollis*** (Herrich-Schaeffer). This deltocephaline leafhopper is a pine specialist known from most of continental Europe, England, northern Africa, and Turkey. In the New World, it has been recorded only from western New York (3 counties) and northeastern Pennsylvania (2 counties) (Wheeler 1989a). Collections of this adventive species were made from Scotch pine (*Pinus sylvestris*) and Swiss mountain pine (*P. mugo*) (Wheeler 1989a).

WASHTENAW Co.: University of Michigan, Ann Arbor, 15-VII, common on *Pinus banksiana*, *P. mugo*, and *P. sylvestris*.

OHIO: Lorain Co.: Oberlin College, Oberlin, 14-VII, common on *P. sylvestris*.

Homoptera: Psyllidae

****Psyllopsis fraxinicola*** (Förster). Smith (1910) usually is credited with the first North American record (e.g., Tuthill 1943, Hodkinson 1988), but the same locality (Atlantic City, New Jersey) had been published in a previous catalog of New Jersey insects (Smith 1900). An even earlier, overlooked record is that of Heidemann (1892) from Washington, D.C. Because *P. fraxinicola* is known from Washington (McAtee 1918, Tuthill 1943, Hodkinson 1988), including specimens collected during 1884-1890 (USNM), it can be assumed that it was the psyllid Heidemann observed on European ash rather than *P. fraxini*, another North American immigrant but one known only from New York (Tuthill 1943, Hodkinson 1988). Additional records of this European ash specialist are British Columbia, California, Idaho, Nova Scotia, and Utah (Hodkinson 1988).

MECOSTA Co.: Ferris State University, Big Rapids, 18-VII, abundant on *Fraxinus excelsior*.

Heteroptera: Berytidae

Berytinus minor (Herrich-Schaeffer). Walley (1935) gave the first North American record (Ontario) of this European stilt bug. The first U.S. record was Cheboygan County, Michigan (Harris 1941). It is now known from Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Quebec, and West Virginia (Froeschner and Henry 1988), and from New Brunswick, Newfoundland, Nova Scotia, and Prince Edward Island (Scudder 1991). *Berytinus minor* presumably feeds on the roots of legumes such as white clover (*Trifolium repens*) (Wheeler 1970, 1979).

CHIPPEWA Co.: De Tour Village, 19-VII, sweeping weeds.

Heteroptera: Lygaeidae

**Megalonotus sabulicola* (Thomson). This rhyparochromine is one of several immigrant Heteroptera established in eastern and western North America. Reported from California by Van Duzee (1928) (as *Rhyparochromus chira-gra* var. *californicus*), *M. sabulicola* was discovered in Connecticut by Slater and Sweet (1958). The recent North American catalog also lists it from British Columbia, Idaho, Maryland, Massachusetts, North Dakota, Oregon, Utah, and Washington (Ashlock and Slater 1988). Later records are Delaware, New Jersey, New York, Pennsylvania, Rhode Island, Virginia, and West Virginia (Wheeler 1989b). This ground-dwelling bug feeds on fallen seeds of bachelor's-button or cornflower (*Centaurea cyanus*) and spotted knapweed (*C. maculosa*) in temporary habitats (Sweet 1964, Wheeler 1989b).

ANTRIM Co.: Rt. 131, 4 mi. N. of Alba, 18-VII, under *Centaurea maculosa* (4 adults, 1 nymph). CHIPPEWA Co.: Sault Ste. Marie, 21-VII, under *C. maculosa* (7, 2 nymphs). HOUGHTON Co.: Rt. 41, Quincy Mine Shaft NE of Hancock, 23-VII, under *C. maculosa* (2 nymphs). MARQUETTE Co.: Marquette, 25-VII, under *C. maculosa* (1 nymph).

Stygnocoris rusticus (Fallén). Heidemann's (1908) New York record is the first for the Nearctic region. A common Palearctic rhyparochromine, it since has been reported from British Columbia, Connecticut, Illinois, Maine, Michigan, New York, Nova Scotia, Prince Edward Island, Quebec, Vermont, Washington, West Virginia, and Wisconsin (Ashlock and Slater 1988, Asquith and Lattin 1991). It feeds on fallen seeds of composites such as tansy (*Tanacetum vulgare*) and yarrow (*Achillea millefolium*) (Sweet 1964, Wheeler 1983). Known in Michigan from Mason and Mecosta counties in the Lower Peninsula (Wheeler 1983), *S. rusticus* is here recorded from the Upper Peninsula.

ONTONAGON Co.: Rt. 64, W. of Ontonagon, 24-VII, sweeping, T. J. Henry coll.

**Stygnocoris sabulosus* (Schilling). Following early records from New York by Barber (1916) and Nova Scotia by Gibson (1917) [both as *S. pedestris* (Fallén)], this European seed predator has been reported from British Columbia, Connecticut, Maine, Massachusetts, Newfoundland, New Hampshire, Oregon, Quebec, and Washington (Slater 1964, Sweet 1964, Ashlock and Slater 1988, Asquith and Lattin 1991). Sweet (1964) studied its habits in New England; nymphs of this univoltine bug feed in the litter layer on seeds of composites and other plants.

HOUGHTON Co.: Osceola, 23-VII, under *Centaurea maculosa*.

Heteroptera: Rhopalidae

**Rhopalus (Brachycarenum) tigrinus* Schilling. First detected in New Jersey (Hoebeke 1977), this common European rhopalid is now known from Maryland, New York, and Pennsylvania (Hoebeke and Wheeler 1982, Wheeler and Hoebeke 1988). A crucifer specialist, *R. tigrinus* develops on naturalized species such as peppergrass (*Lepidium virginicum*) and shepherd's-purse (*Capsella bursapastoris*) (Hoebeke and Wheeler 1982, Wheeler and Hoebeke 1988). INGHAM Co.: Rt. 36, Fairview Cemetery, Dansville, 15-VII, on *Berteroa incana*.

Coleoptera: Chrysomelidae

**Psylliodes affinis* (Paykull). This European flea beetle was first reported in the Nearctic Region from New York, where it occurred on bitter nightshade (*Solanum dulcamara*) (USDA 1968). Ontario and Pennsylvania have been added to the North American distribution (Wheeler and Hoebeke 1983).

CHIPPEWA Co.: Ashmun Bay, Sault Ste. Marie, 21-VII, on *S. dulcamara*. INGHAM Co.: Michigan State University, E. Lansing, 17-VII, *S. dulcamara*. WASHTENAW Co.: University of Michigan, Ann Arbor, 15-VII, *S. dulcamara*. WEXFORD Co.: Rt. 115 W. of Cadillac, 18-VII, *S. dulcamara*. Common at all sites.

Coleoptera: Coccinellidae

Scymnus (Pullus) suturalis Thunberg. Gordon (1976) first reported this European coccinellid (as the indigenous *S. coniferarum* Crotch) from the Western Hemisphere, based on collections from Pennsylvania. He (1982) later referred the Pennsylvania records and one from New York to the Old World *S. suturalis*. This aphid predator has been found primarily on Scotch pine (*P. sylvestris*), and conifer nursery stock from Europe is considered the likely means of introduction (Gordon 1982). Hoebeke (1984) added records from Connecticut and Michigan (Saginaw), noting this scymnine had been intentionally released in Michigan (Clinton and Ottawa counties) in 1961 for the biological control of aphids. He also said it is uncertain if the Saginaw population resulted from the biocontrol releases or westward spread from the East, where populations apparently are adventive. This predator has most recently been reported from Maryland and Virginia (Wheeler 1987).

EMMET Co.: Mackinaw City, 19-VII, on *Pinus sylvestris*. CHIPPEWA Co.: Lake Superior State University, Sault Ste. Marie, 21-VII, *P. sylvestris*. INGHAM Co.: Michigan State University, E. Lansing, 17-VII, *P. sylvestris*. WASHTENAW Co.: University of Michigan, Ann Arbor, 15-VII, *P. sylvestris* (2).

Coleoptera: Curculionidae

**Sciaphilus asperatus* (Bonsdorff). This brachyderine has long been known from the New World, having been reported from Massachusetts by Henshaw (1888) [as *S. muricatus* (F.)]. Brown (1967) gave the first western records of this European weevil in North America (British Columbia). It is also known from Connecticut, Idaho, Maine, Maryland, New Hampshire, New Jersey, New York, North Carolina, Ontario, Quebec, South Dakota, Vermont, Wisconsin (O'Brien and Wibmer 1982), and Nova Scotia (Campbell et al. 1989).

CHIPPEWA Co.: Drummond Island, 20-VII, on *Abies balsamea*. GOGEBIC Co.: Rt. 64 nr. Gogebic State Park, 24-VII, *Rubus* sp. (2).

**Strophosoma melanogrammum* (Förster). Recorded [as *S. coryli* (F.)] from Massachusetts and New Jersey by Henshaw (1888), this weevil also is

known from British Columbia, Newfoundland, New Hampshire, New York, Nova Scotia, Ontario, Quebec, and Washington (O'Brien and Wibmer 1982, Campbell et al. 1989). Its association with various shrubs and trees is noted by Campbell et al. (1989).

BARAGA Co.: Rt. 41 at Herman Rd., W. of Three Lakes, 22-VII, on *Alnus rugosa*, *Picea glauca*. HOUGHTON Co.: Houghton, 23-VII, *Quercus* sp. sprouts; Osceola, 23-VII, *Alnus rugosa*. KEWEENAW Co.: Cliff Drive N. of Mohawk, 23-VII, *Abies balsamea*. ONTONAGAN Co.: Porcupine Mountains Wilderness State Park, 24-VII, *Tsuga canadensis*. Common at all sites.

Neuroptera: Coniopterygidae

**Aleuropteryx juniperi* Ohm. Henry (1974) reported this European scale predator from Pennsylvania as the first North American record. It is now known from Maryland, New Jersey, New York, Virginia, and West Virginia (Wheeler 1981). Henry (1976) studied its seasonal history and habits in Pennsylvania; larvae and adults attack scale insects (*Carulaspis* spp.) on ornamental juniper (*Juniperus* spp.).

INGHAM Co.: Michigan State University, E. Lansing, 16-VII, on *Juniperus chinensis* infested with *Carulaspis juniperi* (Bouch-). MECOSTA Co.: Ferris State University, Big Rapids, 18-VII, on *J. chinensis* with *C. juniperi*. Abundant at both sites.

DISCUSSION

Most of the adventive insects reported herein were collected on plants not native to North America. Ten of the 14 species are new state records for Michigan. Those for *Lepyronia coleoptrata*, *Grypotes puncticollis*, *Psyllopsis fraxinicola*, *Megalonotus sabulicola*, *Rhopalus tigrinus*, *Psylliodes affinis*, and *Aleuropteryx juniperi* represent considerable range extensions. That so many immigrant species new to the state or even the Great Lakes region could be collected in less than two weeks, emphasizes Turnbull's (1979) comment about our ignorance of recent changes in the North American fauna. The paucity of records of nonindigenous species from such an important region can lead to erroneous conclusions regarding their points of introduction.

More European species have been found in Canada's Maritime Provinces than in any other region of the New World (Brown 1940, 1967; Lindroth 1957) and, for many immigrants, the earliest records are from (or near) seaports of the Northeast. The earlier northeastern records for many of the species recorded in this paper suggest that region as the point of introduction, although inferences based on limited collecting obviously are tenuous. Once established in the Northeast, immigrant species may disperse to the Great Lakes and other regions or be further spread through commerce.

It is difficult, however, to determine whether isolated records of adventive insects reflect multiple introductions or subsequent dispersal from a single introduction (e.g., Pollock 1991). Michigan populations of some of the species reported here may have resulted from natural dispersal from the Northeast or from the shipment of infested plant material from that region. In some cases Michigan (or nearby areas of the Upper Great Lakes) may have been the original point of entry despite earlier northeastern records.

For most of the species, a northeastern entry, with subsequent natural dispersal and/or spread with plant material and other forms of commerce, seems most likely. Multiple introductions, however (or simply inadequate collecting), may explain the disjunct distributions of several species. The St. Lawrence Seaway, which allowed moderate-sized ocean vessels to enter the

Great Lakes (Mayer 1980), probably has been responsible for the direct introduction of some adventive insects to the Great Lakes region (e.g., Larochelle and Larivière 1980). It apparently also has aided the further spread of established northeastern populations of certain species (e.g., Watson 1979). Prompt detection of immigrants and surveys to document their dispersal are requisite to answering questions about the North American history of adventive species.

ACKNOWLEDGMENTS

I am grateful to T. J. Henry (Systematic Entomology Laboratory, USDA, c/o National Museum of Natural History, Washington, D.C.) for inviting me on the mirid-collecting trip to Michigan and identifying or verifying identifications of Heteroptera and Neuroptera. E. R. Hoebeke (Department of Entomology, Cornell University, Ithaca, NY) identified or confirmed my identifications of Coleoptera and certain Homoptera. I also thank them for critically reviewing the manuscript. G. L. Miller (Systematic Entomology Laboratory, USDA, Beltsville, MD) provided information on Washington, D.C., specimens of *Psyllopsis fraxinicola* in the USNM collection.

LITERATURE CITED

- Ashlock, P. D. and A. Slater. 1988. Family Lygaeidae Schilling, 1829 (=Infericornes Amyot and Serville, 1843; Myodochidae Kirkaldy, 1899; Geocoridae Kirkaldy, 1902). The seed and chinch bugs. pp. 167-245. *In*: T.J. Henry and R.C. Froeschner (eds.). Catalog of the Heteroptera, or True Bugs, of Canada and the Continental United States. E. J. Brill, Leiden and New York.
- Asquith, A. and J. D. Lattin. 1991. A review of the introduced Lygaeidae of the Pacific Northwest, including the newly discovered *Plinthinus brevipennis* (Latreille) (Heteroptera: Lygaeidae). Pan-Pac. Entomol. 67: 258-271.
- Barber, H. G. 1916. [Exhibition of specimens: *Stygnocoris pedestris* in North America]. J. New York Entomol. Soc. 24:104.
- Brown, W. J. 1940. Notes on the American distribution of some species of Coleoptera common to the European and North American continents. Can. Entomol. 72:65-78.
- _____. 1967. Notes on the extralimital distribution of some species of Coleoptera. Can. Entomol. 99:85-93.
- Campbell, J. M., M. J. Sarazin, and D. B. Lyons. 1989. Canadian beetles (Coleoptera) injurious to crops, ornamentals, stored products, and buildings. Agric. Can. Publ. 1826. 491 pp.
- Froeschner, R. C. and T. J. Henry. 1988. Family Berytidae Fieber, 1891 (=Neididae Kirkaldy, 1902; Berytinidae Southwood and Leston, 1959). The stilt bugs. pp. 56-60. *In*: T.J. Henry and R.C. Froeschner (eds.). Catalog of the Heteroptera, or True Bugs, of Canada and the Continental United States. E.J. Brill, Leiden and New York.
- Gibson, A. 1917. The entomological record, 1917. Forty-seventh Ann. Rep. Entomol. Soc. Ontario, 1916: 137-171.
- Gordon, R. D. 1976. The Scymnini (Coleoptera: Coccinellidae) of the United States and Canada: key to genera and revision of *Scymnus*, *Nephus* and *Diomus*. Bull. Buffalo Soc. Nat. Sci. 28:1-362.
- _____. 1982. An Old World species of *Scymnus* (*Pullus*) established in Pennsylvania and New York (Coleoptera: Coccinellidae). Proc. Entomol. Soc. Wash. 84:250-255.
- Hamilton, K. G. A. 1982. The insects and arachnids of Canada. Part 10. The spittlebugs of Canada (Homoptera: Cercopidae). Agric. Can. Publ. 1740. 102 pp.

- Hanna, M. 1970. An annotated list of the spittlebugs of Michigan (Homoptera: Cercopidae). *Mich. Entomol.* 3:2-16.
- Hanna, M. and T. E. Moore. 1966. The spittlebugs of Michigan (Homoptera: Cercopidae). *Pap. Mich. Acad. Sci., Arts, Lett.* 51:39-73.
- Harris, H. M. 1941. Concerning Neididae, with new species and new records for North America. *Bull. Brooklyn Entomol. Soc.* 36:105-109.
- Heidemann, O. 1892. Note on the food-plants of some Capsidae from the vicinity of Washington, D.C. *Proc. Entomol. Soc. Wash.* 2:224-226.
- _____. 1908. [Exhibition of specimens: *Stygnocoris rusticus* in North America]. *Proc. Entomol. Soc. Wash.* 10:14.
- Henry, T. J. 1974. A coniopterygid (*Aleuropteryx juniperi* Ohm). U.S. Dept. Agric. Coop. Econ. Insect Rep. 24(33):659.
- _____. 1976. *Aleuropteryx juniperi*: a European scale predator established in North America (Neuroptera: Coniopterygidae). *Proc. Entomol. Soc. Wash.* 78:195-201.
- Henshaw, S. 1888. Two European weevils new to the United States. *Psyche* 5:137.
- Hodkinson, I. D. 1988. The Nearctic Psylloidea (Insecta: Homoptera): an annotated check list. *J. Nat. Hist.* 22:1179-1243.
- Hoebeke, E. R. 1977. A rhopalid bug (*Brachycarenum tigrinus* (Schilling)). U.S. Dept. Agric. Coop. Plant Pest Rep. 2(40):802.
- _____. 1984. New records of *Scymnus (Pullus) suturalis* Thunberg in eastern North America (Coleoptera: Coccinellidae). *Coleopt. Bull.* 38:312.
- Hoebeke, E. R. and K. G. A. Hamilton. 1983. *Lepyronia coleoptrata* (L.), a European spittlebug in eastern North America: new locality records and new key to the North American species of *Lepyronia* Amyot and Serville (Homoptera: Cercopidae). *Proc. Entomol. Soc. Wash.* 85:263-271.
- Hoebeke, E. R. and A. G. Wheeler, Jr. 1982. *Rhopalus (Brachycarenum) tigrinus*, recently established in North America, with a key to the genera and species of Rhopalidae in eastern North America (Hemiptera: Heteroptera). *Proc. Entomol. Soc. Wash.* 84:213-224.
- Larochelle, A. and M.-C. Larivière. 1980. *Propylea quatuordecimpunctata* L. (Coleoptera: Coccinellidae) en Amérique du Nord: établissement, habitat et biologie. *Bull. Invent. Insectes Quebec* 2:19.
- Lindroth, C. H. 1957. The Faunal Connections between Europe and North America. John Wiley & Sons, New York. 344 pp.
- McAtee, W. L. 1918. Psyllidae of the vicinity of Washington, D.C., with description of a new species of *Aphalara* (Hom.). *Entomol. News* 29:220-224.
- Mayer, H. M. 1980. Industrial and urban prospects for the Great Lakes region. pp. 232-267. In: D. R. Deskins, Jr. (ed.). *Impact of urbanization and industrialization on the landscape*. Mich. Geogr. Publ. 25. University of Michigan, Ann Arbor.
- Moore, T. E. 1956. *Aphrophora alni* in North America. *Bull. Brooklyn Entomol. Soc.* 51:21.
- O'Brien, C. W. and G. J. Wibmer. 1982. Annotated checklist of the weevils (Curculionidae sensu lato) of North America, Central America, and the West Indies (Coleoptera: Curculionoidea). American Entomological Institute, Ann Arbor, Michigan. 382 pp.
- Pollock, D. A. 1991. Notes on the distribution of, and range extension for, *Acupalpus meridianus* (Linné) (Coleoptera: Carabidae). *Can. Entomol.* 123:705-706.
- Russell, L. M. 1962. The spittlebug *Lepyronia coleoptrata* (Linnaeus) in North America (Homoptera: Cercopidae). U.S. Dept. Agric. Coop. Econ. Insect Rep. 12(16):395-396.
- Scudder, G. G. E. 1991. The stilt bugs (Heteroptera: Berytidae) of Canada. *Can. Entomol.* 123:425-438.
- Slater, J. A. 1964. A Catalogue of the Lygaeidae of the World. 2 vols. University of Connecticut, Storrs. 1668 pp.
- Slater, J. A. and M. H. Sweet. 1958. The occurrence of *Megalonotus chiragra* (F.) in the eastern United States with notes on its biology and ecology (Hemiptera: Lygaeidae). *Bull. Brooklyn Entomol. Soc.* 53:102-107.
- Smith, J. B. 1900. Insects of New Jersey. A list of the species occurring in New Jersey,

- with notes on those of economic importance. Suppl. 27th Ann. Rep. State Board Agric. (1899). 755 pp.
- _____. 1910. A report on the insects of New Jersey. Rep. New Jersey State Mus., 1909. 888 pp.
- Sweet, M. H. 1964. The biology and ecology of the Rhyparochrominae of New England (Heteroptera: Lygaeidae). Part I, II. Entomol. Amer. 43:1-124, 44: 1-201.
- Turnbull, A. L. 1979. Recent changes to the insect fauna of Canada. pp. 180194. In: H.V. Danks (ed.). Canada and its insect fauna. Mem. Entomol. Soc. Can. no. 108.
- Tuthill, L. D. 1943. The psyllids of America north of Mexico (Psyllidae: Homoptera) (subfamilies Psyllinae and Triozinae). Iowa State Coll. J. Sci. 17:443-660.
- U. S. Dept. Agric. 1968. European potato flea beetle (*Psylliodes affinis* (Paykull)). Coop. Econ. Insect. Rep. 18(41):960,965.
- Van Duzee, E. P. 1928. Our first *Rhyparochromus* (Hemip. Lygaeidae). Pan-Pac. Entomol. 5:47.
- Walley, G. S. 1935. Three rare Canadian Hemiptera. Can. Entomol. 67:159-160.
- Watson, W. Y. 1979. North American distribution of *Coccinella u. undecimpunctata* L. (Coleoptera: Coccinellidae). Coleopt. Bull. 33:85-86.
- Wheeler, A. G., Jr. 1970. *Berytinus minor* (Hemiptera: Berytidae) in North America. Can. Entomol. 102:876-886.
- _____. 1979. Further spread of the Palearctic *Berytinus minor* in North America (Hemiptera: Berytidae). Proc. Entomol. Soc. Wash. 81:506-507.
- _____. 1981. Updated distribution of *Aleuropteryx juniperi* (Neuroptera: Coniopterygidae), a predator of scale insects on ornamental juniper. Proc. Entomol. Soc. Wash. 83:173.
- _____. 1983. *Stygnocoris rusticus*: new records in eastern North America, with a review of its distribution (Hemiptera-Heteroptera: Lygaeidae). Entomol. News 94:131-135.
- _____. 1987. *Scymnus (Pullus) suturalis* Thunberg: southernmost records of an immigrant coccinellid (Coleoptera: Coccinellidae) in the United States. Coleopt. Bull. 41:150.
- _____. 1989a. *Grypotes puncticollis* (Homoptera: Cicadellidae), a Palearctic pine-feeding leafhopper new to North America. Proc. Entomol. Soc. Wash. 91:350-354.
- _____. 1989b. *Megalonotus sabulicola* (Heteroptera: Lygaeidae), an immigrant seed predator of *Centaurea* spp. (Asteraceae): distribution and habits in eastern North America. Proc. Entomol. Soc. Wash. 91:538-544.
- _____. 1991. *Lepyronia coleoptrata* (Homoptera: Cercopidae), an immigrant spittlebug in North America: distribution, seasonal history, and host plants. Proc. Entomol. Soc. Wash. 93:463-470.
- Wheeler, A. G., Jr. and E. R. Hoebeke. 1983. New records of a Palearctic flea beetle, *Psylliodes affinis*, in eastern North America (Coleoptera: Chrysomelidae). Proc. Entomol. Soc. Wash. 85:594-597.
- _____. 1988. Biology and seasonal history of *Rhopalus (Brachycarenum) tigrinus*, with descriptions of immature stages (Heteroptera: Rhopalidae). J. New York Entomol. Soc. 96:381-389.