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NEW RECORDS OF PALEARCTIC HEMIPTERA (STERNORRHYNCHA, CICADOMORPHA, HETEROPTERA) IN THE CANADIAN MARITIME PROVINCES

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Abstract.—New records of twelve unintentionally introduced Old World hemipterans are given for the Canadian Maritime Provinces. The Nova Scotian records for *Grypotes puncticollis* are the first for Canada, the record from Nova Scotia for *Anaptus major* (Costa) (Nabidae) is the first for eastern Canada, and records from Nova Scotia for *Cacopsylla peregrina* (Foerster) (Psyllidae) are the first for eastern North America. New to the fauna of the Maritime Provinces are *Psyllopsis fraxini* (L.) (Psyllidae), *Aphrophora alni* (Fallén) (Cercopidae), *Empoasca luda* Davidson and DeLong (Cicadellidae), *Dictyla echii* (Schrank) (Tingidae), and *Pseudoloxops coccineus* (Meyer-Dür) and *Sthenarus rotermundi* (Scholtz) (Miridae). *Eupteryx atropunctata* (Goeze) (Cicadellidae), previously reported in the Maritimes from New Brunswick, is recorded from Nova Scotia, and *Trioza chenopodii* Reuter (Triozidae), known previously from Prince Edward Island, is reported from Nova Scotia and New Brunswick. The mirid *Phytocoris ulmi* (L.), a Palearctic species known previously in the Nearctic Region only from a single specimen collected in Nova Scotia (Yarmouth) in 1914, is reported from additional Nova Scotian localities (Cape Breton Island). A summary of the North American distributions and habits of all twelve Palearctic hemipterans is provided.

Key Words: Hemiptera, insect detection, new records, adventive species

More Old World insects have been found in Atlantic Canada than in any other region of North America. The insect fauna of Newfoundland and the Halifax, Nova Scotia, area is notable for its large proportion of unintentionally introduced Palearctic species (e.g., Brown 1940, 1950, 1967; Lindroth 1957; Hamilton 1983; Wheeler and Hoebeke 1994; Hoebeke and Wheeler 1996).

Herein, we give the first records from Nova Scotia, New Brunswick, or Prince Edward Island for eleven species of Hemiptera (including "Homoptera"), and the first North American records since 1914 of *Phytocoris ulmi* (L.), a mirid known previously in North America only from a specimen from Nova Scotia and whose establishment in the Nearctic Region has remained in doubt (Wheeler and Henry 1992). Families (but not suborders) are arranged according to the *Checklist of the Hemiptera of Canada and Alaska* (Maw et al. 2000), which provides the most current distribution of species by province. All collections were made by the authors. The number of specimens examined is given in parentheses after each locality record. Vouch-

er specimens have been placed in the Cornell University Insect Collection, Ithaca, N.Y., and the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Suborder Sternorrhyncha

Family Psyllidae

Cacopsylla peregrina (Foerster).—The first record of *C. peregrina* in the Nearctic Region was "British Columbia" (Maw et al. 2000); locality (Victoria) and other collection data were provided by Wheeler and Stoops (2001). In the United States, this psyllid is known from California, Oregon, and Washington (Wheeler and Stoops 2001). *Cacopsylla peregrina* is univoltine, overwinters as eggs, and specializes on hawthorns (*Crataegus* spp.; Rosaceae) (Missonnier 1956; Sutton 1983, 1984; Novak 1994; Novak and Achtziger 1995; Wheeler and Stoops 2001).

Additional North American records for *C. peregrina* are Nova Scotia: Annapolis Co., Annapolis Royal, Historic Gardens, 5 Aug. 2001, ex *Crataegus* sp. (5); Colchester Co., Bible Hill, Nova Scotia Agricultural College, 3 Aug. 2001, ex *Crataegus* sp. (not collected); Digby Co., Church Point, Université Sainte-Anne, 6 Aug. 2001, ex *Crataegus* sp. (11); Halifax Co., Halifax, Dalhousie University, 4 Aug. 2001, ex *C. monogyna* (42) and Public Gardens, 2 Aug. 2001, ex *C. monogyna, C. mordensis* x Toba (25) & 28 July 2003, ex *Crataegus* sp. (23); Shelburne Co., Shelburne, marine terminal, 7 Aug. 2001, ex *C. monogyna* (5); Yarmouth Co., Yarmouth, 7 Aug. 2001, ex *Crataegus* sp. (8).

Psyllopsis fraxini (L.).—The first North American record for *P. fraxini* is based on specimens collected at Buffalo, New York, dating from July 1886 (Tuthill 1943). The only additional Nearctic records are "Ontario" and "British Columbia," Canada (Maw et al. 2000). Widespread in the western Palearctic Region, *P. fraxini* is a specialist on ash (*Fraxinus* spp.; Oleaceae) (Ossiannilsson 1992). In Europe, eggs are deposited on the terminal buds of *Fraxinus* in the summer and then overwinter; by the following May or June, nymphs produce a "roll leaf gall with reddish thickened veins" (Ossiannilsson 1992).

Additional North American records for *P. fraxini* are Nova Scotia: Cape Breton Co., Glace Bay, Renwick Park, 1 Aug. 2003, ex *Fraxinus excelsior* (5), Sydney, 23 July 1995, ex *F. excelsior* (1) & 31 July–2 Aug. 2003, ex *F. excelsior* (5); Halifax Co., Halifax, Public Gardens, 18 July 1994, ex *F. excelsior* (40), 2 Aug. 2001, ex *F. excelsior* (2); Shelburne Co., Shelburne, marine terminal, 19 July 1994, ex *F. excelsior* (16).

Family Triozidae

Trioza chenopodii Reuter.—Burckhardt's (1994) mention, in passing, of the presence of *T. chenopodii* in Virginia represents the first North American record of this psylloid. Wheeler and Hoebeke (1997) gave Charlottetown, Prince Edward Island, Canada, as the first specific record from North America. This bivoltine or multivoltine species develops mainly on species of *Atriplex* and *Chenopodium* (Chenopodiaceae). Early instars are gall formers, whereas late instars are free feeders on vegetative and reproductive parts of their hosts (e.g., Hodkinson and White 1979, Lauterer 1982, Burckhardt 1986, Ossiannilsson 1992, Wheeler and Hoebeke 1997).

Additional North American records for *T. chenopodii* are New Brunswick: Westmorland Co., Shediac, 27 July 1997, ex *Atriplex* sp. (15). Nova Scotia: Cape Breton Co., Glace Bay, 1 Aug. 2003, ex *Atriplex* sp. (8); Colchester Co., Truro, nr. railroad tracks, 3 Aug. 2001, ex *Atriplex* sp. (23); Digby Co., Digby and Saulnierville, St. Mary's Bay, 6 Aug. 2001, ex *Atriplex* sp. (not collected); Digby, Annapolis Basin, 6 Aug. 2001, ex *Atriplex* sp. (6); Halifax Co., Halifax, Point Pleasant Park, 2 Aug. 2001, ex *Chenopodium* sp. (3), St. Mary's University, 4 Aug. 2001, ex *Atriplex* sp. (not

collected), and Mt. Saint-Vincent University, 4 Aug. 2001, ex *Atriplex* sp. (8); Lunenburg Co., Lunenburg, Fishermen's Wharf, 8 Aug. 2001, ex *Atriplex* sp. (15).

Suborder Cicadomorpha

Family Cercopidae

Aphrophora alni (Fallén).—Records from Ontario (Moore 1956) were the first for *A. alni* in North America. Hamilton (1982) noted that this spittlebug is found mainly within a 260-km radius of Toronto. Previous North American records also include Michigan, New York, and Quebec (Hanna and Moore 1966, Hamilton 1982, Maw et al. 2000). Nymphs develop at the base of various herbaceous plants and on adventitious shoots of willows (*Salix* spp.; Salicaceae), whereas adults feed on alders (*Alnus* spp.; Betulaceae), willows, other trees and shrubs, and herbs (Ossiannilsson 1950, Hamilton 1982).

Additional North American records for *A. alni* are New Brunswick: Kings Co., Sussex, 23 July 1997, general sweeping (2); St. John Co., St. John, University of New Brunswick, 21 July 1997, general sweeping (2), and nr. airport, 20 July 1997, general sweeping (3). Nova Scotia: Antigonish Co., Antigonish, 30 July 2003, ex *Cirsium arvense* (3); Halifax Co., Dartmouth, 27–28 July 2003, general sweeping (5), Halifax, harbor area, 17 July 1994, ex *Betula* sp., *Ulmus* sp. (7), 20 July 1995, general sweeping (5), Point Pleasant Park, 18 July 1994, general sweeping (7), Public Gardens, 2 Aug. 2001, general sweeping (2) & 28 July 2003, general sweeping & ex *Centaurea nigra* (4); Pictou Co., Pictou, marine terminal, 22 July 1994 (1) & 30 July 2003, ex *Cirsium arvense* (2), New Glasgow, 3 Aug. 2003, sweeping weeds & ex *C. arvense* (3); Cape Breton Co., Glace Bay, 1 Aug. 2003, general sweeping & ex *Arctium minus* (5); North Sydney, 2 Aug. 2003, sweeping weeds (1); Sydney, 24 July 1995 (4) & 31 July–1 Aug. 2003, general sweeping, ex *Malus* sp. & *Spiraea vanhouttei* (11); Sydney Mines, 2 Aug. 2003, ex *Populus alba* (1). Prince Edward Island: Queens Co., Charlottetown, marine terminal, 23 July 1994 (8), 26 July 1997 (3).

Family Cicadellidae

Empoasca (*Kybos*) *luda* Davidson and DeLong.—*Empoasca luda,* although originally described from the United States (Davidson and DeLong 1938), is considered a West Palearctic leafhopper (the European *E. betula* Wagner is a synonym [Hamilton 1983]). The previously recorded U.S. distribution includes Connecticut, Illinois, Maryland, Minnesota, New York, Ohio, Pennsylvania, and Virginia (Wheeler 1997). In Canada, *E. luda* is known from British Columbia, Newfoundland, and Ontario (Hamilton 1983, Maw et al. 2000). *Empoasca luda* is thought to have been accidentally introduced into North America with shipments of its most common host plant, European white birch (*Betula pendula* Roth) (Hamilton 1983). This bivoltine species causes foliar chlorosis on European white birch in landscape plantings (Wheeler 1997).

Additional North American records for *E. luda* are Nova Scotia: Halifax Co., Halifax, Public Gardens, 2 Aug. 2001, ex *Betula pendula* (4); Kings Co., Wolfville, Acadia University, 4 Aug. 2001, ex *B. pendula* (5).

Eupteryx atropunctata (Goeze).—Moore's (1950) record of *E. atropunctata* from Quebec was the first for North America; the earliest North American collection was from Ottawa, Ontario, in 1942 (Hamilton 1983). Hoebeke and Wheeler (1983) referred to a previous record from Connecticut and gave Michigan, New York, and Pennsylvania as new records. This leafhopper now is known from New Brunswick (Maw et al. 2000). In New York and Pennsylvania, this mesophyll-feeding typhlocybine is multivoltine, the nymphs developing on various herbs, especially species of Lamiaceae in flower and medicinal gardens. Nymphal feeding causes chlorosis on the

upper leaf surfaces of host plants (Hoebeke and Wheeler 1983).

Additional North American records for *E. atropunctata* are Nova Scotia: Colchester Co., Bible Hill, Nova Scotia Agricultural College, 29 July 2003, ex *Nepeta cataria* (11) and Truro, 3 Aug. 2001, ex *Arctium minus, Heracleum sphondylium* (6) & 29 July 2003, ex *H. sphondylium* (2).

Grypotes puncticollis (Herrich-Schaeffer).—First collected in the New World in southwestern New York and northwestern Pennsylvania in 1988, *G. puncticollis* since has been reported from one locality in Michigan and one in Ohio. The principal North American host is the Palearctic Scotch pine (*Pinus sylvestris* L.); nymphs also develop on Swiss mountain pine (*P. mugo* Turra). In Michigan, adults were found on jack pine (*P. banksiana* Lamb.), a native North American conifer (Wheeler 1989, 1992).

Additional North American records for *G. puncticollis* are Nova Scotia: Colchester Co., Bible Hill, Nova Scotia Agricultural College, 29 July 2003, ex *Pinus sylvestris* (9); Halifax Co., Halifax, Dalhousie University, 3 Aug. 2003, ex *P. mugo* (8).

Suborder Heteroptera

Family Nabidae

Anaptus major (Costa).—The first North American record of *A. major*, Oregon (Barber 1932), was followed by additional western records—British Columbia and California. The first eastern record was based on a specimen from New York (Lattin 1966). Wheeler (1976) confirmed its establishment at Ithaca, New York, and reported it from Pennsylvania and Washington. This mostly ground-dwelling nabid can be collected in litter, under debris, and in pitfall traps but also can be swept from vegetation (Lattin 1966, Wheeler 1976).

An additional North American record for *A. major* is Nova Scotia: Yarmouth Co., Rt. 3, 1 km N of Yarmouth, 6 Aug. 2001, sweeping weeds (1).

Family Miridae

Phytocoris ulmi (L.).—Reported from Nova Scotia by Knight (1923), *P. ulmi* has remained known in North America only from a female collected in August 1914 at Yarmouth. Wheeler and Henry (1992) noted that its establishment in North America requires confirmation. In Europe, this univoltine plant bug of the subfamily Mirinae preys on small arthropods, such as mites and aphids, found on elms (*Ulmus* spp.; Ulmaceae), hawthorns (*Crataegus* spp.), and other trees and shrubs (e.g., Kullenberg 1944, Southwood and Leston 1959).

Additional Nova Scotian records for *P. ulmi* are Cape Breton Co., Glace Bay, Renwick Park, 1 Aug. 2003, ex *Cydonia japonica* (5) and Sydney, 24 July 1995, ex *Solanum dulcamara* and other weeds at base of trees (7) & 31 July 2003, ex *Lonicera* sp. (1).

Pseudoloxops coccineus (Meyer-Dür).—Previous North American records of *P. coccineus* are limited to those of Kelton (1983) from Ontario. This orthotyline plant bug is a univoltine omnivore on ash (*Fraxinus* spp.; Oleaceae) where it preys on aphids and apparently feeds on the fruits (samaras) of host trees (Southwood and Leston 1959, Putshkov 1961, Strawiński 1964, Ehanno 1987).

Additional North American records for *P. coccineus* are Nova Scotia: Halifax Co., Halifax, St. Mary's University, 4 Aug. 2001, ex *Fraxinus excelsior* (2) and Public Gardens, 28 July 2003, ex *F. excelsior* (1 fifth instar); Lunenburg Co., Lunenburg, Fishermen's Wharf, 8 Aug. 2001, ex *F. excelsior* (5); Shelburne Co., Shelburne, marine terminal, 19–20 July 1994 (not collected) and 7 Aug. 2001, ex *F. excelsior* (10).

Sthenarus rotermundi (Scholtz).—First reported in the Nearctic Region from Pennsylvania and Ontario (Henry and Wheeler 1979), *S. rotermundi* since has been collected in New York, Vermont (Wheeler and Henry 1992), and Quebec (Barnes et al.

2000). In North America, this phyline plant bug has been found not only on the Old World white poplar (*Populus alba* L.; Salicaceae) but also on native bigtooth aspen (*P. grandidentata* Michx.) and quaking aspen (*P. tremuloides* Michx.) (Wheeler and Henry 1992). White poplar and gray poplar (*P. canescens* (Ait.) Sm.) serve as host plants in Europe (e.g., Southwood and Leston 1959).

Additional North American records for *S. rotermundi* are Nova Scotia: Cape Breton Co., Glace Bay, Renwick Park, 1 Aug. 2003, ex *Populus alba* (3); Colchester Co., Bible Hill, Nova Scotia Agricultural College, 3 Aug. 2001, ex *P. alba* (1); Inverness Co., Port Hawksbury, 31 July 2003, ex *P. alba* (7).

Family Tingidae

Dictyla echii (Schrank).—Hambleton (1968) referred to the earliest North American collections of *D. echii*—late 1950s in Pennsylvania—and provided the first records for Maryland, Virginia, and West Virginia. Previous New World records also include New York, Ohio, Ontario (Wheeler and Hoebeke 1985), and Quebec (Barnes et al. 2000). This common Old World lace bug specializes on boraginaceous plants (Vayssieres 1983) and in North America is found almost exclusively on viper's bugloss or blueweed (*Echium vulgare* L.). Populations on *E. vulgare* in southcentral Pennsylvania are bivoltine (Wheeler and Hoebeke 1985).

An additional North American record for *D. echii* is Nova Scotia: Cape Breton Co., Sydney, 23 July 1995, ex *Echium vulgare* (2).

Discussion

Our collections of *Grypotes puncticollis* represent the first Canadian records of this leafhopper. Records from Nova Scotia of the psyllid *Cacopsylla peregrina* are the first for eastern North America, and the Nova Scotian record of the nabid *Anaptus major* is the first for eastern Canada. Previous Canadian records of *A. major* and *C. peregrina* have been limited to British Columbia. Their collection near the principal ports of Halifax, Nova Scotia, and Vancouver, British Columbia, suggests separate introductions to eastern and western Canada, either with commerce originating in Europe or via established U.S. populations of these insects.

The Nova Scotian records of the cercopid *Aphrophora alni,* the cicadellid *Empoasca (Kybos) luda,* the mirids *Pseudoloxops coccineus* and *Sthenarus rotermundi,* the tingid *Dictyla echii,* and the psyllid *Psyllopsis fraxini* are the first for these Palearctic species in the Maritime Provinces. The psylloid *Trioza chenopodii,* known previously in North America only from Prince Edward Island and Virginia, and the cicadellid *Eupteryx atropunctata,* known previously in the Maritime Provinces from New Brunswick, are reported new to Nova Scotia. The collection of seven of the twelve species—*C. peregrina, P. fraxini, T. chenopodii, A. alni, E. luda, G. puncticollis,* and *P. coccineus*—at Halifax further increases the impressive number of Old World insects recorded from this Nova Scotian port city. At the Public Gardens in Halifax, we found *P. fraxini* on European ash with two other Old World congeners, *P. discrepans* (Flor) and *P. fraxinicola* (Foerster), both of which have been reported previously from Nova Scotia (Maw et al. 2000).

Additional Nova Scotian records for the mirid *Phytocoris ulmi,* the first in North America in almost 90 years, indicate the establishment of this Palearctic plant bug in the Nearctic Region. Despite field work in Nova Scotia by the miridologist L. A. Kelton and others, this species, until 1995, had not been collected in North America since 1914.

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