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ADVENTIVE LADY BEETLES (COLEOPTERA: COCCINELLIDAE) IN THE CANADIAN MARITIME PROVINCES, WITH NEW EASTERN U.S. RECORDS OF *HARMONIA QUADRIPUNCTATA*[1]

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ABSTRACT: New distributional data are given for four Old World aphidophagous lady beetles (Coccinellidae) occurring in the Maritime Provinces of Canada, some of which represent new provincial records. Records are cited for *Scymnus* (*Pullus*) *suturalis* from Nova Scotia, for *Harmonia axyridis* from New Brunswick and Nova Scotia, and for *Propylea quatuordecimpunctata* and *Hippodamia variegata* from New Brunswick, Nova Scotia, and Prince Edward Island. New eastern U. S. records are also given for the immigrant *Harmonia quadripunctata*.

Lady beetles (Coccinellidae) are among the most familiar and important groups of predatory insects, and they have been used extensively in classical biological control (Balduf 1935; Hagen 1962, 1974). Various Old World species have been introduced and released in eastern North America in attempts to suppress populations of pest aphids and other homopterans (Gordon 1985; Gordon and Vandenberg 1991). Several adventive coccinellids have become established in the east since the 1970s, either from intentional releases or accidental introduction with commerce (Schaefer and Dysart 1988; Day *et al.* 1994).

As part of our continuing studies of adventive insects in the Maritime Provinces of Canada (Hoebeke and Wheeler 1996), we collected coccinellids in New Brunswick, Nova Scotia, and Prince Edward Island in June 1993 and July 1994-1995. Sweep-net sampling of herbaceous vegetation was conducted in disturbed sites such as urban lots near ports of entry. We also concentrated on college and university campuses, public gardens, and other areas considered vulnerable to invasion by exotic insects, combining sweep-net sampling of weeds with the beating of branches of trees and shrubs over a shallow net.

Here we report and map new distributional data for four exotic lady beetles occurring in the Canadian Maritime Provinces: the scymnine *Scymnus* (*Pullus*) *suturalis* Thunberg and the coccinellines *Propylea quatuordecimpunctata* (L.), *Hippodamia variegata* (Goeze), and *Harmonia axyridis* (Pallas). Our collecting also confirms the widespread occurrence and abundance of *Coccinella septempunctata* (L.) (C7) throughout the Canadian Maritime Provinces (see Schaefer *et al.* 1987), but these records are not reported here. New eastern U.S. records are also cited and mapped for the adventive *Harmonia quadripunctata* (Pontoppidan). Voucher specimens of all species are deposited in the Cornell University Insect Collection, Ithaca, NY (CUIC), unless noted otherwise.

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Scymnus (Pullus) suturalis Thunberg

Releases and Establishment: This European coccinellid was first reported from North America by Gordon (1976), based on collections from Pennsylvania (cited as *S. coniferarum*); he later added a record from New York (Gordon 1982). Records are now available for Connecticut and Michigan (Hoebeke 1984, Wheeler 1992), Maryland and Virginia (Wheeler 1987), Quebec, Canada (McNamara 1992), and Massachusetts and Rhode Island (Lyon and Montgomery 1995).

Gordon (1982) suggested that *S. suturalis* has been established in North America since the early 1900s and was probably accidentally introduced with shipments of conifer nursery stock prior to plant quarantine laws. In 1961, this

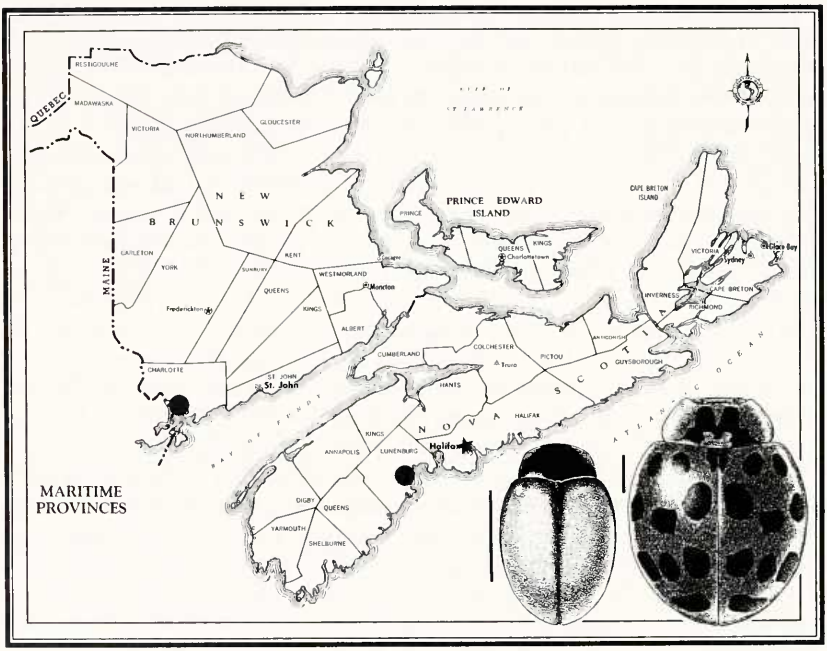

Figure 1. Known distribution of *Scymnus* (*Pullus*) *suturalis* (star) and *Harmonia axyridis* (circle) in the Canadian Maritime Provinces. Habitus illustration (on left) representing *S. suturalis* is from Gordon (1982: fig. 7, p. 253). **Note**: this figure is actually of *S. coniferarum* Crotch, which is nearly identical to *S. suturalis*, except that the body of *S. coniferarum* is more elongate (slightly broader, less elongate in *S. suturalis*), with elytral punctures small, separated by about 2 times diameter of a puncture (elytral punctures coarse, dense, separated by diam. of puncture or less in *S. suturalis*); male and female genitalia of both species are quite different (compare figures 2-6 and 8-12 in Gordon, 1982). Habitus illustration (on right) of *H. axyridis* is from Gordon and Vandenberg (1991: fig. 9, p. 52). Scale lines = 1.0 mm.

aphid and adelgid predator was released at two localities in Michigan (Clinton and Ottawa counties), based on reared stock obtained from Germany (Hoebeke 1984). In North America, this Palearctic species occurs principally on conifers, with most records from *Pinus sylvestris* L., but also *P. resinosa* Ait., *P. strobus* L., *Picea pungens* Engelm., and *Tsuga canadensis* (L.) Carr.

New Maritime Record: The one collection made in Nova Scotia (Fig.1) represents a NEW MARITIMES PROVINCIAL RECORD.

NOVA SCOTIA: Halifax Co., Halifax, Dalhousie University campus, 26 June 1993 (ex *P. sylvestris*).

Propylea quatuordecimpunctata (L.)

Releases and Establishment: This common Palearctic aphid predator, the so-called fourteen-spotted lady beetle (hereafter PQ), was first intentionally introduced into the United States in 1968 to help control greenbugs (*Schizaphis graminum* [Rondani]) in the Great Plains states (Ellis and Adams 1993). It was reared and released in Delaware, New Jersey, and Oklahoma beginning in 1970, but no recoveries of beetles were made at release sites in these states. Between 1987 and 1992, it was propagated and released in 16 western states as a potential control agent of the newly detected Russian wheat aphid, *Diuraphis noxia* (Mordvilko), which was first found in the West beginning in 1986. It was also propagated and released in Georgia, Iowa, Indiana, Maryland, Michigan, Minnesota, Missouri, New Jersey, and Pennsylvania in 1989 and 1990. Although establishment of PQ has been confirmed in the eastern United States (Maine, Massachusetts, Connecticut, New Hampshire, New Jersey, Pennsylvania, Rhode Island, Vermont, and New York (Dysart 1988; Wheeler 1990, 1993; Ellis and Adams 1993; Day *et al.*1994; Yanega 1996) and in eastern Canada (McNamara 1991), it has not been recovered from any of the 16 western states. PQ was first observed as an established population in eastern North America in 1968 near Quebec City (Ste. Foy), Quebec (Chantal 1972; Ellis and Adams 1993), and in the United States in Grand Isle County, Vermont, in August 1984 (Dysart 1988; Day *et al.* 1994).

It has been suggested that, in spite of repeated attempts to establish PQ through release programs, its establishment may have resulted from an accidental introduction into North America by transoceanic shipping through the St. Lawrence Seaway system (Schaefer and Dysart 1988; Day *et al.* 1994).

Canadian Maritime Records: McNamara (1991) recorded PQ from Ontario, Quebec, and New Brunswick. During late June 1993 and July 1994-1995, we collected PQ from the following localities (Fig. 2); Nova Scotia and Prince Edward Island are NEW PROVINCIAL RECORDS.

NEW BRUNSWICK: Charlotte Co., St. Stephen, 24 June 1993.

NOVA SCOTIA: Colchester Co., Truro, 25 June 1993; Truro, 22 July 1995 (ex *Vicia* sp.). Halifax Co., Dartmouth, 26 June 1993; Halifax, 26 June 1993 (ex *Physocarpus opulifolius*); Halifax, 17 July 1994 (ex *Trifolium pratense*); Halifax, 20 July 1995. Pictou Co., Pictou, 22 July 1994 (ex *Artemisia vulgaris, Arctium minus*); Pictou, 22 July 1995; Rte.104 at Rte. 347, 22 July 1995. Antigonish Co., Antigonish, 22 July 1994 (ex *Trifolium pratense*). (Cape Breton Island) Inverness Co., Port Hawkesbury, 23 July 1995. Richmond Co., Chapel Island, 23 July 1995. Cape Breton Co., Sydney, 23 July 1995.

PRINCE EDWARD ISLAND: Queens Co., Charlottetown, 23 July 1994. Prince Co., Summerside, 26 July 1995 (ex *Trifolium pratense*).

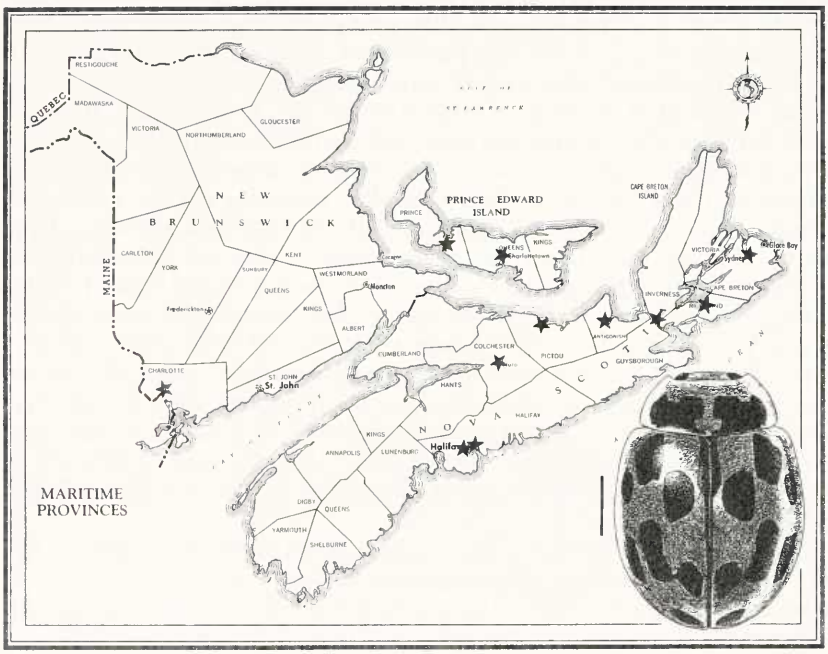

Figure 2. Known distribution of *Propylea quatuordecimpunctata* in the Canadian Maritime Provinces. Habitus illustration is from Gordon and Vandenberg (1991: fig. 3, p. 48). Scale line = 1.0 mm.

Hippodamia variegata (Goeze)

Releases and Establishment: This Old World coccinellid (hereafter HV) was first recorded from North America by Gordon (1987), with established populations found in the vicinity of Montreal, Quebec, in 1984. Beginning in 1957-1958, this aphid predator had been released in the western and southern United States (Arizona, California, Florida, and Georgia), but with no known releases in Canada (Gordon 1985, 1987). Beginning again in 1987, various strains of Eurasian HV were released in several eastern and western states, including Colorado, Kansas, Maryland, Massachusetts, New Mexico, Pennsylvania, and New Jersey (Obrycki and Orr 1990; Flanders *et al.* 1991).

Gordon and Vandenberg (1991) and McNamara (1991) recorded HV from Quebec and Ontario, respectively, while Wheeler (1993) provided new locality records to extend HV's range to the northeastern United States: Connecticut, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. This species is also known from Maine (Ellis and Adams 1993). Like PQ, HV is thought to have been accidentally introduced into North

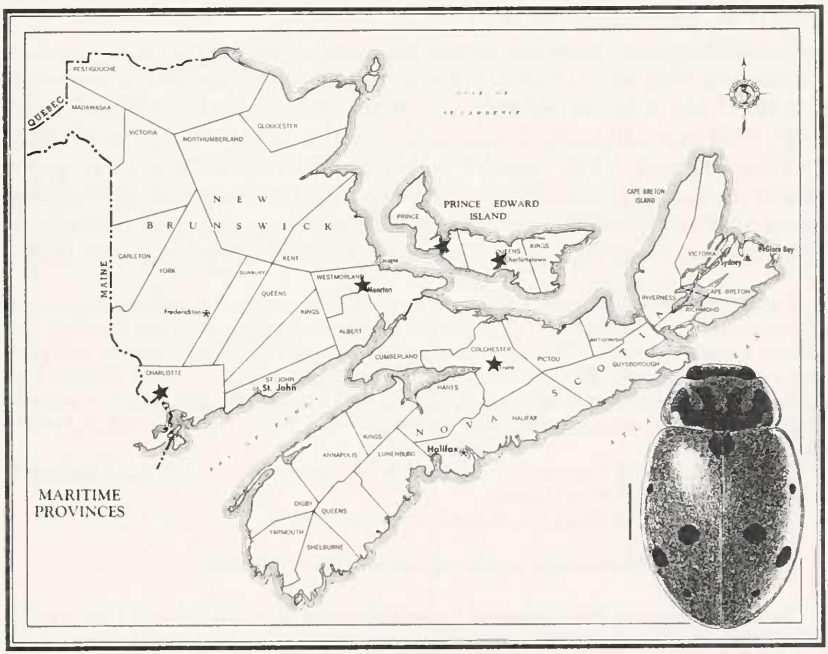

Figure 3. Known distribution of *Hippodamia variegata* in the Canadian Maritime Provinces. Habitus illustration is from Gordon and Vandenberg (1991: fig. 6, p. 50). Scale lines = 1.0 mm.

America by transoceanic shipping through the St. Lawrence Seaway (Schaefer and Dysart 1988; Day *et al.* 1994).

Canadian Maritime Records: The following locality records (Fig. 3) are the first for New Brunswick, Nova Scotia, and Prince Edward Island (NEW PROVINCIAL RECORDS).

NEW BRUNSWICK: Charlotte Co., St. Stephen, 24 June 1993. Westmorland Co., Moncton, 25 June 1993.

NOVA SCOTIA: Colchester Co., Truro, 22 July 1995 (ex *Vicia* sp., *Tanacetum vulgare*).

PRINCE EDWARD ISLAND: Prince Co., Summerside, 26 July 1995 (ex *Trifolium pratense*). Queen Co., Charlottetown, 26 July 1995.

Harmonia axyridis (Pallas)

Releases and Establishment: Several attempts have been made to introduce this exotic lady beetle into North America. Recorded releases include California (in 1916, and again in 1964-1965), Connecticut, Delaware, District of Columbia, Georgia, Louisiana, Maine, Maryland, Mississippi, Ohio, Pennsylvania, Washington, and Nova Scotia (1978-1982), and again Connecticut (1985) (Gordon, 1985; Tedders and Schaefer 1994). An unspecified number of specimens were also released into pine trees in the Kentville area of Nova Scotia in 1983 (H. B. Specht, pers comm.).

Establishment of the multicolored Asian lady beetle was first reported in Louisiana in 1988 and in several counties in Mississippi in 1990 (Chapin and Brou 1991). *Harmonia axyridis* now occurs nearly throughout the eastern United States, with especially large populations recorded in the mid-Atlantic region and New England. It has recently been recorded from Canada in an apple orchard in Quebec (Frelishburg) (Coderre *et al.* 1995) and from the western United States in Vancouver, Washington; western Oregon (LaMana and Miller 1996); and in Yolo and Sacramento counties in California (Dreistadt *et al.* 1995).

Canadian Maritime Records: There are no previous reports in the literature mentioning recovery records or establishment of *H. axyridis* in the Maritime Provinces. In late July 1995, we collected a single specimen from flowers at a roadside parking area south of Halifax, along the coast, and additional specimens were collected in the southwestern corner of New Brunswick in October 1995 (Yves Bousquet, pers. comm.) (Fig.1). In early August 1995, specimens of *H. axyridis* were observed, but not collected, on potatoes at Barton, Nova Scotia (Digby Co.) (H. B. Specht. pers. comm.).

NEW BRUNSWICK: Charlotte Co., St. Andrews, 7 October 1995, W. Robichaud (deposited in Canadian National Collection, Ottawa).

NOVA SCOTIA: Lunenburg Co., Mahone Bay, 21 July 1995.

Harmonia quadripunctata (Pontoppidan)

North American Records and Establishment: This Old World lady beetle of the tribe Coccinellini was first reported from North America based on eight specimens from New York (Mt. Kisco) and New Jersey (Paterson and Westfield) (Vandenberg 1990). According to Vandenberg, these specimens represent a minimum of 3 separate collection events, spanning > 54 years and a linear distance of about 50 miles (= 80km). The earliest collection was made in 1924

(Paterson, NJ) and the most recent in 1979 (Mt. Kisco, NY). The proximity of the three collection sites led Vandenberg (1990) to suggest that the 8 specimens (with similar color patterns) descended from a single long-established population and that the species probably was accidentally introduced to the east coast of North America with European shipping.

Additional North American localities from specimens in the CUIC extend the known range in eastern North America from Kingston, Rhode Island, to Ithaca, New York.

New Eastern North American Records: The following distributional data are taken from 18 specimens housed in the CUIC. All previously reported locality records and new records given below are mapped in Fig. 4.

NEW JERSEY: Bergen Co., Bergenfield, 1 November 1936, 24 May 1942, 14 June 1944 ("at light"), F. M. Schott (4); Ridgefield Park, 12 January 1927, F. M. Schott, "under bark of sycamore" (1); Teaneck, 18 December 1924, F. M. Schott, "under bark of elm" (3); Wallington, 31 January 1930, F. M. Schott, "under bark in colony of *A[dalia]. bipunctata*," (1). Passaic Co., Paterson, 25 and 27 February 1924, "under bark silver maple" (3).

NEW YORK: Nassau Co., Lynbrook, 26 June 1976, G. C. Eickwort (3). Tompkins Co., Ithaca, Cornell Univ. campus, 15 September 1965, ex "Austrian pine" (2).

RHODE ISLAND: Washington Co., Kingston, Univ. of Rhode Island campus, 29 May 1988, E. R. Hoebeke and A. G. Wheeler, ex "Scotch pine" (1).

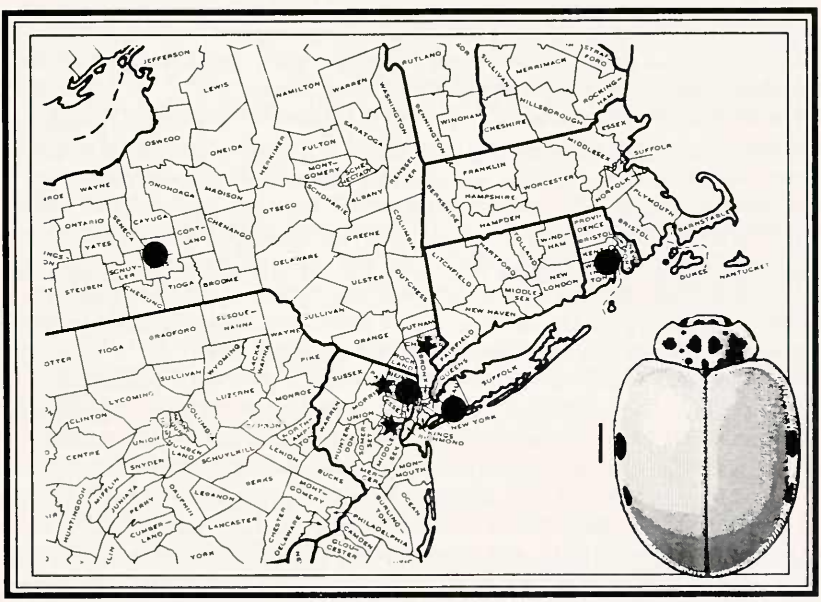

Figure 4. Revised distribution of *Harmonia quadripunctata* in the eastern United States; previous records reported in Vandenberg (1990) denoted by stars (★) and new records by circles (●). Habitus illustration is from Gordon and Vandenberg (1991: fig. 12, p. 52). Scale line = 1.0 mm.

DISCUSSION

Although long-term monitoring of coccinellid populations throughout the growing season is needed, our field work in June or July of three consecutive years in Nova Scotia and two in Prince Edward Island represents more than casual collecting. Intensive sampling along almost the entire coast of Nova Scotia, including repeat collections at several sites, allows us to comment on the status of the four adventive species in the Maritime Provinces.

PQ was the most widely distributed and most numerous species associated with herbaceous weeds in disturbed sites. HV was collected at only two sites in both New Brunswick and Prince Edward Island, and was found only at Truro in Nova Scotia. Its apparent absence from other sites in Nova Scotia and detection in 1995 at a site in Truro where sampling had failed to yield specimens in 1993 and 1994 suggest that this lady beetle is just beginning to become established in the province. *Scymnus suturalis* was taken only at Halifax despite our sampling of Scotch pine at numerous other sites in the Maritime Provinces, suggesting that it has a limited maritime distribution. To our knowledge, adults of *Harmonia axyridis* have been collected at only two sites in the Maritimes: at St. Andrews, New Brunswick, and at Mahone Bay, Nova Scotia, both in 1995. In the 1990s this Asian species has rapidly spread northward from the southern states, its populations exploding in the mid-Atlantic and New England states (Coderre *et al.* 1995; Kidd *et al.* 1995; Hoebeke and Wheeler unpubl. data). It appears to be a very recent arrival in New Brunswick and Nova Scotia.

The origin of most adventive coccinellids in eastern North America is equivocal. Some species may have become established as a result of biological control releases, but most were probably accidentally introduced with maritime commerce: at coastal seaports or inland along the St. Lawrence Seaway (Day *et al.* 1994; DeQuattro 1995). Regardless of their origin, these Old World species are probably permanent members of our fauna, and their further spread should be documented. Their presence in North America should be largely beneficial, helping to suppress populations of injurious aphids and adelgids (Tedders and Schaefer 1994; Lyon and Montgomery 1995; DeQuattro 1995).

Possible adverse effects on humans and the environment (Coderre *et al.* 1995) should also be considered. *Harmonia axyridis* has become a household nuisance because of its tendency to invade houses and other structures in fall (e.g., Lyon 1994), sometimes aggregating by the hundreds or thousands (Hoebeke and Wheeler pers. observ.). The establishment of *Coccinella septempunctata* (C7) may be detrimental to native coccinellids such as *C. novemnotata* Herbst (Wheeler and Hoebeke 1995, and references therein). The presence of several adventive coccinellids in eastern North America affords researchers an opportunity to evaluate interactions between the polyphagous aggressive immigrants C7 and *H. axyridis* and to attempt to assess the effects that these and other adventive coccinellids might have on native lady beetles and on natural and managed systems.

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LITERATURE CITED

Balduf, W. V. 1935. The Bionomics of Entomophagous Coleoptera. John S. Swift, St. Louis, Mo. 220 pp.

Chantal., C. 1972. Additions a la faune coleopterique du Quebec. Nat. Can. 99:243-244.

Chapin, J. B. and V. A. Brou. 1991. *Harmonia axyridis* (Pallas), the third species of the genus to be found in the United States (Coleoptera: Coccinellidae). Proc. Entomol. Soc. Wash. 93:630-635.

Coderre, D., E. Lucas, and I. Gagné. 1995. The occurrence of *Harmonia axyridis* (Pallas) (Coleoptera: Coccinellidae) in Canada. Can. Entomol. 127:609-611.

Day, W. H., D. R. Prokrym, D. R. Ellis, and R. J. Chianese. 1994. The known distribution of the predator *Propylea quatuordecimpunctata* (Coleoptera: Coccinellidae) in the United States, and thoughts on the origin of this species and five other exotic lady beetles in eastern North America. Entomol. News 105:244-256.

DeQuattro, J. 1995. Gotcha! Lady beetles gobble aphids. Agric. Res. (USDA, ARS) 43(3):4-8 (March).

Dreistadt, S. H., K. S. Hagen, and L. G. Bezark. 1995. *Harmonia axyridis* (Pallas) (Coleoptera: Coccinellidae), first western United States record for this Asiatic lady beetle. Pan-Pac. Entomol. 71:135-136.

Dysart, R. J. 1988. The European lady beetle *Propylea quatuordecimpunctata*: new locality records for North America. J. New York Entomol. Soc. 96:119-121.

Ellis, D. H. and R. G. Adams. 1993. *Hippodamia variegata* (HV) and *Propylea quatuordecimpunctata* (PQ): Exotic Lady Beetle Multistate Survey, 1993. USDA, APHIS, PPQ. Coop. Agric. Pest Survey (CAPS), Northeast Region. Unpublished Summary Report.12 pp. + 5 figs.

Flanders, R. V., D. J. Nelson, R. Deerburg, and C. J. Copeland. 1991. Aphid biological control project: FY 1990 project report. USDA-APHIS Biological Control Laboratory, Niles, Mich. 20 pp. + 26 tables.

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.

Gordon, R. D. 1982. An Old World species of *Scymnus* (*Pullus*) established in Pennsylvania and New York (Coleoptera: Coccinellidae). Proc. Entomol. Soc. Wash. 84:250-255.

Gordon, R. D. 1985. The Coccinellidae (Coleoptera) of America north of Mexico. J. New York Entomol. Soc. 93:1-912.

Gordon, R. D. 1987. The first North American records of *Hippodamia variegata* (Goeze). J. New York Entomol. Soc. 95:307-309.

Gordon, R. D. and N. Vandenberg. 1991. Field guide to recently introduced species of Coccinellidae (Coleoptera) in North America, with a revised key to North American genera of Coccinellini. Proc. Entomol. Soc. Wash. 93:845-864.

Hagen, K. S. 1962. Biology and ecology of predaceous Coccinellidae. Annu. Rev. Entomol. 7:289-326.

Hagen, K. S. 1974. The significance of predaceous coccinellids in biological and integrated control of insects. Entomophaga, Mem. H. S. 7:25-44.

Hoebeke, E. R. 1984. New records of *Scymnus* (*Pullus*) *suturalis* Thunberg in eastern North America (Coleoptera: Coccinellidae). Coleopts. Bull. 38:312.

Hoebeke, E. R. and A. G. Wheeler, Jr. 1996. *Meligethes viridescens* (F.) in Maine, Nova Scotia, and Prince Edward Island: diagnosis, distribution, and bionomics of a Palearctic nitidulid new to North America (Coleoptera). Proc. Entomol. Soc. Wash. 98:221-227.

Kidd, K. A., C. A. Nalepa, E. R. Day, and M. G. Waldvogel. 1995. Distribution of *Harmonia axyridis* (Pallas) (Coleoptera: Coccinellidae) in North Carolina and Virginia. Proc. Entomol. Soc. Wash. 97:729-731.

LaMana, M. L. and J. C. Miller. 1996. Field observations on *Harmonia axyridis* Pallas (Coleoptera: Coccinellidae) in Oregon. Biol. Control 6:232-237.

Lyon, S. M. and M. E. Montgomery. 1995. *Scymnus* (*Pullus*) *suturalis* Thunberg (Coleoptera: Coccinellidae): new locality records, and a report of feeding on hemlock woolly adelgid, *Adelges tsugae* Annand (Homoptera: Adelgidae). Coleopts. Bull. 49:118.

Lyon, W. F. 1994. Multicolored Asian lady beetle. Ohio State Univ. Ext. Factsheet HYG-2158-94. 2 pp.

McNamara, J. 1991. Family Coccinellidae, ladybird beetles. pp. 229-237. *In:* Y. Bousquet (ed.), Checklist of Beetles of Canada and Alaska. Res. Branch Agric. Can. Publ.1861/E.

McNamara, J. 1992. The first Canadian records of *Scymnus* (*Pullus*) *suturalis* Thunberg (Coleoptera: Coccinellidae). Coleopts. Bull. 46:359-360.

Obrycki, J. J. and C. J. Orr. 1990. Suitability of three prey species for Nearctic populations of *Coccinella septempunctata*, *Hippodamia variegata*, and *Propylea quatuordecimpunctata* (Coleoptera: Coccinellidae). J. Econ. Entomol 83:1292-1297.

Schaefer, P. W. and R. J. Dysart. 1988. Palearctic aphidophagous coccinellids in North America, pp. 99-103. *In* E. Niemczyk and A. F. G. Dixon (eds.), Ecology and Effectiveness of Aphidophaga. SPB Academic Publishing, The Hague, Netherlands.

Schaefer, P. W., R. J. Dysart, and H. B. Specht. 1987. North American distribution of *Coccinella septempunctata* (Coleoptera: Coccinellidae) and its mass appearance in coastal Delaware. Environ. Entomol.16:368-373.

Tedders, W. L. and P. W. Schaefer. 1994. Release and establishment of *Harmonia axyridis* (Coleoptera: Coccinellidae) in the southeastern United States. Entomol. News 105:228-243.

Vandenberg, N. J. 1990. First North American records for *Harmonia quadripunctata* (Pontopiddian) (Coleoptera: Coccinellidae); a lady beetle native to the Palaearctic. Proc. Entomol. Soc. Wash. 92:407-410.

Wheeler, A. G., Jr. 1987. *Scymnus* (*Pullus*) *suturalis* Thunberg: southernmost records of an immigrant coccinellid (Coleoptera: Coccinellidae) in the United States. Coleopts. Bull. 41:150.

Wheeler, A. G., Jr. 1990. *Propylea quatuordecimpunctata*: additional U.S. records of an adventive lady beetle. Entomol. News 101:164-166.

Wheeler, A. G., Jr. 1992. Holarctic insects adventive in Michigan: new and additional records (Homoptera, Heteroptera, Coleoptera, Neuroptera). Great Lakes Entomol. 25:99-106.

Wheeler, A. G., Jr. 1993. Establishment of *Hippodamia variegata* and new records of *Propylea quatuordecimpunctata* in the eastern United States. Entomol. News 104:102-110.

Wheeler, A. G., Jr. and E. R. Hoebeke. 1995. *Coccinella novemnotata* in northeastern North America: historical occurrence and current status (Coleoptera: Coccinellidae). Proc. Entomol. Soc. Wash. 97:701-716.

Yanega, D. 1996. Records of *Propylea quatuordecimpunctata* (Coleoptera: Coccinellidae) from Long Island, New York: evidence for a naturalized population before 1991. Entomol. News 107:36-38.