



## ***Hyperaspis* and *Brachiacantha* (Coleoptera: Coccinellidae): two poorly known genera of native lady beetles in the Maritime Provinces**

Christopher G. Majka and Sarah Robinson

### **ABSTRACT**

*Hyperaspis inflexa* Casey is reported for the first time in the Maritime Provinces of Canada. This discovery provides an opportunity to survey the species of *Hyperaspis* and *Brachiacantha* found in the region, to present a key to the species found in the Maritimes, and to briefly discuss the distribution and bionomics of the genera.

### **RÉSUMÉ**

La présence de *Hyperaspis inflexa* Casey dans les provinces maritimes canadiennes est rapportée pour la première fois. Cette découverte nous donne l'occasion de répertorier les espèces de *Hyperaspis* et *Brachiacantha* de la région, de présenter une clef d'identification des espèces que l'on retrouve dans les maritimes et de commenter sur la distribution et la bionomie de ce genre.

### **INTRODUCTION**

Lady beetles of the genera *Hyperaspis* Redtenbacher 1844 (94 species) and *Scymnus* Kugelann 1794 (93 species) are the most species-rich genera of Coccinellidae in North America (Vandenberg 2002). Adults and larvae of *Hyperaspis* are predators of scale insects and mealybugs (Homoptera: Coccoidea) (McClanahan 1970; Booth et al. 1995; Stäubli Dreyer et al. 1997; Vandenberg 2002). Some larvae burrow into the egg sacks of female scales and approach a parasitic mode of existence (Vandenberg 2002). They superficially resemble beetles in the genus *Brachiacantha* Dejean 1837, which are predators of coccids in ant nests, and possibly other Homoptera (Vandenberg 2002). Gordon (1985) clarified the taxonomy of both genera in North America.

The subfamily Scymninae Mulsant 1846 consists of a number of distinct phylogenies. Of these the Stethorini Dobzhansky 1924, Scymnini Mulsant 1846, Diomini Gordon 1999, Hyperaspidini Mulsant 1846, and Brachiacanthini Mulsant 1850 have representatives in the Maritime Provinces. In the present treatment we examine the latter two tribes, represented by the genera *Hyperaspis* and *Brachiacantha*, in part for pragmatic reasons since the two genera resemble one another in having a similar shape, being dorsally glabrous, and (in some species) having similar patterns of maculation. The dorsally pubescent species in the Stethorini, Scymnini, and Diomini, represented by the genera *Stethorus* Weise 1885, *Didion* Casey 1899, *Scymnus* Kugelann 1794, *Nephus* Mulsant 1846, and *Diomus* Mulsant 1850 in the Maritime Provinces (10 species), will be treated in a future publication.

In the Maritime Provinces (New Brunswick, Nova Scotia, and Prince Edward Island) the genus *Hyperaspis* is well represented. Majka and McCorquodale (2006) recorded seven species in the region: *Hyperaspis bigeminata* (Randall,

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Christopher G. Majka<sup>1</sup>: c/o Nova Scotia Museum, 1747 Summer Street, Halifax, Nova Scotia, Canada, B3H 3A6.

Sarah Robinson: Department of Biology, Saint Mary's University, 923 Robie Street, Halifax, Nova Scotia, Canada, B3H 3C3.

<sup>1</sup>Corresponding author (email [c.majka@ns.sympatico.ca](mailto:c.majka@ns.sympatico.ca)).

1838); *Hyperaspis binotata* (Say, 1826); *Hyperaspis consimilis* LeConte, 1852; *Hyperaspis disconotata* Mulsant, 1850; *Hyperaspis octavia* Casey, 1908; *Hyperaspis troglodytes* Mulsant, 1853; and *Hyperaspis undulata* (Say, 1824). Subsequently Majka et al. (2007) added *Hyperaspis brunnescens* Dobzhansky, 1941 on the basis of a specimen collected on Scatarie Island in Nova Scotia. The genus *Brachiacantha* is represented by two species: *Brachiacantha decempustulata* (Melsheimer, 1847) and *Brachiacantha ursina* (Fabricius, 1787) (Majka and McCorquodale 2006). We take the opportunity of the discovery of yet another species in this group in the Maritime Provinces, to briefly survey the fauna of the region.

## METHODS AND CONVENTIONS

In order to assess the distribution and status of species of *Hyperaspis* and *Brachiacantha* in the Maritime Provinces, data from specimens collected in the region were compiled and plotted (Figures 14-16). These included data from all collections listed in Majka and McCorquodale (2006) as well as the following collections:

<b>FNP</b>	Fundy National Park Collection, Alma, New Brunswick, Canada
<b>JOC</b>	Jeffrey Ogden Collection, Truro, Nova Scotia, Canada
<b>STFX</b>	Saint Francis Xavier University Collection, Antigonish, Nova Scotia, Canada
<b>UMNB</b>	Université de Moncton Collection, Moncton, New Brunswick, Canada

Data from 321 specimens (New Brunswick, 90; Nova Scotia, 222; Prince Edward Island, 9) were employed in the distribution maps. Records of 129 of these have been previously published in Chapin (1955), Boiteau et al. (1999), Majka and McCorquodale (2006), and Majka et al. (2007); the data from the other 192 specimens are previously unpublished.

## RESULTS

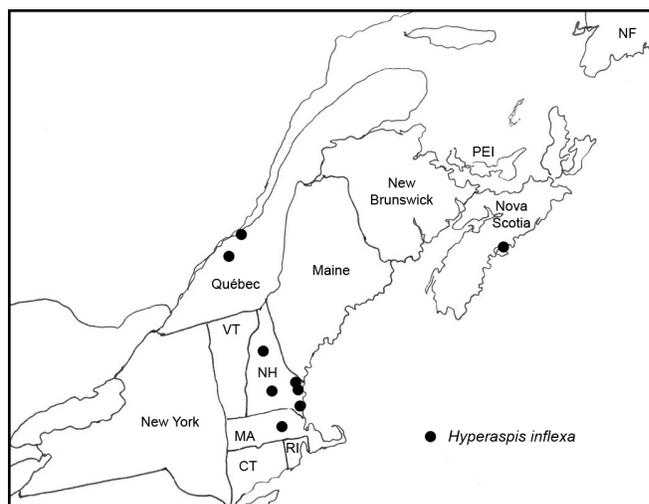
On 11 June 2008 in the Burnside region of Dartmouth, Nova Scotia (44°41'23"N, 63°35'16"W), the second author found a specimen *Hyperaspis inflexa* Casey, 1899 in a pitfall trap (determined and retained by C.G.M.) (Fig. 1). The site, is a disturbed cultural steppe environment characterized by plants such as *Daucus carota* L. (Apiaceae), *Hieracium lachenalii* C. Gmelin, *Hieracium pilosella* L., *Senecio viscosus* L., *Solidago juncea* Ait., *Taraxacum officinale* Weber (Asteraceae),

**Fig. 1.** Collection site of *Hyperaspis inflexa* in Dartmouth, Nova Scotia, Canada. Photo credit: Sarah Robinson.



*Melilotus alba* Desr., *Trifolium aureum* Pollich, *Trifolium arvense* L. (Fabaceae), *Danthonia spicata* (L.) Beauv., and *Poa compressa* L. (Poaceae). The vegetation is sparse and grows amongst gravel and crushed rock on a lot adjacent to a commercial development. This site was used (in part) as an area for storing shipping containers and commercial vehicles, and has subsequently been developed as a commercial building.

**Fig. 2.** Distribution of *Hyperaspis inflexa* in northeastern North America.



## DISCUSSION

*Hyperaspis inflexa* is a widely-distributed species in the United States found from California and Idaho south to Texas and east to North Carolina, Massachusetts, and New Hampshire (Gordon 1985; Chandler 2001). In Canada it has been recorded chiefly in the west from British Columbia to Manitoba, and also in Québec (McNamara 1991). The present discovery represents a range extension of ~ 600 km from the nearest sites in Québec and New Hampshire where the species has been found (Fig. 2).

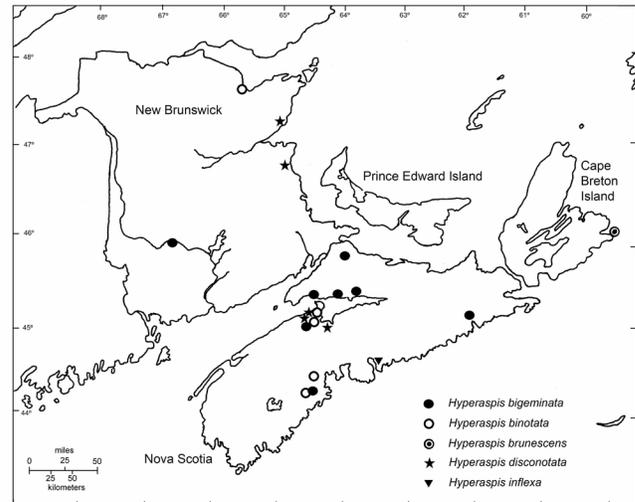
Little has been recorded about the bionomics of the species. Acorn (2007) reports sweep-netting a specimen on a sandy trail with pasture sage (*Artemisia frigida* Willd., Asteraceae), scurf pea (*Psoralea* spp., Fabaceae), and other low plants. In New Hampshire specimens have been reared from juniper (presumably feeding on scales found on the plants) and collected in a pine-oak barren (D. Chandler *in litt.*). In North Dakota, Fauske et al. (2003) found *Hyperaspis inflexa* in stabilized sand dunes with oak savannah, and in dry to mesic prairie vegetation. The former site has sparse vegetation growing on sand, while the latter site has thin topsoil over gravel. Both have the water table very near the surface (G.M. Fauske *in litt.*). Although the specific vegetational composition of these areas are very different from the site in Nova Scotia (*Solidago* sp. does grow in all three areas), they have in common sparse vegetation growing on thin soil over gravel in an open habitat.

The specimen of *Hyperaspis inflexa* collected in Dartmouth was found in a cultural steppe habitat used (in part) for the storage of shipping containers and commercial vehicles. The question therefore arises as to whether it may have been introduced to the area via commercial truck traffic. This is a possibility, although *Hyperaspis inflexa* is not a synanthropic species and seems unlikely to have been introduced in such a fashion. Further fieldwork, however, will be required to ascertain if this specimen represents an isolated adventive individual, if there is an established population, or if the species is more widely distributed in the region.

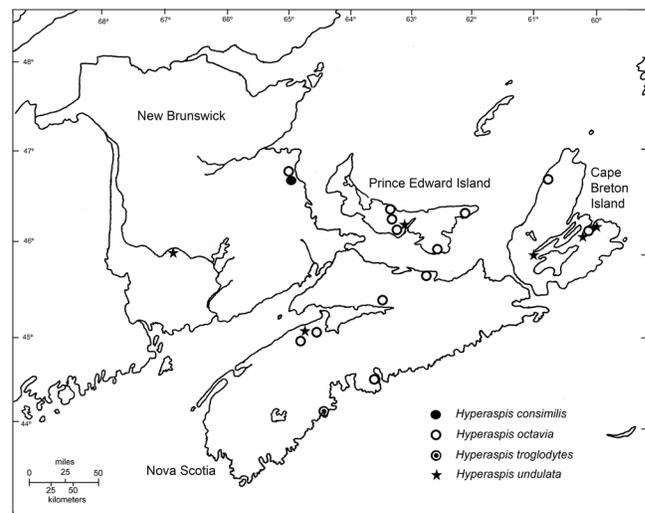
There are several species of native coccinellids found in the Maritime Provinces, including *Hyperaspis brunnescens*, *Hyperaspis troglodytes*, *Hyperaspis consimilis*, *Coccidophilus marginatus* (LeConte, 1878), *Diomus amabilis* (LeConte, 1852), and *Cycloneda munda* (Say, 1835), that are known in the region from only one or two specimens (Majka and McCorquodale 2006). *Hyperaspis inflexa* may be yet another illustration of a native coccinellid that is seldom collected.

The distribution of many of species of *Hyperaspis* found in the Maritime Provinces is poorly known. *Hyperaspis*

**Fig. 3.** Distribution of *Hyperaspis bigeminata*, *Hyperaspis binotata*, *Hyperaspis brunnescens*, *Hyperaspis disconotata*, and *Hyperaspis inflexa* in the Maritime Provinces of Canada.

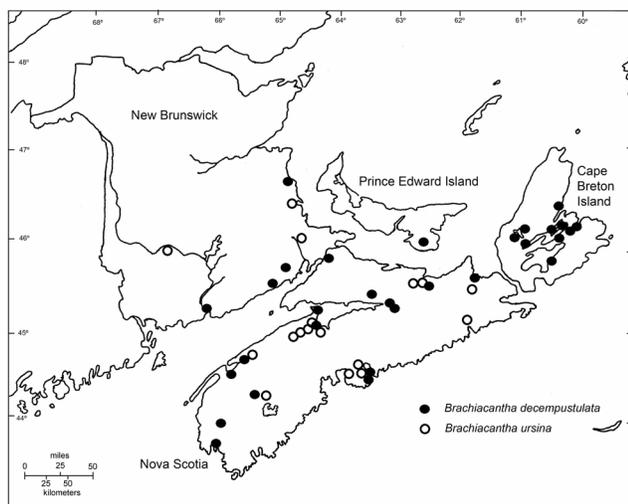


**Fig. 4.** Distribution of *Hyperaspis consimilis*, *Hyperaspis octavia*, *Hyperaspis troglodytes*, and *Hyperaspis undulata* in the Maritime Provinces of Canada.



*bigeminata*, *Hyperaspis octavia*, and *Hyperaspis undulata* appear relatively widely distributed in the region (Figs. 3, 4); *Hyperaspis binotata* and *Hyperaspis disconotata* have been collected in a few scattered sites (Fig. 3); and the remaining four species (*Hyperaspis brunnescens*, *Hyperaspis consimilis*, *Hyperaspis inflexa*, and *Hyperaspis troglodytes*) have only been recorded from single locations

**Fig. 5.** Distribution of *Brachiacantha decempustulata* and *Brachiacantha ursina* in the Maritime Provinces of Canada.



(Figs. 3,4). *Brachiacantha decempustulata* is widely distributed in the Maritime Provinces and *B. ursina*, while being widely distributed on the mainland, has not been found on Cape Breton or Prince Edward Islands (Fig. 5).

The bionomics of many species of *Hyperaspis* and *Brachiacantha* are almost completely unknown. Bishop and Bristow (2003) found *Hyperaspis binotata* feeding on the soft scale, *Toumeyella parvicornis* (Cockerell), on jack pine (*Pinus banksiana* Lamb, Pinaceae). D.B. Bishop has also found it on scots pine (*Pinus sylvestris* L.) (D.B. Bishop *in litt.*). Majka and McCorquodale (2006) noted that *Hyperaspis bigeminata* was exclusively associated with deciduous forests in Nova Scotia. Lovell (1915) recorded *Hyperaspis octavia* on *Salix* sp. (Salicaceae) and *Hyperaspis undulata* on *Daucus carota* L. (Apiaceae), while Acorn (2007) found *Hyperaspis undulata* on *Helianthus* sp. (Asteraceae). Majka et al. (2007) suggested that *H. brunnescens* might be associated with subterranean scales or might be myrmecophilous. Smith (1886) found larvae of *B. ursina* in nests of ants of the genus *Lasius* where they were feeding on aphids domesticated by the ants.

As the above account makes clear, although beetles in the genera *Hyperaspis* and *Brachiacantha* account for almost one quarter of the species of lady beetles found in the Maritime Provinces, knowledge about this group in the region is still very limited. Given that these species are predators of aphids and scale insects, their biocontrol potential might warrant investigation. Species such as *Hyperaspis japonica* Crotch, *Hyperaspis jucunda* Mulsant,

*Hyperaspis* sp. nr. *lunulata* Mulsant, and *Hyperaspis senegalensis hottentota* Mulsant, have all been intentionally introduced for biocontrol purposes in the United States (Gordon 1985). Additional fieldwork is required to better understand their distribution, bionomics, and the role that these coccinellids play in habitats in this region.

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## KEY TO SPECIES

The following key, based largely on external morphology, is adapted from Gordon (1985) and Downie & Arnett (1996), and can be used to differentiate between the species of *Hyperaspis* and *Brachicanatha* that have been recorded in the Maritime Provinces. It is worth noting that some species of *Hyperaspis* and *Brachicanatha* can only be reliably distinguished on the basis of differences in the genitalia. This is particularly true in the southwestern United States where there are very rich species complexes. The Maritime Provinces have a much smaller suite of species and in most cases species can readily be distinguished on the basis of external morphology.

## KEY TO SPECIES OF MARITIME PROVINCES *HYPERASPIS* AND *BRACHIACANTHA*

1. Front tibia with a small spine on the outer edge near the middle... *Brachicanatha* Chevrolat 11  
 – Front tibia without such a spine.....*Hyperaspis* Redtenbacher 2
  
2. Elytra black, with only a single circular spot..... 3  
 – Elytra black, with multiple spots or vittae..... 4
  
3. Elytra with a large red or yellow apical spot; a large pale spot occupying entire lateral area of pronotum. 2.3-3.4 mm..... *Hyperaspis bigeminata* (Randall, 1838) (Fig. 6A)  
 – Elytra with a large red medial spot; the lateral margin of pronotum narrowly yellow. 2.4-4.5 mm..... *Hyperaspis binotata* (Say, 1826) (Fig. 6B)
  
4. Elytra with only lateral and apical vittae and no median spots. 1.8-2.8 mm. ....  
 ..... *Hyperaspis inflexa* Casey, 1899 (Fig. 6C)  
 – Elytra with median spots or vittae..... 5
  
5. Elytra with basal spot in addition to lateral vitta or humeral spot..... 6  
 – Elytra without basal spot ..... 8
  
6. Elytra with elongate, linear, discal vitta. 2.3-2.7 mm. *Hyperaspis consimilis* LeConte, 1852 (Fig. 6D)  
 – Elytra with discal spot located medially behind basal spot..... 7
  
7. Body elongate, pronotal punctures very fine to indistinct; basal and humeral spots almost touching. 2.3-2.8 mm. .... *Hyperaspis disconotata* Mulsant, 1850 (Fig. 6E)  
 – Body rounded, pronotal punctures distinct; basal and humeral spots widely separated. 2.0-2.8 mm.....*Hyperaspis troglodytes* Mulsant, 1853 (in part)<sup>1</sup>
  
8. Elytra with elongate, linear, discal vitta; strongly alutaceous. 2.3-2.5 mm. ....  
 ..... *Hyperaspis brunnescens* Dobzhansky, 1941 (Fig. 6G)  
 – Elytra with circular medial or post-medial spot..... 9

9. Elytra with circular spot located post-medially. 2.3 mm  
 ..... *Hyperaspis "novascotiae"* Chapin, 1955 (= *H. troglodytes*) (in part) (Fig. 6F)<sup>2</sup>  
 – Elytra with circular spot located medially (Figs. 6H-I) ..... 10
10. Lateral yellow area of pronotum as wide as, or nearly as wide as, elytral humeral spot; elytral punctures much larger than those of pronotum; pronotum strongly alutaceous. 1.8-2.8 mm.  
 ..... *Hyperaspis undulata* (Say, 1824) (Fig. 6H)  
 – Lateral yellow area of pronotum narrower than humeral spot; elytral punctures only slightly larger than those of pronotum; pronotum less strongly alutaceous. 2.2–2.8 mm. ....  
 ..... *Hyperaspis octavia* Casey, 1908 (Fig. 6I)
11. Smaller than 2.5 mm<sup>3</sup>; head coarsely, densely punctate; elytra with five small yellowish spots; basal portion of the basal lobe of the aedeagus of the male with a prominent keel (Fig. 6L). 2.0-2.4 mm. .... *Brachiacantha decempustulata* (Melsheimer, 1847) (Fig. 6J)  
 – Larger than 3.0 mm; head finely, indistinctly punctate; elytra with five large yellow spots; basal portion of the basal lobe of the aedeagus of the male with much lower and less prominent keel (Fig. 6M). 3.0-4.0 mm. .... *Brachiacantha ursina* (Fabricius, 1787) (Fig. 6K)

<sup>1</sup> See *Hyperaspis novascotiae* below.

<sup>2</sup> Note: *Hyperaspis novascotiae* was described on the basis of a specimen collected in Bridgewater, Nova Scotia, which lacks the median basal spot of *Hyperaspis troglodytes*. Despite this, and despite slight differences in the genitalia, Gordon (1985) regarded *Hyperaspis novascotiae* as synonymous with *Hyperaspis troglodytes*. The only specimen of *Hyperaspis novascotiae* is the holotype and so there is no way to discern if this specimen represents an individual aberration or if this is typical of specimens from this region. Normal specimens of *Hyperaspis troglodytes* have not been collected in the Maritime Provinces. Further collecting will be required to determine the status of this species in the region.

<sup>3</sup> A small number of individuals collected on the mainland of Nova Scotia are between 2.5 and 3.0 mm in length, intermediate in size between *Brachiacantha decempustulata* and *Brachiacantha ursina*. To identify such individuals the genitalia of males should be examined.

Figure 6. Dorsal habitus of (A) *Hyperaspis bigeminata*, (B) *Hyperaspis binotata*, (C) *Hyperaspis inflexa*, (D) *Hyperaspis consimilis*, (E) *Hyperaspis disconotata*, (F) *Hyperaspis novoscotiae* (= *Hyperaspis troglodytes*).

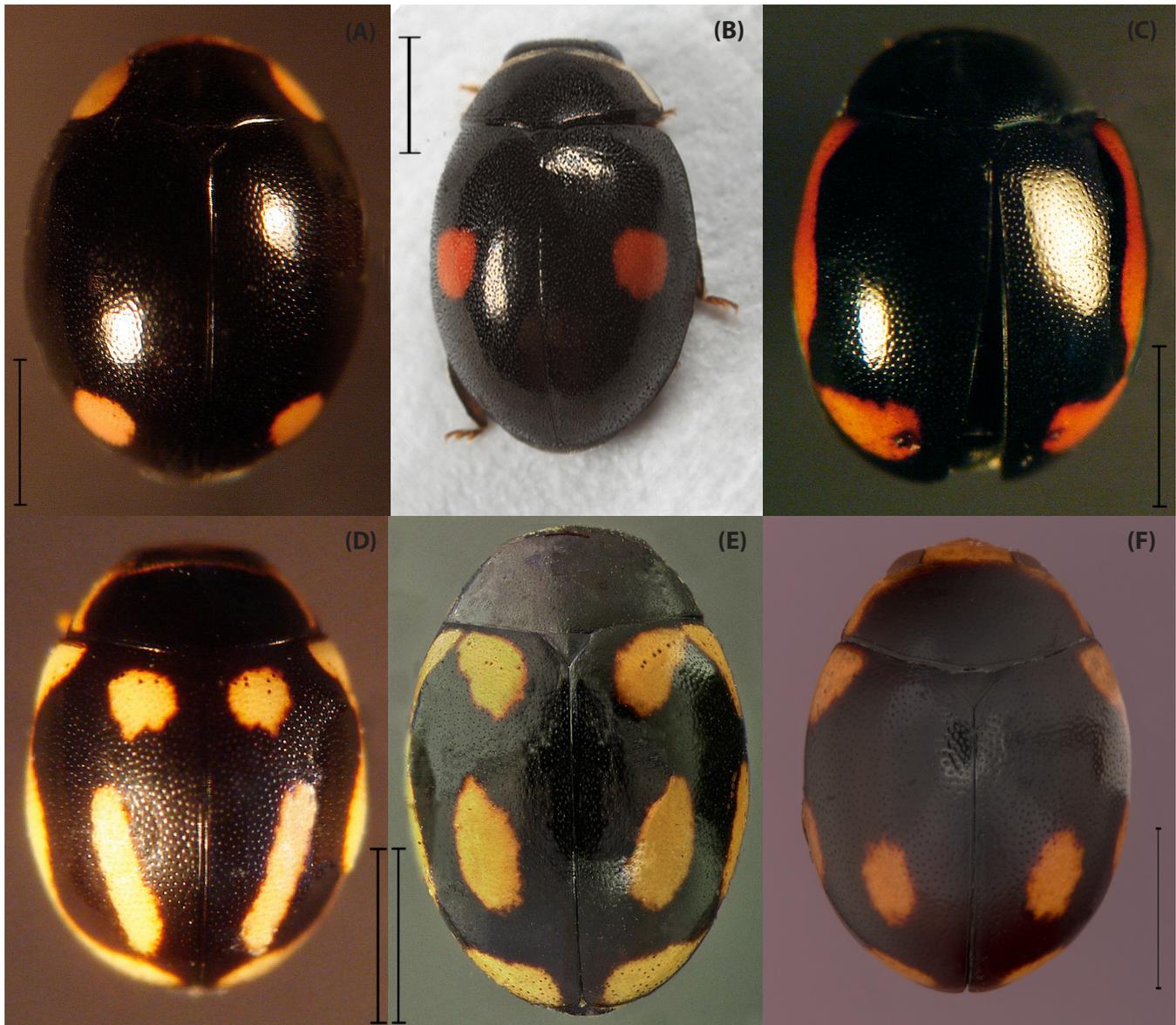


Figure 6 (cont'd). Dorsal habitus of (G) *Hyperaspis brunnescens*, (H) *Hyperaspis undulata*, (I) *Hyperaspis octavia*, (J) *Brachiacantha decempustulata*, (K) *Brachiacantha ursina*; Lateral view of the basal lobe of the aedeagus of *Brachiacantha decempustulata* (L) and *Brachiacantha ursina* (M) [adapted from Gordon (1985)]. Note prominent keel (L) and much lower and less prominent keel (M).

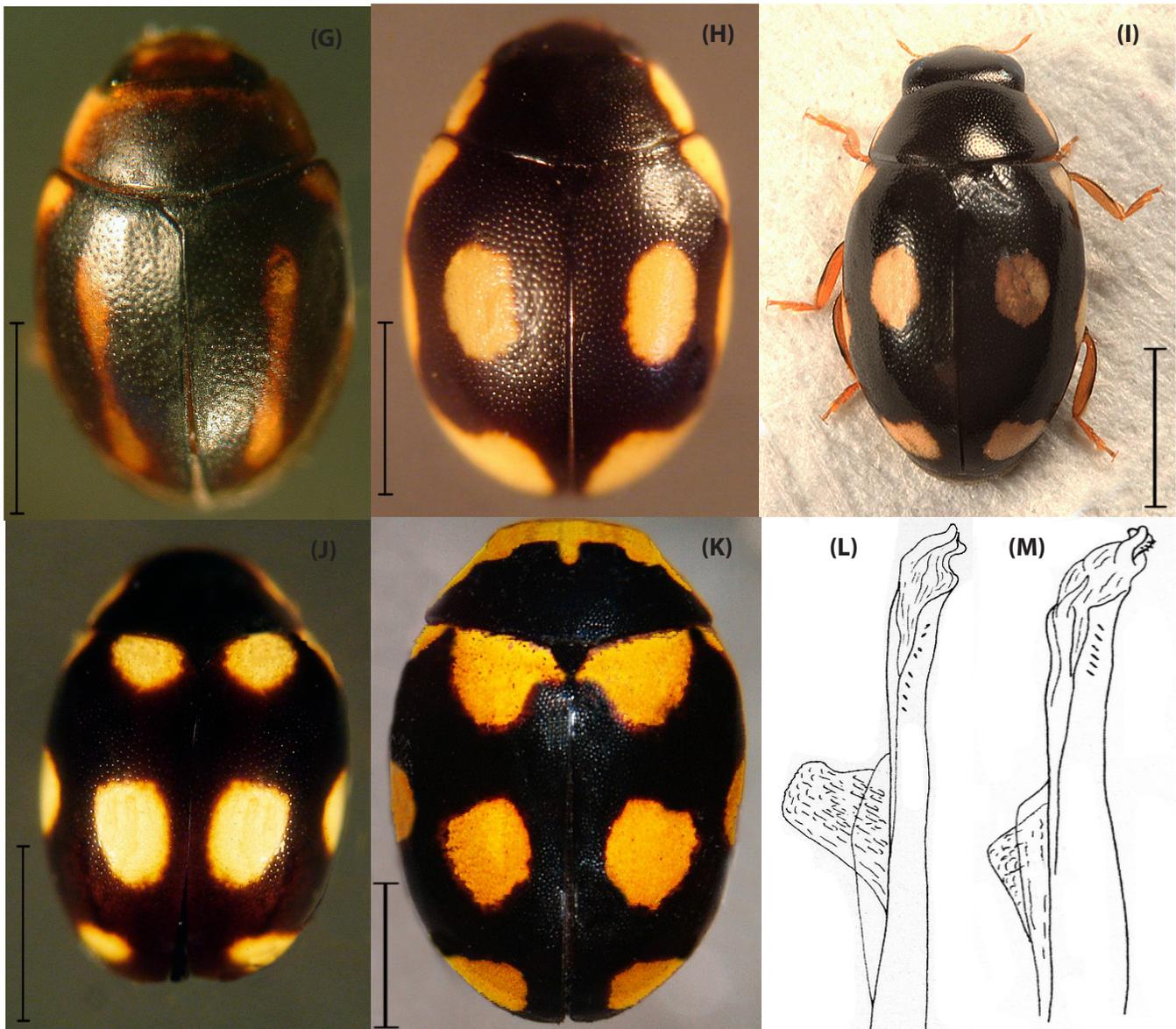


Photo Credit: Christopher Majka, Nova Scotia Museum - Figures 6A, C, D, E, G, H, J, K; Tom Murray - Figures 6B, I; Anthony Davies, Canadian National Collection of Insects, Arachnids and Nematodes - Figure 6F