

**REVIEW OF THE CANADIAN SPECIES OF *HOPLISOIDES*  
(HYMENOPTERA: CRABRONIDAE) WITH REVISIONARY  
NOTES ON THE *H. PLACIDUS* SPECIES GROUP**

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**Abstract**

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The seven Canadian species of *Hoplisoides* Gribodo are reviewed and a key to species is presented. Three species are recorded for the first time from Canada: *H. hamatus* (Handlirsch), *H. punctifrons* (Cameron), and *H. tricolor* (Cresson). Characters of the flagellum are used for the first time to distinguish the very similar males of the *H. placidus* species group. *Hoplisoides nebulosus* (Packard) sp. restit., formerly considered a subspecies of *H. placidus* (Smith), is reinstated as a good species. *Hoplisoides spilopterus* (Handlirsch) is reduced to subspecies rank: *H. nebulosus spilopterus* stat. nov.. *Gorytes pergandei* Handlirsch is removed from synonymy with *Hoplisoides nebulosus* and given subspecies rank as *H. placidus pergandei* stat. nov.. *Gorytes microcephalus* Handlirsch is removed from synonymy with *H. nebulosus* and synonymized with *H. placidus pergandei*. *Hoplisoides birkmanni* Baker (from southcentral U.S.) and its synonym *H. pruinosus* Baker are also removed from synonymy with *H. nebulosus* and the former is reinstated as a valid subspecies: *H. placidus birkmanni* ssp. restit.. A neotype for *Philanthus harringtonii* Provancher (synonym of *H. nebulosus*) and lectotypes for *Gorytes pergandei* and *G. microcephalus* are designated.

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**Introduction**

Recent work on spheciform wasps in Ontario (Buck 2004) led to the discovery that two eastern Nearctic species of *Hoplisoides* Gribodo were previously confused under the name *H. placidus nebulosus* (Packard). This realisation made necessary several taxonomic changes in the *H. placidus* species group including the designation of lectotypes and a neotype. These findings and three new species records for Canada are presented within the framework of a review of the Canadian species of the genus.

The Nearctic, Central American, and Caribbean species of *Hoplisoides* were reviewed and keyed by Bohart (1997). Bohart's key is the only available recent key for Nearctic *Hoplisoides* but is difficult to use for males of some species of the *H. placidus* group. The *H. placidus* group was defined by Bohart and Menke (1976) based on the absence of woolly hair on male sterna 4-5 and a large anteroventral metapleural pit. It

includes four species in Canada: *H. placidus*, *H. nebulosus*, *H. punctifrons*, and *H. hamatus*. The present study revealed new diagnostic characters in the male flagellum such as the shape of the tyloid of male flagellomere I and the microtomentum of flagellomere XI. The wing pattern is diagnostic in both sexes but shows strong sexual dimorphism in most species.

Wasps of the genus *Hoplisoides* are relatively rare in Canada and not particularly well represented in collections. These medium-sized, ground-nesting gorytine wasps usually prey on Membracidae and Cicadellidae, although extralimital species also take fulgoroid planthoppers. More or less detailed biological information is available on all Canadian species (e.g., Evans 1966) except *H. punctifrons* and *H. pygidialis*.

## Materials and Methods

Lists of synonymic names are only provided for taxa whose synonymies were revised; synonymies for other species can be found in Bohart (1997) or Pulawski (2006). Detailed specimen data is provided only for Canadian material and for specimens pertaining to revised taxa.

Photography: Photographs were taken with a Microptics Digital Lab XLT imaging system using a Canon EOS 1 Ds camera and Microptics ML-1000 flash fibre optic illumination system. Each image was assembled from a series of photographs (with different focal planes) using the computer freeware CombineZ (Hadley 2005).

Abbreviations: F (e.g., in FXI) – flagellomere; T (e.g., in T5) – tergum. Abbreviations for provinces and territories in Canada and for states in the United States are the same ones that are used by the postal system in both countries. Co. – County; Distr. – District; Reg. – Region.

Acronyms of depositories: ANSP – Academy of Natural Sciences, Philadelphia, Pennsylvania; BAR – private collection of Brad Arnal and Harold Duggan, Waterloo, Ontario; BCPM – Royal British Columbia Museum, Victoria, British Columbia; CASC – California Academy of Sciences, Dept. of Entomology, San Francisco, California; CNCI – Canadian National Collection of Insects, Ottawa, Ontario; CSUC – Colorado State University, Fort Collins, Colorado; DEBU – Dept. of Environmental Biology, University of Guelph, Guelph, Ontario; EDUM – J. B. Wallis Museum, Entomology Dept., University of Manitoba, Winnipeg, Manitoba; LPC – collection of Laurence Packer, York University, Toronto, Ontario; MHNG – Muséum d'Histoire Naturelle, Genève, Switzerland; PMAE – Royal Alberta Museum (formerly Provincial Museum of Alberta), Edmonton, Alberta; ROME – Royal Ontario Museum, Toronto, Ontario; SEMC – Snow Entomological Museum, University of Kansas, Lawrence, Kansas; ULQC – University of Laval, Dept. of Biology, Québec City, Québec; USNM – United States National Museum, Washington, D.C.

Specimens are deposited in the Guelph collection (DEBU) unless mentioned otherwise.

**Genus *Hoplisoides* Gribodo**

**Key to the Canadian species of *Hoplisoides* Gribodo**

Note: *H. confertus* (Fox), a species recorded from as far north as Montana, was included in the key because it could occur in Canada.

- 1. Lower metapleural pit much smaller than diameter of mid ocellus .....2
- Lower metapleural pit about as large as mid ocellus (Fig. 1) .....*H. placidus* group 5
- 2. Metapleuron gradually tapering from upper to lower pit. Mesosoma mostly red in female .....*H. tricolor* (Cresson)
- Metapleuron parallel-sided for most of its length below upper pit, fairly abruptly tapered near lower pit. Colour of mesosoma variable .....3
- 3. Female with scutum and mesopleuron mostly red, metasomal terga mostly yellow. Male sterna 3-5 with dense, white, woolly pubescence; sternum 5 on each side with a raised submarginal carina (western U.S.) .....[*H. confertus* (Fox)]
- Female scutum and mesopleuron mostly black, lacking red markings. Male sterna 3-5 with short, sparse, inconspicuous pubescence; sternum 5 without lateral carinae .....4

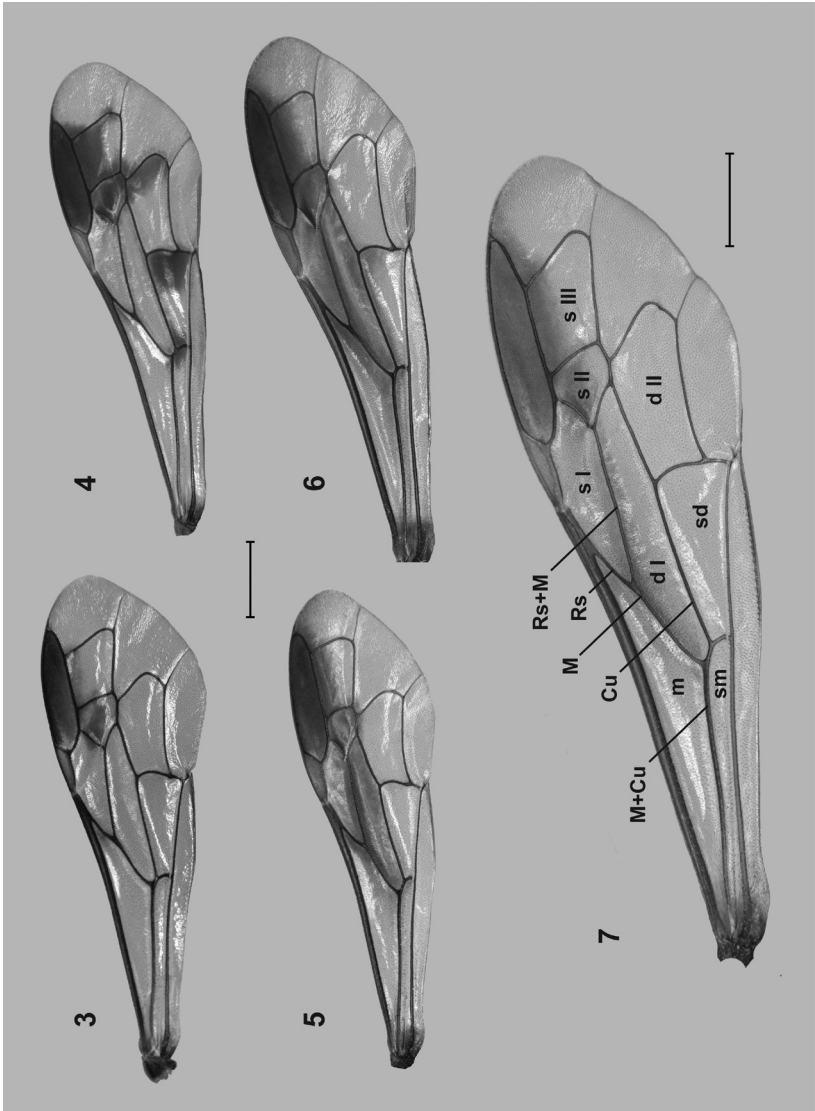


FIGURE 1. *Hoplisoides nebulosus nebulosus*, female habitus (Ontario, Windsor). Scale bar=1 mm. Abbreviation: p – lower metapleural pit.

4.	Terga 4-5 mostly yellow, female tergum 6 often partly yellow (western) .....	<i>H. pygidialis</i> (Fox)
–	Terga 4-5 mostly black, only with narrow yellow apical fasciae, female tergum 6 black (eastern) .....	<i>H. costalis</i> (Cresson)
5.	Male .....	6
–	Female .....	10
6.	Clypeus distinctly bevelled apically, bevel forming a $\leq 90^\circ$ angle with clypeal disc (Fig. 2). FI with very short, tubercle-like tyloid; FXI with bare ventral area (devoid of microtomentum). Lateral clypeal hair tufts conspicuously (almost semicircularly) curved medially. Yellow band of scutellum usually divided medially or incised anteriorly (western) .....	<i>H. hamatus</i> (Handlirsch)
–	Clypeus not distinctly bevelled (apical margin forming a $> 90^\circ$ angle with clypeal disc), if slightly bevelled ( <i>H. punctifrons</i> ), then FI with linear tyloid that extends over most of length of flagellomere, and FXI without bare area (i.e., completely covered in microtomentum). Lateral clypeal hair tufts straight to moderately curved medially. Yellow band of scutellum entire except in some eastern specimens .....	7
7.	FI with linear tyloid that extends over most of length of flagellomere; FXI without bare area ventrally. Discoidal cell I, medial cell, and submarginal cell I (except small area contiguous to submarginal cell II) completely clear (as in Fig. 3) (western) .....	<i>H. punctifrons</i> (Cameron)



FIGURE 2. *Hoplisoides hamatus*, male head (California, Davis, CASC). Scale bar=0.5 mm.



FIGURES 3-7. *Hoplisoides* spp., fore wings. 3 – *H. nebulosus nebulosus*, male (Ontario, Hepworth); 4 – ditto, female (Ontario, Windsor); 5 – *H. placidus pergandei*, male (Ontario, Brantford); 6 – ditto, female (Ontario, Christian I.); 7 – *H. pygidialis*, female (Alberta, Writing-on-Stone Provincial Park, PMAE). Scale bars=1 mm. Abbreviations: Cu, M, Rs: veins Cu, M, Rs; d I, II: discoidal cells I, II; m: medial cell; s I, II, III: submarginal cells I, II, III; sd: subdiscoidal cell; sm: submedian cell.

- First flagellomere with very short, tubercle-like tyloid. Last flagellomere with bare area ventrally; very small and inconspicuous in some eastern specimens (some *H. placidus pergandei*) but then discoidal cell I, distal portion of medial cell and posterior portion of submarginal cell I at least slightly infuscated.....8
- 8. Discoidal cell I, medial cell along Rs and M, and posterior portion of submarginal cell I slightly to moderately infuscated (Fig. 5). FXI completely microtomentose or with small bare area (smaller than lateral ocellus) .....*H. placidus pergandei* (Handlirsch)
- Discoidal cell I, medial cell (excl. area beyond fork of Rs and M), and submarginal cell I (except small area contiguous to submarginal cell II) completely clear (Fig. 3). FXI with larger bare area (at least as large as lateral ocellus) .....  
.....*H. nebulosus* (Packard) 9
- 9. Alberta and British Columbia south to western Texas, Chihuahua, and California. Tergum 5 with well-developed yellow apical fascia .....  
.....*H. n. spilopterus* (Handlirsch)
- Eastern Canada south to North Carolina and Tennessee, west to Kansas and Iowa. Tergum 5 usually without yellow apical fascia.....*H. n. nebulosus* (Packard)  
Note: Males of the two subspecies of *H. nebulosus* cannot always be separated based on the provided character. The geographic boundary between the subspecies is insufficiently known.
- 10. Subdiscoidal cell with anterior infuscation that extends all along Cu, clear posteriorly; no discrete infuscation in apical 2/5 (Fig. 6) (eastern) .....  
.....*H. placidus pergandei* (Handlirsch)
- Subdiscoidal cell with discrete infuscation in apical 2/5 (Fig. 4) .....11
- 11. Propodeum at least in part reddish. Metasomal tergum 1 and sometimes 2 in part reddish (western) .....12
- Ground colour of propodeum and terga black, lacking reddish markings .....13
- 12. Pronotum, scutum laterally and tergum 2 partially red; terga 3-5 entirely black or with narrow yellow apical fascia .....*H. punctifrons* (Cameron)
- Pronotum, scutum laterally and metasomal tergum 2 rarely with red areas but if so then terga 3-5 predominantly yellow .....*H. nebulosus spilopterus* (Handlirsch)
- 13. Transverse yellow band of scutellum medially divided or anteriorly incised. Punctures of apical third of tergum 1 small, distinctly smaller than those of tergum 2 (western) .....  
.....*H. hamatus* (Handlirsch)
- Transverse yellow band of scutellum entire, anterior margin sometimes slightly concave but not incised. Punctures of metasomal tergum 1 larger; largest ones subequal to those of tergum 2 (eastern) .....*H. nebulosus nebulosus* (Packard)

### ***H. placidus* species group**

**Diagnosis.** Lower metapleural pit about as large as mid ocellus.

***Hoplisoides nebulosus nebulosus* (Packard, 1867) sp. restit.** (Figs. 1, 3, 4)

*Gorytes nebulosus* Packard, 1867: 422 (♀).



*Gorytes armatus* Provancher, 1887: 272 (♂, erroneously stated as ♀). Bohart in Bohart and Menke 1976: 521 (synonymy).

*Philanthus harringtonii* Provancher 1888: 278 (♂, sex not indicated in description). Bohart in Bohart and Menke 1976: 521 (synonymy).

*Hoplisoides placidus nebulosus* (Packard), partim. Bohart in Bohart and Menke 1976: 521 (subspecies status).

**Type material.** *Gorytes nebulosus*: Lectotype ♀ (designated by Cresson, 1928: 48). “N.J.” [= New Jersey], “*Gorytes nebulosus* ♀ Pack.”, “Type No. 10063” (red label) (ANSP). The actual specimen was not examined but a digital image of the wing was provided by J. Weintraub. The wing pattern of *H. nebulosus* differs from all other sympatric species and is therefore sufficient to establish the identity of this species.

*Gorytes armatus*: Lectotype ♂ (designated by Gahan & Rohwer 1917: 427). “256” (red label), “845” (blue label), “1434” (yellow label), locality not stated [= Ottawa, cf. Harrington 1902] (ULQC, Provancher collection). Note: Provancher (1887) and Bohart (1997) erroneously recorded the type as female.

*Philanthus harringtonii*: Neotype ♀ (by present designation, justification see below). Ontario: Ottawa, 21 July 1885, Guignard (CNCI).

**Other material examined.** **CANADA, Québec:** Ste-Anne-de-Bellevue, ♀, 22 June 1965, G. Jamieson, ♂, 13 July 1965, E. Vlasak, ♂, 9 May[?] 1966, W. Boyle, ♂, 16 July 1967, R. Lalonde (LEMQ); 2♀, St. Hilaire, 25 July and 1 September 1927, J. W. Buckle (LEMQ). **Ontario: Rainy River Distr.,** ♀, Rainy River, 14 July 1960, S. M. Clark (CNCI). **Sudbury Distr.,** ♀, Capreol, 14 August 1972, W. M. M. Edmonds (ROME). **Ottawa–Carleton Reg.,** ♂, “21/6”, ♂, “23/6”, locality not stated [= Ottawa], W. H. Harrington collection (CNCI); 2♀, Stittsville, 16 and 30 June 1977, M. Sanborne (PMAE). **Muskoka Distr.,** ♀, Port Sydney, [day illegible] August 1923, N. K. Bigelow (ROME). **Hastings Co.,** Belleville, ♂, 30 July 1950, J. C. Martin (CNCI), ♂, 21 July 1950, J. C. Fisher. **Peterborough Co.,** 3♀, Norwood, 5–6 August 1983, T. D. Galloway (EDUM). **Bruce Co.,** ♂, Inverhuron Provincial Park, 25 July 2003, dunes, M. Buck. **Grey Co.,** 2♂, Hepworth dunes, 5 July 2003, M. Buck. **Dufferin Co.,** ♀, Boyne Valley Provincial Park, 1 km N Primrose, 44°6'15"N, 80°8'0"W, 27 July 2002, M. Buck. **Peel Reg.,** ♀, Forks of the Credit, gravel pit NW of Provincial Park, 43°49'24"N, 80°0'57"W, 5 August 2002, M. Buck. **Wellington Co.,** Guelph, ♂, June 1951, D. H. Pengelly, ♀, 12 July 1974, J. T. Huber, ♀, 10 August 1976, M. Waters, 2♀, 27 and 28 June 1978, W. A. Attwater, ♂, 28 June 1978, N. Pierce, ♂, 7 July 1978, S. Giamondi, ♀, 18 July 1980, S. Beierl, ♀ (PMAE), 10 August 1988, D. B. McCorquodale; ♀, Guelph, University Arboretum, 1–15 July 1991, malaise trap, M. Montes Castillo; Guelph, Wellington Street & Fife Road, ♀, 14 August 2004, ♀, 4 September 2004, M. Buck; ♀, Aberfoyle, 2 August 2004, M. Buck; ♀, Rockwood, Valley Road, 43°36'56"N, 80°08'28"W, 21 July 2004, M. Buck. **Waterloo Reg.,** ♀, Cambridge, 28 July 1975, W. J. Moolenbeek; ♂, Blair, 20 June 2006, M. D. Bergeron. **Welland Co.,** ♂, Niagara Falls, Niagara Whirlpool, 1 July 2004, S. M. Paiero. **Brant Co.,** ♀, Brantford Railway Prairie, 43°10'N, 80°19'W, 12 July 2002, S. M. Paiero. **Lambton Co.,** ♂, Thedford Conservation Area, 6 July 2003, B. Arnal & H. Duggan (BAR). **Essex Co.,** ♀, Pelee I., Fish Point, 5 August 1993, R. A. Cannings & H. Nadel (BCPM); ♀, Windsor, Ojibway Prairie, 42°15'51"N, 83°04'30"W, 28 July 2005, S.

M. Paiero; ♀, Windsor, nr. Ojibway Pk., 21–28 June 1982, S. A. Marshall (PMAE); Windsor, Springarden Road ANSI, 2♀, 31 July 2002, M. Buck, 7♀, 27 August 2002, M. Buck & S. M. Paiero. **New Brunswick:** ♂, Fredericton, Nashwaak, 26 July 1922, L. J. S. (CNCI). **Prince Edward Island:** Consecon Co., ♂, no locality, 28 August 1903, Evans (CNCI). **UNITED STATES** (all in USNM unless stated otherwise), **District of Columbia:** 7♂, 9♀ (1♂ [!] pinned with adult *Platycotis vittata*, 1♀ with adult *Entylia carinata*), Washington, various dates, June–September, 1945–1952, D. Shappirio; ♀, same locality, 2 September 1949, R. Boettcher. **Illinois:** ♀, Carlinville, Robertson (date not indicated). **Iowa:** ♀, Ames, June 1914, *Tilia americana* – 627; ♂, Jones Co., Anamosa, 27 June 1914, D. Stoner. **Kansas:** ♂, Topeka, 17 July (year not indicated). **Maryland:** ♀, Beltsville, 15–21 August 1950, D. Shappirio; 2♀, Fort Washington, 22 June 1947 and 1 July 1948, D. Shappirio; ♀, Odenton, 26 July 1947, D. Shappirio; ♂, Indian Head, 23 August 1902, Bridwell; ♂, ♀, Frederick Co., nr. Frederick, 30 June 1951, D. Shappirio. **Massachusetts:** ♀, Woods Hole, 24 August 1946, K. W. Cooper; ♀, “WH” [= Woods Hole?], 18 August 1946; Berkshire Co., ♂, North Adams, 4 July 1930, J. C. Bridwell. **Missouri:** ♀, Columbia, 15 August 1967, malaise trap, F. D. Parker. **New Jersey:** Princeton, ♂, 23 June 1946, ♂, ♀, “48f24”, ♀ (pinned with membracid nymph), 15 June 1941. **New York:** ♂, Ithaca, Lickbrook, 25 June 1940, P. P. Babi (CASC); ♂, Ithaca, Six Mile Creek, 13 June 1937, P. P. Babi (CNCI); ♀, Rensselaerville, 24 May 1914, K. W. C.; ♂, Powder Mills, “56g19”; 2♂, Rochester, 25 June 1939; ♂, Long I., Orient, 8 September 1953, R. Latham. **North Carolina:** ♂, Red Hill, 16 August 1957, L. A. Kelton (CNCI). **Tennessee:** ♂, Knoxville, 24 June 1920, C. G. Ainslie. **Virginia:** ♂, 22 July 1883, T. Pergande; Loudon Co., ♂, 31 May 1947, D. Shappirio. **West Virginia:** Hampshire Co., ♂, North River Mills, 29 May 1939, A. H. Clark. **Wisconsin:** ♀, Milwaukee. No locality: ♀, “Phil Rau No. 21”.

**Diagnosis.** Yellow spot of scutellum almost always entire (medially divided and partially suffused with brown in one male from Guelph, Ontario).

**Male.** Clypeus not distinctly bevelled, angle between plane of apical portion and clypeal disc  $>90^\circ$ ; apical margin slightly lamellate in about central half; lamellate rim becoming narrower laterally. Lateral clypeal hair tufts nearly straight except for slightly curved apical 1/4–1/3. FI with short papilla-like tyloid similar to one on FII; FXI with bare ventral area (devoid of microtomentum) at least as large as lateral ocellus. Wing (Fig. 3): Discoidal cell I clear; medial cell clear except weak infuscation near apex beyond level where Rs joins M; submarginal cell I clear except in small area contiguous to submarginal cell II. Metasomal tergum 5 black; yellow apical fascia absent or narrow (at most 5x as broad as long) and not interrupted medially.

**Female.** Wing (Fig. 4): Subdiscoidal cell infuscated in apical 2/5, clear along Cu in basal 3/5; discoidal cell I clear, except sometimes weakly and narrowly at extreme base; medial cell clear except apical infuscation (beyond level where Rs joins M) and small area in posterior corner (near fork of M and Cu); submarginal cell I clear except area contiguous to submarginal cell II. One unusual female from Rainy River, Ontario, shows a wing pattern that is somewhat intermediate with regard to *H. placidus pergandei* (i.e. with additional weak infuscation in discoidal cell I and submarginal cell I). Ground colour of propodeum and tergum 1 black. Pygidial carina bent near base, anteriormost sections slightly convergent basally.



**Discussion.** It is surprising that *H. n. nebulosus* has been confused with *H. placidus pergandei*. While differences between males are subtle, females of both species are easily separated by their distinctly different wing patterns. *Hoplisoides n. nebulosus* shows the same pattern as the western *H. nebulosus spilopterus*, *H. hamatus*, and *H. punctifrons* while *H. placidus pergandei* is very similar to the nominate subspecies. Based on their different wing patterns, Bohart (1997) correctly separated females of the three western taxa from *H. placidus* (s.str.) (l.c., p. 648: couplet 20) but failed to realize that *H. nebulosus* is different from the widespread eastern subspecies of *H. placidus*, which he incorrectly called “*H. placidus nebulosus*”. In Bohart’s key, females of *H. n. nebulosus* run to *H. hamatus*; males run to *H. spilopterus*, which is here considered the western subspecies of *H. nebulosus* (see below).

The reinstatement of *H. nebulosus* as a good species makes necessary a neotype designation for *Philanthus harringtonii* Provancher, a species currently standing in synonymy with *H. nebulosus*. This action is justified as follows: (1) The type material of *Philanthus harringtonii* is lost. Gahan & Rohwer (1917: 134) could not locate the type in the Provancher collection (now at ULQC) and speculated that it might have been returned to the collector, W. H. Harrington. However, the Harrington collection (now at CNCI) does not include any specimens labelled as *Ph. harringtonii*, neither does the Hymenoptera type collection at the CNCI. The absence of *Ph. harringtonii* material at ULQC was recently confirmed by G. Wagner (2002, in litt.). Bohart (1997: 656), obviously in error, reported to have examined the type of *Ph. harringtonii* which he recorded as female. The sex of the type was not stated by Provancher (1888) but the original description clearly applies to a male. (2) The identity of *Ph. harringtonii* cannot be ascertained from Provancher’s (1888) original description. Despite the original generic combination, the description apparently refers to a *Hoplisoides* specimen provided by W. H. Harrington. The only two species that occur at the type locality, Ottawa, are *H. n. nebulosus* and *H. placidus pergandei*. The CNCI has specimens of both species collected by Harrington. The fairly subtle characters that separate males of the two species are not mentioned in the original description so the name could refer to either of the two. (3) The exact publication dates of the works by Provancher (1888: *Philanthus harringtonii*) and Handlirsch (1888: *Gorytes pergandei*) are unknown. This causes uncertainty with regard to the name that has to be applied to the northern subspecies of *H. placidus*. The present neotype designation for *Ph. harringtonii* resolves this uncertainty by fixing the identity of the species in its previous sense (i.e. as a junior synonym of *nebulosus* vs. a synonym of *pergandei*). The designated neotype was collected by W. H. Harrington at the type locality and was possibly examined by Provancher.

**Distribution.** Due to previous confusion with *H. placidus pergandei* the range of *H. n. nebulosus* is insufficiently known. Verified records are from eastern Canada (NB, PE, QC, ON) (Buck 2004), and the eastern U.S. (WI, IA, IL, MA, NY, NJ, MD, DC, VA, WV, NC, TN, MO, KS).

**Biology.** Preys on membracid nymphs and adults of *Entylia carinata* (Forster) and *Platycotis vittata* (F.) (Membracidae). Previously published prey records (adult and nymphal Membracidae, summarized by Krombein 1979 under “*H. placidus nebulosus*”) pertain either to *H. n. nebulosus* or to *H. placidus pergandei*.

***Hoplisoides nebulosus spilopterus* (Handlirsch, 1888) stat. nov.**

*Gorytes spilopterus* Handlirsch, 1888: 414 (♀).

*Gorytes maculatus* Provancher, 1895: 140 (♀). Bohart in Bohart and Menke 1976: 521 (synonymy).

*Gorytes (Hoplisoides) pogonodes* Bradley, 1920 (♂). Bohart in Bohart and Menke 1976: 521 (synonymy).

**Type material.** Not examined.

**Material examined.** **CANADA, Alberta:** ♀, Medicine Hat, 17 July 1917, F. W. L. Sladen (CNCI); ♀, Writing-on-Stone Provincial Park, 6 km E at bridge, 12 August 1981, D. B. McCorquodale (PMAE); Writing-on-Stone Provincial Park, Sand Pit, ♀, 1 July 1981, ♂, 8 July 1982, ♀, 22 July 1982, D. B. McCorquodale (PMAE); ♀, Lake Newell, SE of lake, 18 July 1989, D. B. McCorquodale (PMAE). **British Columbia:** ♀, Salmon Arm, 4 July 1914, F. W. L. Sladen (CNCI); ♀, Oliver, 20 July 1923, E. R. Buckell (CNCI); Vernon, ♂, 3♀, 9 July 1920, M. H. Ruhmann, ♀, 6 August 1920, N. L. Cutler (CNCI); ♀, Osoyoos, Richter Pass, 28 June 1959, L. A. Kelton (CNCI). **UNITED STATES, California:** Colusa Co., 2♀, Ramsay Canyon, 10 and 14 May 1970, M. K. Sears (DEBU); 3♂, ♀, Thousand Palms, 10, 12, and 15 April 1955, W. R. Richards (CNCI). **Colorado:** ♂, Boulder, Valmont Butte, 5300 ft, 30 July 1961, J. R. Stainer (CNCI). **Texas:** Davis Mts. State Park, 5200 ft, 19-22 July 1973, E. Lindquist (CNCI); ♂, 10 mi W Fort Davis, Point Rocks, 5000 ft, 30 May 1959, W. R. M. Mason (CNCI); 3♂, ♀, 23 mi W Fort Davis, 4500 and 5000 ft, 1 June 1959, W. R. M. Mason and J. F. McAlpine (CNCI); ♀, Del Rio, Devil's River, 27 April 1959, J. F. McAlpine (CNCI). **MEXICO, Chihuahua:** 2♂, 35 mi NW Chihuahua, Majalca Road, 5500 and 6000 ft, 14-17 April 1961, Howden & Martin (CNCI).

**Diagnosis.** As nominate subspecies except for the following: male metasomal tergum 5 with an anvil-shaped ivory spot that is approximately 2.5x as broad as long (the reliability of this character requires further testing). Female propodeum and tergum 1 mostly red.

**Discussion.** Because of the absence of structural differences between *H. nebulosus* (s.str.) and *H. spilopterus* and their allopatric distribution, I propose subspecies rank for *H. spilopterus* under *H. nebulosus*. Similar geographic variation is also found in *H. placidus* where red-marked populations from Texas and other western localities were described as ssp. *birkmanni* (see below).

**Distribution.** Canada: Alberta (Carter 1925, identification tentative; Strickland 1947) and British Columbia (new record). Widespread in the western U.S., south to northern Mexico (Chihuahua, Sonora, Baja California) (Pulawski 2006). The easternmost known localities are in Nebraska, Colorado, New Mexico, and western Texas. The geographic boundary between this subspecies and ssp. *nebulosus* is insufficiently known. The apparent distributional gap in central Canada (Manitoba, Saskatchewan) is probably due to inadequate collecting.

**Biology.** Preys on adults and nymphs of various Membracidae genera (Krombein 1979).

***Hoplisoides placidus pergandei* Handlirsch, 1888, stat. nov.** (Figs. 5, 6)

*Gorytes pergandei* Handlirsch, 1888: 407 (♂). Wrongly synonymized with *Gorytes nebulosus* Packard by Bohart in Bohart and Menke 1976: 521 (synonymy not indicated as new but authorship mentioned in Bohart 1997: 656).

*Gorytes microcephalus* Handlirsch, 1888: 405 (♂). **rev. syn.** Wrongly synonymized with *Gorytes nebulosus* Packard by Bohart in Bohart and Menke 1976: 521.

*Hoplisoides placidus nebulosus* auctt., nec (Packard), partim. Bohart in Bohart and Menke 1976: 521, and subsequent authors.

**Type material.** *Gorytes pergandei*: Lectotype ♂ (by present designation). “Illinois”, “C<sup>n</sup> de Saussure”, “Gorytes pergandei Handl”, “Lectotype ♂ pergandei (RMB) Handl.” (red label) (MHNG). The head is largely destroyed by dermestids but the right antenna and the clypeus are fully preserved. Syntype from Virginia not in MHNG, probably lost.

*Gorytes microcephalus*: Lectotype ♂ (by present designation). “Georgie” [= Georgia], “C<sup>n</sup> de Saussure”, “Gorytes microcephalus Handl”, and one empty red label (MHNG). Right mid leg and hind legs missing. Other syntype not in MHNG, probably lost.

**Other material examined.** **CANADA, Ontario:** Kent Co., ♀, Rondeau Provincial Park, South Point Trail, west parking lot, 42°16'53"N, 81°51'16"W, **Carolinian forest, 20 July 2004**, D. K. B. Cheung; Rondeau Provincial Park, Group Campground, 42°17'35"N, 81°50'52"W, ♀, **11 July 2005**, M. Buck, ♀, **11 August 2005**, S. M. Paiero. **Lambton Co.**, ♀, Walpole I., nr. Chiefs Road, sand pits, 42°39'39"N, 82°29'47"W, **8 August 2005**, S. M. Paiero. Further 21♂, 42♀ from the following counties and regions (detailed label data in Buck 2004): Brant, Carleton, Essex, Grey (♀ pinned with cf. *Campylenchia latipes* nymph), Kent, Lambton, Norfolk, Peterborough, Simcoe. **Québec:** 3♀ from Lanoraie, St. Anne's and 3 mi N Ste. Scholastique (see Buck 2004 for details). **UNITED STATES** (all in USNM except stated otherwise), **Georgia:** ♂, Savannah, 1 May 1937, P. W. Fattig; Rabun Co., ♀, Satolah, 2500 ft, 4 July 1957, W. R. M. Mason (CNCI). **District of Columbia:** 2♀, Washington, 10 August 1945 and 30 July 1946, D. Shappirio. **Indiana:** ♂, Elkhart. **Louisiana:** ♀\*, Keatchie, 14 June 1905, La. Crop Pest Comm. **Maryland:** Montgomery Co., ♀, 8 July 1945, D. Shappirio; ♀, Plummers I., 16 September 1972, P. D. Hurd; ♂, Beltsville, Agr. Res. Stn., 2 July 1949, D., R. & S. Shappirio; AnneArundel Co., ♀\*, nr. Patuxent, 3 July 1948. **Massachusetts:** ♀\*, Dennis, 4 July 1954, J. W. Green (CASC); ♀, “WH” [= Woods Hole?], 23 August(?) 1946. **Minnesota:** Olmsted Co., ♂ June 1898, ♀\*, no date, C.N. Ainslie. **Mississippi:** Lincoln Co., ♀\*, Peach, 28 May 1938, Turner; Lafayette Co., ♀, May 1945, F. M. Hull (CNCI). **New Hampshire:** ♀, Salem, 10 August 1948, D. Shappirio. **New Jersey:** ♀, Brown's Mills, 21 June 1908, C. T. Greene; ♀ (pinned with membracid nymph), Princeton, 15 June 1941, K. W. Cooper; ♂, Riverton, 20 June 1904; Camden Co., ♂, 28 June 1891, W. J. Fox collection. **North Carolina:** Dare Co., 15♂, 9♀, Kill Devil Hills, various dates, May–September, 1948–1958, 1966, K. V. Krombein and

D. G. Shappirio (USNM, 1♀ CASC); Cumberland Co., ♀, Fort Bragg, 27 September–3 October 1967, J. D. Birchim (CASC). **South Carolina:** 2♂, Cherry Grove Beach, 2 August 1966, G. S. Walley (CNCI). **Texas** (unassociated males cannot be separated from ssp. *birkmanni*): 3♂, Victoria, 16 May 1913, J. D. Mitchell; ♂, Jacksonville, 11 August 1906, F. C. Bishopp; Willis, ♂, 15 June 1903, ♀\*, 11 June 1903, Bridwell; ♂, Rosser, 28 June(?) 1905, on *Cassia* sp., C. R. Jones (CASC). **Virginia:** ♀, Great Falls, 15 June 1948, D. Shappirio.

\* = females with more or less infuscated apical part of subdiscoidal cell.

**Diagnosis.** Yellow spot of scutellum entire, not divided medially.

Male. Clypeus as in *H. nebulosus* but hair tufts usually more curved. FI with short papilla-like tyloid similar to one on FII; FXI with bare ventral area absent or smaller than lateral ocellus. Wing (Fig. 5): Degree (intensity) of infuscation variable, better developed in specimens from southeastern part of range. Discoidal cell I strongly to very weakly infuscated except clear longitudinal medial streak from base to apex; medial cell variably infuscated, infuscation always present distally along Rs and M, in some specimens extending over whole cell; submarginal cell I lightly to strongly infuscated in posterior half; subdiscoidal cell varying from completely clear to usually somewhat infuscated along anterior margin, in some specimens also with infuscation in distal 2/5. Yellow apical fascia of T5 at least 7x as broad as long (usually much more), sometimes medially interrupted.

Female. Wing (Fig. 6): Subdiscoidal cell infuscated along anterior margin, in a small number of specimens also in apical 2/5; discoidal cell I infuscated except lighter longitudinal medial streak from base to apex; medial cell infuscated along Rs, M, and M+Cu (more weakly so towards base); submarginal cell I infuscated but infuscation becoming lighter anteriorly. Ground colour of propodeum and tergum 1 black. Pygidial carina bent near base, anteriormost sections parallel to slightly convergent basally.

**Discussion.** As discussed above, the name *H. nebulosus* was misapplied to the widespread eastern subspecies of *H. placidus* (the nominate subspecies is restricted to Florida). The oldest available names for this subspecies are *pergandei* Handlirsch and *microcephalus* Handlirsch, both described in the same work. As first reviser, I am synonymizing *Gorytes microcephalus* with *H. pergandei*, which becomes the valid name for the subspecies. I prefer the name *pergandei* because *microcephalus* was described from Georgia, close to the range of the nominate subspecies. Through the present lectotype designation the type locality for *pergandei* is fixed as “Illinois” (the second syntype was from “Virginia”).

The designated *H. pergandei* lectotype already bears a lectotype label by R. M. Bohart. His designation was not published and is therefore invalid. The wing pattern of the specimen is somewhat faded and therefore only distinguishable with difficulty from *H. nebulosus nebulosus*. However, the absence of a bare spot on the last flagellomere clearly identifies the specimen as a member of the widespread eastern subspecies of *H. placidus*.

*Hoplisoides birkmanni* Baker, 1907 and its synonym *H. pruinus* Baker, 1907 (synonymized by Bohart in Bohart and Menke 1976: 521) are here removed from synonymy with *H. nebulosus* (synonymized by Bohart 1997: 656), and reinstated as a subspecies of *H. placidus* (subspecies status first given by Bohart in Bohart and Menke 1976: 521): *H.*

*placidus birkmanni* Baker **ssp. restit.** This taxon was erected for southwestern populations of *H. placidus* (from Texas, etc.), in which the female has red markings on the propodeum, tergum 6, and sometimes tergum 1. It differs from the red-marked nominate subspecies from Florida in having well-developed yellow apical fasciae on terga 3-5, clear yellow markings on head, mesosoma, and metasoma (not suffused with orange-red), and weaker wing infuscation (as in *H. placidus pergandei*). We have examined 11♂, 16♀ of *H. p. birkmanni* from Texas, Kleberg and Kenedy Cos. (CASC).

**Distribution.** Due to confusion with *H. nebulosus nebulosus*, the range of *H. placidus pergandei* is insufficiently known. Verified records are from Canada (QC, ON) (Buck 2004) and the eastern U.S. (NH, MI, IN, MA, NJ, MD, DC, VA, NC, SC, GA, MS, LA, eastern TX).

**Biology.** Preys on nymphs of cf. *Campylenchia latipes* Say (Membracidae). Previously published prey records (adult and nymphal Membracidae, summarized by Krombein 1979 under “*H. placidus nebulosus*”) pertain either to *H. placidus pergandei* or to *H. nebulosus nebulosus*.

### *Hoplisoides hamatus* (Handlirsch, 1888) (Fig. 2)

**Material examined.** CANADA, British Columbia: ♀, Seton Lake, Lillooet, 15 June 1926, J. McDunnough (CNCI). UNITED STATES, California: 4♀ (DEBU), 13♂, 46♀ (CASC). Colorado: ♀ (CASC). Nevada: ♀ (CASC). New Mexico: 2♂, ♀ (CASC). Oregon: ♂, ♀ (CASC). Utah: 2♂, 6♀ (CASC).

**Diagnosis.** Yellow spot of scutellum divided medially.

Male. Clypeal bevel sharply defined, plane of bevel bent posterad  $\geq 90^\circ$ ; apical margin with weakly developed lamellate rim in middle third; lateral clypeal hair tufts almost semicircularly curved medially (curved more strongly than in related species) (Fig. 2). FI with short papilla-like tyloid similar to one on FII. FXI with bare ventral area (devoid of microtomentum). Wing as in *H. nebulosus* (Fig. 3). Metasomal tergum 5 black or with an yellow apical spot that is at most 1.7x as broad as long.

Female. Wing pattern as in *H. nebulosus* (Fig. 4). Ground colour of propodeum and tergum 1 black. Pygidial carina evenly curved towards base, anteriormost sections very slightly divergent or parallel to each other.

**Distribution.** Canada: British Columbia (first record from Canada). Widespread in the western U.S. (Krombein 1979); recorded as far east as “Dakota” by Fox (1896).

**Biology.** Preys on nymphs of several genera of Membracidae (Krombein 1979).

*Hoplisoides punctifrons* (Cameron, 1890)

**Material examined.** **CANADA, Saskatchewan:** 2♂, Elbow, 12 July 1960, A. R. Brooks (CNCI). **Alberta:** ♀, Scandia, 2 August 1949, G. A. Hobbs (CNCI); ♀, Orion, 17 July 1933, G. F. Manson (CNCI); ♂, Lower Kananaska Hwy., 5 August 1980, S. A. Marshall (DEBU); ♀, Writing-on-Stone Provincial Park, Sand-North, 1 August 1990, M. Klassen (PMAE); ♂, Lethbridge, 4 km SE Picture Butte, 20-29 July 1991, C. D. Michener (SEMC). **British Columbia:** 2♂, 2♀, Vernon, 25 July 1917, F. W. L. Sladen (CNCI). **UNITED STATES, Arizona:** 3♂, 4♀ (USNM), ♂, ♀ (CASC). **California:** 4♂, 3♀ (USNM), 9♂ (CNCI), 2♂, 1♀ (CASC). **Colorado:** ♂ (USNM), ♂ (CNCI). **New Mexico:** ♂, ♀ (CASC). **North Dakota:** 4♂ (USNM). **Texas:** ♂ (USNM), ♀ (CASC). **Utah:** ♀ (CNCI). **Wyoming:** ♀ (CSUC). **MEXICO, Baja California Sur:** ♀ (CASC).

**Diagnosis.** Very similar to *H. nebulosus spilopterus*; differs as follows.

Male. Clypeus more distinctly bevelled; apical margin lamellate only in about central 1/3-1/5; lamellate portion ending more or less abruptly laterally. FI with long linear tyloid dissimilar to short tuberculate tyloid of FII; FXI lacking bare ventral area (completely microtomentose).

Female. Tergum 2 reddish (except apical fascia), reddish areas on pronotum and laterally on scutum. The examined Canadian females differ from specimens from the southwestern U.S. in having well developed yellow apical fasciae on terga 3-4(-5) as *H. spilopterus*.

**Distribution.** Canada: Saskatchewan to British Columbia (first records for Canada). United States west of 100<sup>th</sup> meridian, Mexico (Sonora, Jalisco) (Bohart 1997).

**Biology.** Unknown.

*H. costalis* species group

**Diagnosis.** Lower metapleural pit much smaller than mid ocellus.

*Hoplisoides costalis* (Cresson, 1872)

**Material examined.** **CANADA, Ontario:** Halton Reg., ♂ Oakville, nr. Hwy 25 & Burnhamthorpe Road, 43°27'14"N, 79°47'32"W, 9 July 2004, S. M. Paiero. **Kent Co.,** ♀, Rondeau Provincial Park, Group Campground, 42°17'35"N, 81°50'52"W, 20-22 July 2004, S. A. Marshall. Further 2♂, 14♀ from the following counties and regions (detailed label data in Buck 2004): Carleton, Essex, Halton, Huron, Kent, Norfolk, Lambton, Wellington, Wentworth, York. **UNITED STATES, Florida:** ♂ (USNM); **South Carolina:** ♂ (DEBU).

**Diagnosis.** Body black, marked with yellow. Male FI with linear tyloid extending over nearly entire length of flagellomere; FXI with large bare ventral area. Metapleuron parallel-sided



over most of its length, fairly abruptly narrowed towards lower pit. Wing infuscation similar to Fig. 7: Infuscated areas include apical and posterior areas of medial cell, submarginal cell I (paler or rarely clear anteriorly), submarginal cell II (except sometimes posteriorly), anterior half of submarginal cell III, discoidal cell I (posterior half paler, rarely clear), sometimes submedian cell weakly, and anterobasal corner of subdiscoidal cell. Terga 4 and 5 largely black, with narrow apical fascia; female tergum 6 black. Pygidial plate of female long, 1.6-1.8x as long as wide; lateral carinae gently curved, slightly divergent at base.

**Distribution.** Canada: Ontario (Buck 2004). United States east of 100<sup>th</sup> meridian, Mexico (Tamaulipas, Veracruz, Hidalgo, ?Yucatán) (Bohart 1997). Krombein (1979) also listed the species for Alaska, a record that appears highly unlikely and needs confirmation.

**Biology.** Preys on adults of at least ten genera of Membracidae (Krombein 1979; Buck 2004).

***Hoplisoides pygidialis* (Fox, 1896) (Fig. 7)**

**Material examined.** CANADA, Alberta: ♀, Writing-on-Stone Provincial Park, Sand Pit, 5 August 1982, D. B. McCorquodale (PMAE).

**Diagnosis.** Very similar to *H. costalis* except for largely yellow terga 4 and 5 and partially yellow female tergum 6. Wing as in Fig. 7.

**Distribution.** Canada: Alberta (Strickland 1947). United States west of 100<sup>th</sup> meridian (easternmost records from ND, NE), Mexico south to Chiapas and Yucatán (Bohart 1997, Pulawski 2006).

**Biology.** Unknown.

***Hoplisoides tricolor* (Cresson, 1868)**

**Material examined.** CANADA, British Columbia: 2♀, Osoyoos, Haynes Lease Ecol. Res., "Throne Area", 27 July 1988, C. S. Guppy (BCPM). UNITED STATES, Kansas: ♀ (CNCI). Utah: ♂ (CNCI).

**Diagnosis.** A very distinctive species with largely red and yellow body; black areas very restricted. Metapleuron gradually tapering from upper to lower pit. Wing pattern as follows: medial cell and submarginal cell I largely clear; infuscated areas include submarginal cell II and anterior two thirds of submarginal cell III, mostly posterior half of discoidal cell I, anterobasal third of discoidal cell II, apex of submedian cell, and most of subdiscoidal cell (paler posteriorly). Terga 3 to 5 largely yellow, with narrow black basal bands; female terga 5 and 6 red. Pygidial plate of female short, 0.9-1.2x as long as wide; lateral carinae gently curved, strongly divergent at base.

**Distribution.** Canada: British Columbia (first Canadian record). United States west of 100<sup>th</sup> meridian, Mexico (Sonora, Sinaloa, Nuevo León, Coahuila) (Bohart 1997).

**Biology.** Preys on adults and nymphs of *Parabolocratrus* (Cicadellidae) (Krombein 1979).

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