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Revision of the Nearctic
GLYPHICNEMIS Foerster
(Hymenoptera: Ichneumonidae, Gelinae)

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INTRODUCTION. GLYPHICNEMIS Foerster is a small Holarctic genus in the subtribe Endaseina of the Gelini. Nearctic species were placed in PHYGAEUON Gravenhorst until Townes (1944) placed them in the subgenus GLYPHICNEMIS within ENDASYS Foerster. However, earlier Cushman (1925) had transferred PHYGADEUON CRASSIPES Provancher, a junior synonym of G. MANDIBULARIS (Cresson), to GLYPHICNEMIS, and the Palearctic species, at first placed in PHYGADEUON, were included by Habermehl (1916) in GLYPHICNEMIS, reduced to a subgenus within STYLOCRYPTUS Thomson (1873). This status was continued until Townes (1970) listed and described GLYPHICNEMIS as a separate genus.

I recognize 4 valid Nearctic species. Two species, MANDIBULARIS (Cresson) and CALIFORNICUS (Cresson), are redescribed. The latter is resurrected from synonymy with MANDIBULARIS. Two new species are described: VULGARIS which is eastern and common, and NIGRIFEMORUM, western and uncommon.

MATERIALS and METHODS. This study was based on over 800 Nearctic specimens borrowed from the following collections: California Academy of Sciences, San Francisco, (CAS); Canadian National Collection, Ottawa, (CNC); Clement Dasch, Muskingum College; Museum of Comparative Zoology, Harvard (MCZ); Universite Laval, Quebec, (UL); University of Minnesota, St. Paul, (UM); Academy of Natural Sciences, Philadelphia (ANSN); United States Museum National Museum, Washington D.C., (USNM). In addition, 19 Palearctic specimens were from the Zoological Institute, Academy of Sciences, Leningrad.

The terminology used in this revision is that of Townes (1969), except "area dentipara" is used instead of "second lateral area", "trochantelli" instead of "second trochanters"; and "tergum(-a)" instead of "tergite(s)." The length of the hind femur includes the trochantellus. Pinned specimens were examined under a dissecting microscope, usually at 45x, with illumination from a 75 watt, incandescent bulb. Drawings were done using a dissecting microscope with a camera lucida attachment.

BIOLOGY and HOSTS. Townes (1965) recorded G. PROFLIGATOR (Fabricius) from DENDROLIMUS ALBOLINEATUS Mats. (Lasiocampidae) in Japan. However, this record is doubtful since no other DENDROLIMUS have GLYPHICNEMIS recorded from them (Thomson, 1957). In the European part of the U.S.S.R., G. PROFLIGATOR has been reared from European pine sawfly, NEODIPRION SERIFAPER (Geoffrey) (Kolomiets et al., 1979). However, it is not one of the more common parasites of this sawfly, being 0.4% of all reared parasites according to Ryvkin (1963). In the Nearctic, GLYPHICNEMIS is conspicuously absent from lists of parasites reared from sawflies. This leads me to believe that the usual hosts are not sawflies, but another insect that pupates beneath the soil. The morphology of the genus provides a clue to another possible host. GLYPHICNEMIS has strongly developed tibial spines which presumably aid in emerging from subterranean cocoons. In the female they are very strongly developed, and may be used for digging to parasitize such cocoons. The same body form with strong tibial spines occurs in RICHTICHNEUMON RESIDUUS (Say) (Ichneumoninae) which has been reared from geometrid larvae (Heinrich, 1977), and emerges from
subterranean pupae.

ZOOGEOGRAPHY. The 4 Nearctic species are closely related to those in the Palearctic. They can be placed into 3 groups along with the 5 Palearctic species studied: CLYPEALIS (Thomson) with VULGARIS n. sp.; ATRATUS (Strobl) with CALIFORNICUS (Cresson) and NIGRIFEMORUM n. sp.; and VAGABUNDUS (Gravenhorst) with PROPLIGATOR (Fabricius), SATOI (Uchida), and MANDIBULARIS (Cresson).

From the widespread distribution of these species throughout the Holarctic Region it would appear that the species groups evolved before Berinia was emergent in the early Tertiary (Matthews, 1980). Exchange of species between Asia and North America via Beringia would have occurred throughout the Tertiary until the Pliocene. The present day Nearctic species could be seen as descendents of Palearctic ancestors. Further speculation on the biogeography and evolution of GLYPHICNEMIS requires host information and distribution of the Palearctic species.

GLYPHICNEMIS Förster


DIAGNOSIS. GLYPHICNEMIS is structurally very similar to ENDASYS and AMPHIBULUS Kriechbaumer. All three share the transverse break in front of the prescutellar groove on the hind edge of the mesoscutum, usually with a strong, central longitudinal ridge dividing the groove in two (ridge often reduced or absent in AMPHIBULUS). All have strong tibial spines on the outer face and apex of the tibiae. GLYPHICNEMIS resembles AMPHIBULUS by the wide clypeus with apical margin sharp and upturned, the more numerous tyloids of the males, the siender petiole, strong sternaulus, elongate-hexagonal areola, area dentipara more nearly rectangular, and the lack of distinct apophyses present in most ENDASYS. Diagnostic features of GLYPHICNEMIS are the distinctly subapical insertion of the hind tibial spurs (Fig. 2) and tarsi, as well as the mandible with the distinctly shorter upper tooth. In both AMPHIBULUS and ENDASYS the lower tooth is always shorter, and the hind tarsi and tibial spurs are apical. Townes (1970) gives a complete description and figure of GLYPHICNEMIS. Diagnosis of species relies mainly on color and punctation patterns in addition to variations of several generic characters.

**Key to the Nearctic GLYPHICNEMIS**

1. Males......................... 2.
1! Females........................ 6.

2. Trochanters white or pale yellow; clypeus black; flagellum with 7 to 8 tyloids (Fig. 3), small species, 5 to 6 mm long; VULGARIS, n. sp.
2! Trochanters orange or black; if whitish, clypeus orange; 4 or fewer tyloids (Fig. 3, 5, 8), larger species, over 6 mm long;........ 3.

3. Hind coxa orange; flagellum orange or black!............. 4.
3! Hind coxa black to orange-black; flagellum black............... 5.

4. Hind femur orange with black apex (Fig 2) frons and face very densely, coarsely punctate-rugulose; usually 4 distinct tyloids, flagellum orange;.............. . MANDIBULARIS (Cresson).
4! Hind femur entirely orange (Fig 7) frons and face densely, finely punctate; face finely granular; 3 distinct tyloids; flagellum black;............. light forms CALIFORNICUS (Cresson).

5. Trochantelli orange (Fig. 6, 7); front and middle femora yellow; 5th abdominal sternum not membranous medially;........... dark forms CALIFORNICUS (Cresson).
5! Trochantelli black (Fig. 4); front and middle femora blackish at least basally; 5th abdominal sternum membranous medially;........ NIGRIFEMOMIM, n. sp.
6. Flagellar segments 6-10 viewed from above distinctly white; remaining segments black; abdominal tergum 2 and 3 with some black, apex black: .......................... Vulgaris, n. sp.

6! Nasal half of flagellum viewed from above pale-orange, apical half black; sometimes segments 5-10 or 11 whitish; abdominal tergum 2 and 3 orange, apex orange or black: .......................... CALIFORNICUS (Cresson).

7. Frons and propleurum rugulose and coarsely punctate; hind femur and tibia orange with black apices; scape, tegula, coxae, and trochanters always orange (or coxae and trochanters sometimes with whitish): .................. MANDIBULARIS (Cresson).

7! Frons and propleurum smoother, densely to sparsely, finely punctate; color pattern not as above: .......................... SEMIODES SEMINIGER: Harington, 1894.

8. Apex of abdomen orange; coxae and trochanters often entirely orange: .......................... CALIFORNICUS (Cresson).

8! Apex of abdomen black; coxae and trochanters black, never entirely orange: .......................... NIGRIFEMORUM, n. sp.

GLYPHICNEMIS CALIFORNICUS (Cresson) renewed status and new combination (Fig. 5-7)


PHYGADEUON SEMINIGER: Harrington, 1897, Can. Ent. 29: 43.


MALE DIAGNOSIS. Medium size, 6 to 7 mm long; type and light forms with orange scape, clypeus, tegula, abdomen except apex and most of petiole, and legs (Fig. 7) except occasional blackening of apex of hind tibia and tarsi; usually 3 tyloids (sometimes faint 4th) on flagellar segments 10-12 (or 13) (Fig. 5), tyloids linear and sharp, shiny on top; 5th abdominal sternum not membranous medially like NIGRIFEMORUM. Dark forms with black scape, clypeus, tegula, coxae and first trochanters, hind femur at least apically, base and apex of hind tibia (Fig. 6), often petiole except apex, and abdomen apex.

MALE DESCRIPTION. Black: Type and light forms with flagellum, head capsule except clypeus and mandible, thorax except tegula, often most of petiole except apex, abdomen apex, and sometimes apex of hind tibia, and usually most of hind tarsus. Dark forms with black head, thorax except often tegula, coxae, first trochanters (not trochantelli), usually hind femur apically (sometimes mostly blackish), hind tibia basally and apically, tip of abdomen, and usually petiole except apically. Intermediate forms occur.

Orange: Type and light forms with scape, clypeus, mandible, tegula, legs except sometimes apex of hind tibia and most of hind tarsi, and abdomen except sometimes most of petiole. Dark forms usually without orange on head, thorax, coxae and first trochanters, and always with black apices on hind femur and tibia.

Punctuation: Frons with dense, finely distinct pits, often slight horizontal rugulosity; variably sparse, obscure pits on temple, propleurum, and most of mesopleurum, its central area more distinctly pitted and somewhat rugulose.

Shape: Areola broadly hexagonal, often elongated apically; area dentipara narrowly trapezoidal, slightly higher than wide, with distinct, moderate carinae, gradually higher apically; tyloids nearly linear, sharp, and shiny on top (NIGRIFEMORUM with tyloids elongate-elliptical, flattened and mat); propodeal spiracle elongate elliptical; hind femur only moderately swollen, depth over length .22-.23.

FEMALE DIAGNOSIS. Medium size, 6 mm long; easily separated from Vulgaris by lacking white flagellar segments, entire basal half of flagellum brownish, and clypeus orange at least apically; differs from MANDIBULARIS by the hind femur with orange or
blackish-orange but not at apex, and punctation of frons and propleurum dense to sparse with finely distinct pits, not with a coarse, rugulose surface. Palearctic ATRATUS (Strobl) very similar to dark forms, but CALIFORNICUS always with orange on all or part of clypeus, punctation slightly finer on temple, frons, and propleurum, and hind femur sometimes blackish. Differs from NIGRIFEMORUM mainly by orange clypeus, tegula, legs, and abdomen, also radial cell longer and straighter apically.

**FEMALE DESCRIPTION.** Black: Light forms with apical half of flagellum, head capsule except scape, clypeus, and mandibles; thorax except tegula; petiole often basally. "ark forms with black basal half of clypeus, coxae, hind femur, and base and apex of hind tibia. Intermediate forms occur.

Orange: Light forms with basal half of flagellum, scape, clypeus, mandible, tegula, abdomen, and legs. "ark forms with orange scape, clypeus apically, front and middle legs beyond coxae, and hind tibia except base and apex.

Punctatian: Frons and propleurum variably dense with finely distinct pits, often slightly rugulose; temple with variably sparse, more or less distinct pits.

Shape: Areola broadly hexagonal; area dentipara narrow with fine carinae.

**REMARKS.** This species has been confused with MANDIBULARIS because the apices of the hind femur and tibia are often black (Fig. 2,6). However, MANDIBULARIS is eastern, has distinctly coarse and rugulose punctation on the head, male usually has an orange flagellum with 4 distinct tyloids, female often has flagellar segments 5-10 or 11 pale yellow-white, and coxae of both sexes are often pale yellowish. G. CALIFORNICUS is western, has finer punctation on the head, male has black flagellum with 3 distinct tyloids (often a faint 4th), female with flagellum pale orange on basal half, and both sexes never have coxae pale yellowish. The dark forms of CALIFORNICUS are diagnosed by black coxae; the light forms by orange coxae.

**RANGE.** California, Oregon, Washington, British Columbia, and Alaska, eastward to Alberta, Saskatchewan, Idaho, Montana, South Dakota, and Colorado. Dark forms are generally collected from British Columbia to Alaska, as well as in Colorado and the northern plains; light forms, from Washington southward to California. Collections dates are June through late August.

**HOLOTYPE.** Male (ANSP). Identified by labels as follows: (imprinted) "Cala.", (red) "TYPE No. 1217.1", (white with pink border, written) "Phygadeuon californicus". Specimen complete except for lost flagellar segments 25-apex of both antennae. Male is a light form with orange legs except for apex of hind tibia which is blackish.

**PARATYPES.** The 2 males (ANSP) so labelled are not congeneric. Each is a species of ENDASYS. These specimens are labelled "Cal.", "PARATYPE No. 1217-2", and "PARATYPE No. 1217-3".

**MATERIAL STUDIED.** (Canada & U.S.A., 177 specimens) ALASKA-- (8 males) Anchorage: June 15, 1921, J.M. Aldrich (USNM); (7 males) Fairbanks: January 20, 1921, J.M. Aldrich (USNM); (7 males) Delta Junction: July 6 & 7, 1977, B. & C. Dasch.


BRITISH COLUMBIA-- (7 males) Burnaby: July, 1979, July 14, 16, 24, 1978, D. Gillespie (CNC); (2 males) Burns: July 22, 1977, B. & C. Dasch; (1 male) Cultus Lake, July 1, 1948, H.R. Foxlee (CNC); (1 male) Lake Errock near Deroche: June 2, 1953, Edith Mason (CNC).

GLYPHICNEMIS MANDIBULARIS (Cresson) (Fig. 1-2)


MALE DIAGNOSIS. Large size, 7 to 8 mm long; orange scape, clypeus, mandible, hind legs except tarsi and apices of femur and tibia (Fig. 2), designated by Barron, 1975, Nat. Canad. 102(4): 548-549.


abdomen except apex; yellow to whitish on front and middle coxae; tegula yellow; extremely coarse punctuation on head; frons rugulose; usually 4 distinct tyloids on flagellar segments 10 to 13 (Fig. 1). Resembles only Palearctic VAGABUNDUS (Grav.) which has all black head, coxae, trochanters, and bases of femora.

MALE DESCRIPTION. Black: Head capsule except clypeus and mouth; thorax except tegula; apex of abdomen; apices of hind femur and tibia, hind tarsi.

Orange: Antennae, clypeus, abdomen except apex, hind femur and tibia except apices.

Yellow: Tegula, front and middle coxae and trochanters (sometimes whitish), hind trochanters, front and middle femora and tibiae.

Punctation: Rugulose frons and face; variably dense to sparse with distinct pits on temple, propleurum, and mesopleurum (latter rugulose and sparsely punctate on central area).

Other: Areola broadly hexagonal; propodeal carinae very strong; 4 (sometimes 3) tyloids on flagellar segments 10 to 13 (or 12).

FEMALE DESCRIPTION. Black: Apical half of antennae, head capsule except clypeus and mouth, and often medially swollen area of face; thorax except tegula; apices of hind femur and tibia (often lightly infuscate).

Orange: Scape, clypeus, mandible, often medial swollen area of face, tegula, usually hind corner of pronotum, abdomen, legs except hind tarsi (often infuscate) and apices of hind femur and tibia.

Punctation: Frons, propleurum, and mesopleurum coarse and rugulose; temple distinctly punctate, pits variably dense to sparse;

Shape: areola hexagonal, slightly flattened; area dentipara narrowly rectangular with reduced but distinct carinae.

RANGE. Eastern North America and southeastern Canada, westward to Minnesota and Kansas. Collections May through August.

HOLOTYPE. Female (ANSP). Identified by labels as follows: (imprinted) "Ill.", (red) "TYPE No. 1224-", (pink-bordered, written) "Phygadeuon mandibularis Cresson" with "Ill" written on the left margin. Complete except for missing 5th tarsal segment of left hind-leg, and right front-leg beyond coxa. There were probably no other specimens in the type series since the type number is not "1224.1". Cresson numbered all his paratypes from the number of the type (Azuma, pers. comm.). The number to the right of the decimal tells the number of the specimen: the type is "1", the paratypes ".2", ".3" etc. (see CALIFORNICUS paratypes).

MATERIAL STUDIED. (Canada and U.S.A., 475 specimens) CANADA (no locale) -- (5 males, 1 female): C.F. Baker (USNM).


GLYPHICNEMIS NIGRIFEMORUM, new species (Fig. 3-4)

MALE DIAGNOSIS. Medium small, 5.5 to 7 mm long; mostly black except tibiae and abdominal terga 2 to 4 or 5; 5th abdominal sternum membranous medially with 2 sternites; tyloids elongate-elliptical (Fig. 3), flattened on top and mat; apical transverse carina of propodeum distinctly higher than adjacent carinae; areola nearly trapezoidal—very elongate hexagonal. Similar to CALIFORNICUS, but latter with yellow front and middle femora and tibiae, tyloids linear and sharp, and 5th abdominal sternum complete with one sternite.

MALE DESCRIPTION. Black: Head, thorax, petiole except apex, variably on 2d abdominal tergum, apically on terga 4 to 6, abdomen tip, coxae, trochanters, at least basally on femora, often most of hind femur (Fig. 4), at least basally and apically on hind tibia.

Orange: Sometimes medially on hind tibia, most of front and middle femora except basally, front and middle tibiae, apex of petiole, variably on 2d abdominal tergum, and terga 4 to 6 except apices.

Punctuation: Dense to sparse (near vertex) with fine, more or less distinct pits on frons; sparse with more or less distinct pits on temple, propodeum, and mesopleuron except central area rugulose with denser punctuation: 2d abdominal tergum slightly mat.

Shape: Areola elongate hexagonal to nearly trapezoidal; area dentipara squarish to slightly elongate; 2d abdominal tergum nearly regularly trapezoidal; propodeal spiracle roundly elliptical; radial cell shortened; tyloids elongate-elliptical, flattened and mat on top.

Other: Apical transverse carinae of propodeum distinctly and evenly developed, much stronger than adjacent carinae; 5th abdominal sternum divided by membrane medially; ocelli small, distant from each other by more than the diameter of one; hind femur more swollen (than in CALIFORNICUS), depth over length .26 to .27 (length includes trochantellus).

FEMALE DIAGNOSIS. Small size, 5 mm long; black clypeus, petiole except apex, variably on 2d abdominal tergum, apically on terga 4-6 and all of apex, coxae, trochanters, and hind leg; blackish-yellow on front and middle femora; areola hexagonal, nearly square; radial cell short, radial sector beyond
areolet curved distinctly forward to join metacarpus.

FEMALE DESCRIPTION. Black: Head capsule except mandible, thorax (tegula variable), petiole except apex, apically on abdominal terga 4-6 and all of tip, coxae, trochanters, and hind leg.

Orange: Scape, flagellum (orangeish), mandible, apically on petiole, and abdominal terga 2-6 except apices.

Blackish-yellow: Variably on front and middle femora.

Punctuation: Face variably dense to sparse with variably distinct pits, its surface shiny; frons irregularly, moderately sparse with vertex very sparse, pits shallow and sometimes obscure; temple sparse with very fine, shallow pits; propleuron and mesopleuron moderately dense to sparse with fine, distinct pits, their surface slightly rugulose.

Shape: Areola hexagonal--nearly square; area dentipara narrowly trapezoidal with fine but distinct carinae; propodeal spiracle broadly elliptical (egg shaped); radial cell with vein beyond areolet distinctly curved forward to metacarpus.

RANGE. Oregon, Montana, Wyoming, and Colorado; collections June through early August.

HOLOTYPE. (Male) Oregon, Mary's Peak 4000 ft: August 7, 1965, C. Dasch (deposited in the C. Dasch collection, Muskingum College, Ohio).


GLYPHICNEMIS VULGARIS, new species (Fig. 8-9)

MALE DIAGNOSIS. Small, 5 to 6 mm long; white on front and middle coxae and all trochanters; black clypeus, most of hind coxa and hind femur (Fig. 9): abdomen mostly black on terga 4 to 7, and black with orange apically on terga 1 to 4; 7 (or 8) tyloids on flagellar segments 8 (or 9)-15 (Fig. 8). Resembles no other Nearctic species. Palearctic CLYPEALIS (Thomson) very similar but with yellow clypeus, orange hind coxa and femur, and only 5 distinct tyloids.

MALE DESCRIPTION. Black: Head capsule; thorax except tegula; petiole except apex; abdominal terga 1 to 4 except apical margins, and terga 5 to tip; front and middle coxae basally (blackish), most of hind coxa and hind femur, and basal and apical ends of hind tibia.

White: At least tips of front and middle coxae, and all trochanters.

Orange: Scape, tegula, often front and middle coxae (more infuscate-orange) basally, usually tip of hind coxa and base of hind femur, hind tibia except base and apex, apical margins of abdominal terga 1 to 4, and sometimes most of terga 3 and 4.

Punctuation: Dense, fine, distinct pits on frons; moderately rare, fine, distinct pits on temple; sparse, indistinct pits on propleuron and mesopleuron; 2d abdominal tergum slightly mat.

Shape: Petiole nearly parallel sided (slender); 2d tergum narrowed.

FEMALE DIAGNOSIS. Small, 5 to 6 mm long; pale front and middle coxae with mostly infuscate hind coxa and hind femur; orange clypeus, sometimes only apically; abdomen with at least some black on terga 4 to 7; distinct, white annulus on flagellar segments 6 to 9 or 10, antenna black-white-black when viewed dorsally.

FEMALE DESCRIPTION. Black: Head capsule except all or most of clypeus; thorax except sometimes tegula infuscate-orange; petiole except apex; at least some infuscation on abdominal terga 4 to 7, often laterally on terga 2 and 3; front and middle coxae often infuscate-orange,
also hind femur, and tip of hind tibia.

Yellow: Often front and middle coxae and all trochanters.

Orange: Scape, clypeus except sometimes only apically; coxae and hind femur sometimes more orangish; hind tibia except apex; apex of petiole, and most of terga 2 and 3.

Punctation: Frons with variably sparse, finely distinct pits; propleuron and mesopleuron with sparse, indistinct pits; temple with sparse, finely distinct pits.

Shape: Areola broadly hexagonal; postpetiole narrow, width only somewhat greater than length; carinae of propodeum reduced but distinct.

RANGE. Eastern North America from New York to West Virginia, westward to eastern British Columbia, Minnesota, and Colorado. Collections early June through late July.

HOLOTYPE. (Female) West Virginia, Bowden: June 7, 1980, C. Dasch (deposited in Dasch collection, Muskingum College, Ohio).


Fig. 1-9 GLYPHICNEMIS spp. Fig. 1-2, G. MANDIBULARIS (Cresson): 1, male tyloids, flagellar segments 10-13; 2, male hind trochanters, femur, and tibia. Fig. 3-4, G. NIGRIFEMORUM, n. sp.: 3, male tyloids, flagellar segments 10-12; 4, male hind trochanters, femur, and tibia. Fig. 5-7, G. CALIFORNICUS (Cresson): 5, male tyloids, flagellar segments 10-13; 6, male hind trochanters, femur, and tibia, (dark form); 7, male hind trochanters, femur, and tibia, (light form). Fig. 8-9, G. VULGARIS, n. sp.: 8, male tyloids, flagellar segments 8-15; 9, male hind trochanters, femur, and tibia.