

**A STUDY OF THE GENUS *FALCOSYNTRETUS* TOBIAS FROM THE NEW
WORLD WITH FIVE NEW SPECIES AND A KEY TO KNOWN SPECIES
(HYMENOPTERA: BRACONIDAE: EUPHORINAE)**

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Abstract.—Five new species of *Falcosyntretus* Tobias from North and Central America are described and illustrated: *F. complanatus*, *F. falcoi*, *F. fallax*, *F. muesebecki*, and *F. transversus*. A key for the six known New World species of *Falcosyntretus* is provided.

Key Words: *Falcosyntretus*, Euphorinae, parasitoids

The genus *Falcosyntretus* Tobias was erected based on one Asian species, *F. falcifer* (Tobias 1965). Although a species now assigned to this genus, *F. venustus*, was described by Muesebeck (1936), the presence of this genus in the New World was not recognized until that species was reclassified by Shaw (1985). Shaw (1985) also established the monophyly of *Falcosyntretus* on the basis of three synapomorphies: the propodeum being mostly smooth and polished, the petiolate first metasomal tergum being smooth and polished, and the curved ovipositor which is as long or longer than the first metasomal tergum. Shaw (1985) defined the tribe Syntretini to include *Falcosyntretus* and five other genera sharing several synapomorphies including cleft tarsal claws, forewing vein M+CU absent, and the petiolate first metasomal segment being fused ventrally. Tobias (1986) indicated that the European species *Syntretus xanthocephalus* Marshall should be transferred to *Falcosyntretus*. Most recently, Papp (1992) described *F. elabsus* from Korea.

As far as known, all members of the tribe

Syntretini have distinctive cleft tarsal claws (Figs. 13–16) and are koinobiont endoparasitoids of adult Hymenoptera, including bees and ichneumonids (Shenefelt 1969, Shaw 1988). This peculiar life style may partly account for their rarity in collections, because few attempts are made to rear parasitoids from hosts such as adult bumble bees or adult ichneumonids. Specimens can be identified as *Falcosyntretus* using the key provided by Shaw (1997). A generic diagnosis was provided by Shaw (1985). Morphological terminology follows that of Sharkey and Wharton (1997). Types are deposited at the University of Wyoming, Laramie (UWL); the Hungarian Natural History Museum, Budapest (HNHM); the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM); the Canadian National Collection, Ottawa (CNC); and the Zoological Museum, Lund (ZML).

The root of the generic name, *falco*, means “hawk” in Latin and refers to the falcate (curved) ovipositor of the type species. However, this character can be misleading for generic recognition because it is

clear from examination of females of several species that the ovipositor is very flexible, and its appearance varies depending on its position at death. It may appear curved or straight, or somewhat shorter or longer depending on its position or degree of exertion at death. A more useful character for generic recognition is the mostly smooth propodeum that lacks a carinate areola (Figs. 9–12).

KEY TO FEMALES OF THE NEW WORLD
SPECIES OF *FALCOSYNTRETUS*

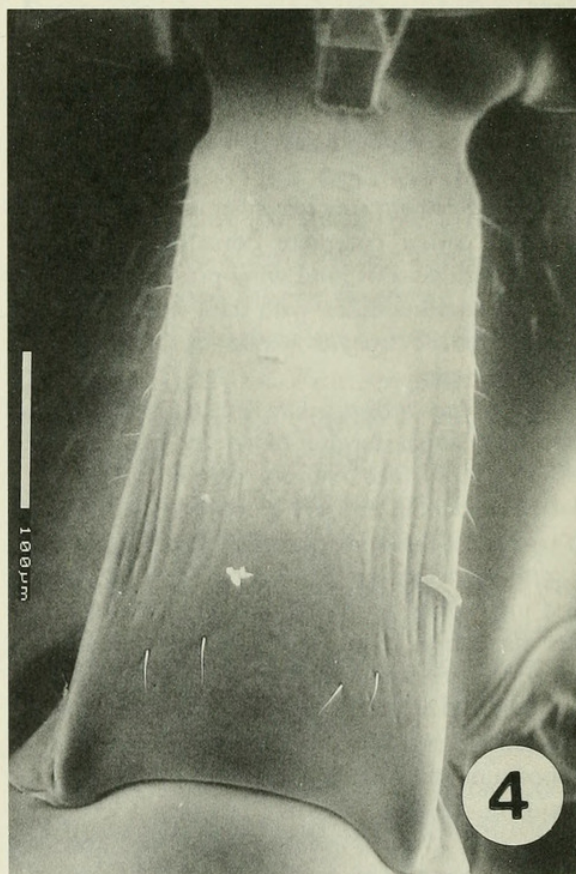
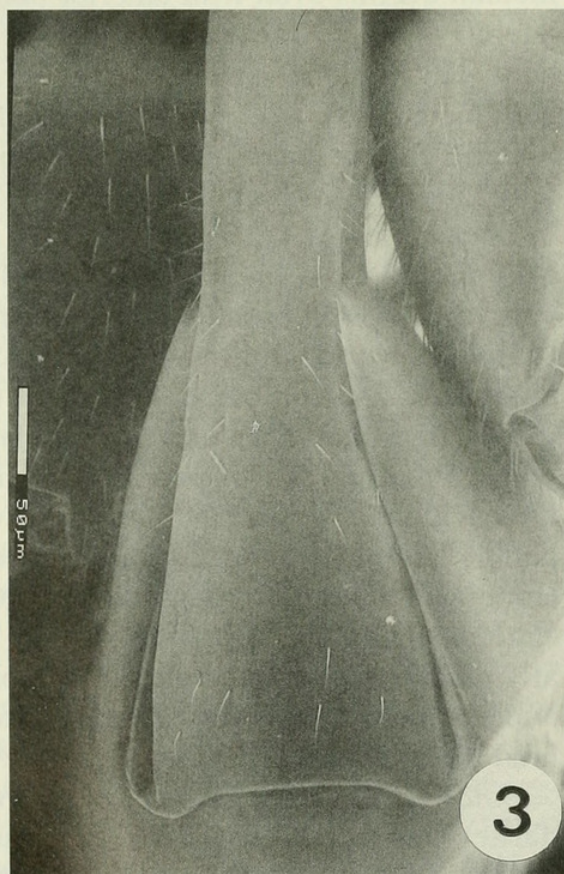
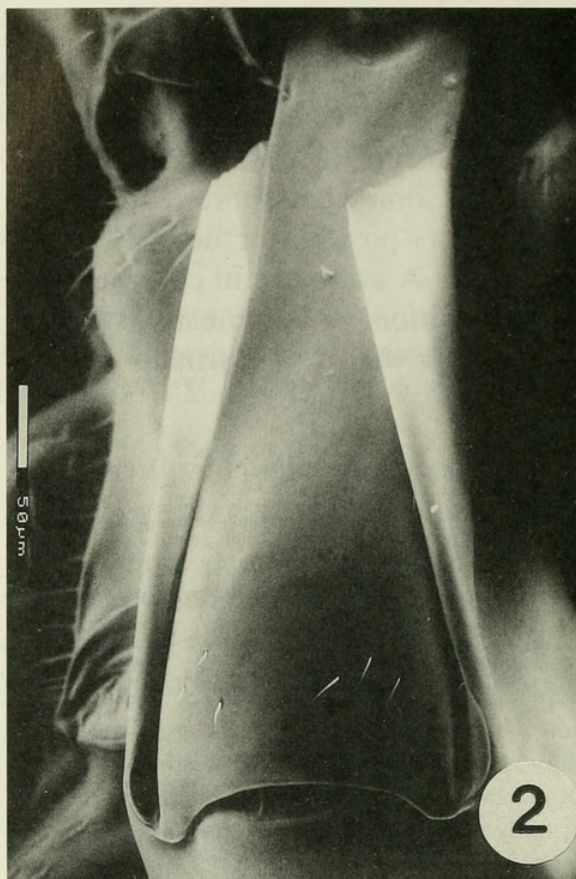
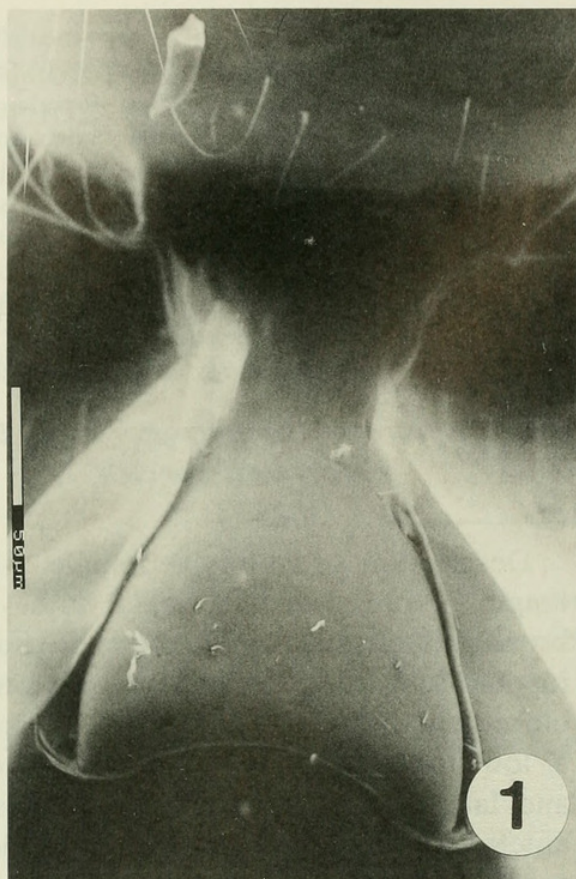
1. First metasomal tergite distinctly narrowest medially, giving the appearance of a constriction near the spiracles (Fig. 1); body size usually smaller than 3mm; antenna short, with 17–23 antennomeres 2
- First metasomal tergite about as broad medially as basally, or just barely narrower, but not appearing constricted at middle (Figs. 2–4); body size usually larger than 3mm, antenna longer, with more than 23 antennomeres 3
- 2(1) Occipital carina effaced dorsally (Fig. 5); vein cu-a of hind wing absent; vertex of head with a broad dark brown to black band that meets compound eye margins completely *Falcosyntretus transversus*, new species
- Occipital carina complete dorsally (as in Fig. 6); vein cu-a of hind wing present; vertex of head sometimes with dark markings around ocelli, but never meeting margins of compound eyes *Falcosyntretus muesebecki*, new species
- 3(1). First metasomal tergite distinctly broader posteriorly, surface entirely smooth (Figs. 2–4); propodeum entirely smooth (Figs. 9–10) or with scattered, extremely faint rugae or pitting postero-medially (Fig. 11) 4
- First metasomal tergite about evenly broad over its entire length, not greatly broader posteriorly than anteriorly or medially, surface smooth but with two small longitudinally striate areas latero-medially (Fig. 4); propodeum with median line distinctly rugose (Fig. 12) *Falcosyntretus falcoi*, new species
- 4(3). Posterior margin of median ocellus about even with anterior margins of lateral ocelli (Fig. 7); propodeum entirely smooth 5
- Posterior margin of median ocellus distinctly anterior to anterior margins of lateral ocelli (Figs. 6, 8); propodeum variable, sometimes smooth but often with faint ir-

- regular rugae or pitting postero-medially (Fig. 11) . . . *Falcosyntretus fallax*, new species
- 5(4). Mesoscutum entirely black; propodeum with a complete semi-circular carina bordering the junction with the metasoma (Fig. 9) . . . *Falcosyntretus complanatus*, new species
- Mesoscutum yellowish orange, with some black markings; propodeum with a distinct break medially in the carina bordering the junction with the metasoma (Fig. 10) *Falcosyntretus venustus* (Muesebeck)

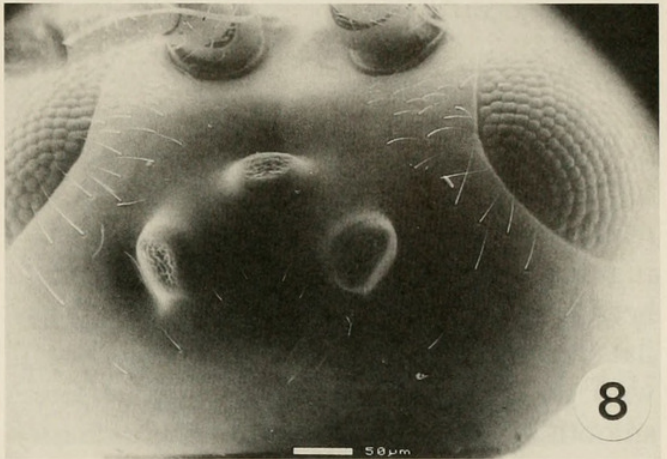
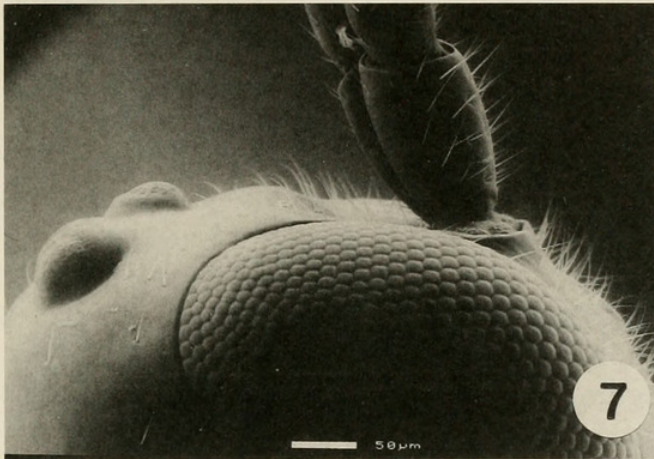
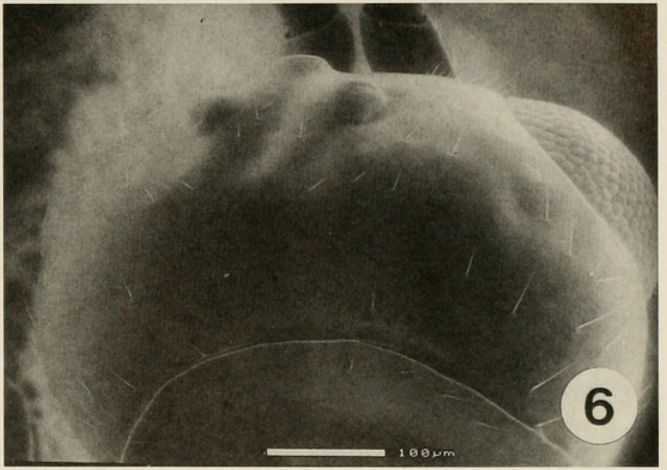
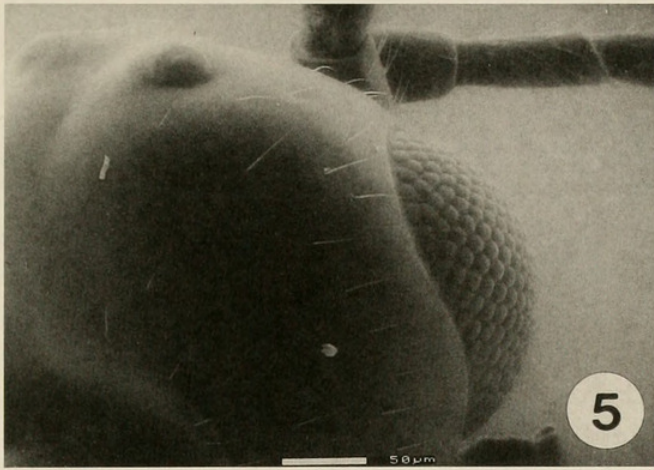
Falcosyntretus complanatus Papp and
Shaw, new species
(Figs. 2, 9)

Description of holotype female.—Body length 4 mm. Head in dorsal view 1.6× broader than long, eye somewhat protruding and longer than temple, temple rounded close behind eye. Ocelli large and forming a low triangle, distance between median and lateral ocelli shorter than greatest diameter of an ocellus, posterior border of median ocellus even with anterior border of lateral ocelli. Antenna just shorter than body and with 30 antennomeres, first flagellomere 1.4× as long as second flagellomere, further flagellomeres proximo-distally 2.0–2.2× as long as broad. Mesosoma in lateral view 1.4× as long as high. Pterostigma 3.5× as long as wide. Hind wing vein cu-a present basally. Hind femur 5.3× as long as broad. Hind basitarsus as long as tarsomeres 2–3 combined. Metasoma somewhat longer than head and mesosoma combined. Proximal 0.5 of petiole flattened, its hind width 1.4× greater than basal width, petiole itself as long as tarsomeres 1–2 combined. Tergites long, second tergite slightly wider posteriorly than long medially, third tergite quadrate or as long as wide behind. Ovipositor sheath as long as hind tarsomeres 1–2 combined.

Color: Body color mostly golden yellow, darker dorsally. Antenna, longitudinal streak of vertex brownish black. Mesosoma dorsally (mesonotum, scutellum, metanotum and propodeum) and petiole black. Tergites dark brown to black. Legs mostly yellow, coxae and trochanters whitish, hind femur apically and tarsomeres dark brown.



Figs. 1–4. First metasomal tergites of *Falcosyntretus* species, dorsal view. 1, *F. muesebecki*, 300 \times . 2, *F. complanatus*, 210 \times . 3, *F. venustus*, 220 \times . 4, *F. falcoi*, 200 \times .



Figs. 5–8. Heads of *Falcosyntretus* species. 5, *F. transversus*, dorso-lateral view, 285 \times , note effaced occipital carina. 6, *F. fallax*, dorsal view, 200 \times . 7, *F. complanatus*, lateral view, 220 \times . 8, *F. muesebecki*, dorsal view, 200 \times .

Wings subhyaline, pterostigma and venation dark brown.

Variation, paratype females.—Body 4.0–4.2 mm long. Head in dorsal view 1.48–1.54 broader than long. Antenna with 25–31 antennomeres. First flagellomere 1.3–1.4 \times as long as second flagellomere. Pterostigma 3.4–3.8 \times as long as wide. Hind femur 4.1–5.0 \times as long as broad. Hind femur apically and tarsomeres dark brown to black.

Material examined.—Holotype ♀: COSTA RICA: Puntarenas, San Vito, Estac. Biol. Las Alturas, 1,500 m, ex. Malaise, January 1992 (P. Hanson) (UWL). Paratypes: same data as holotype, 1 ♀ (UWL); same data except December 1991, 1 ♀ (UWL); same data except June 1992, 2 ♀ (UWL); same data except March 1992, 1 ♀ (UWL); same data except May 1992, 1 ♀ (UWL); San José, Cerro de la Muerte, 26 km. N. San Isidro, ex. Malaise, 2,100 m,

February–May 1991 (P. Hanson), 1 ♀ (HNHM).

Comments.—The form of the petiolate first metasomal tergum is distinctive in this species; it is broad and flat through its basal half, and is barely or not at all constricted at the middle (Fig. 2). *Falcosyntretus complanatus* is most similar to *F. venustus* (Muesebeck) but can be distinguished by the presence of a complete semi-circular carina bordering the junction of the metasoma to the propodeum (Fig. 9) and by the mesoscutum being entirely black.

Etymology.—The species name *complanatus* (= flattened) refers to the dorsally flattened petiole.

***Falcosyntretus falcoi* Papp and Shaw,
new species
(Figs. 4, 12–13)**

Description of holotype female.—Body length 4 mm. Head in dorsal view 1.6 \times

broader than long, eye somewhat protruding and longer than temple, temple rounded close behind eye. Ocelli large and forming a low triangle, distance between median and lateral ocelli shorter than greatest diameter of an ocellus, posterior border of median ocellus even with anterior border of lateral ocelli. Antenna just shorter than body and with 30 antennomeres, first flagellomere $1.4\times$ as long as second flagellomere, further flagellomeres proximo-distally $2.0\text{--}2.2\times$ as long as broad. Mesosoma in lateral view $1.4\times$ as long as high. Pterostigma $3.5\times$ as long as wide. Hind wing vein cu-a present basally. Hind femur $5.3\times$ as long as broad. Hind basitarsus as long as tarsomeres 2–3 combined. Propodeum mostly smooth except median line distinctly rugulose. Metasoma somewhat longer than head and mesosoma combined. broad and flat through its entire length, parallel-sided with no median constriction, and entirely smooth except for two small longitudinally striate areas latero-medially. Hind width of petiole barely broader than anterior width. Entire petiole as long as tarsomeres 1–2 combined. Tergites long, second tergite slightly wider posteriorly than long medially, third tergite quadrate or as long as wide behind. Ovipositor sheath as long as hind tarsomeres 1–2 combined.

Color: Body color mostly golden yellow, darker dorsally. Antenna, longitudinal streak of vertex brownish black. Mesosoma dorsally (mesonotum, scutellum, metanotum and propodeum) and petiole black. Tergites dark brown to black. Legs mostly yellow, coxae and trochanters whitish, hind femur apically and tarsomeres dark brown to black. Wings subhyaline, pterostigma and venation dark brown.

Variation, paratype female.—Essentially as in holotype female.

Material examined.—Holotype ♀: MEXICO: Chiapas, San Cristobal de las Casas, 7,000 ft., 7 June 1969, Malaise trap, (CNC). Paratypes: UNITED STATES: 1 ♀, North Carolina, Swain Co., Smokemont, 16 July 1977, Malaise trap, North Carolina Depart-

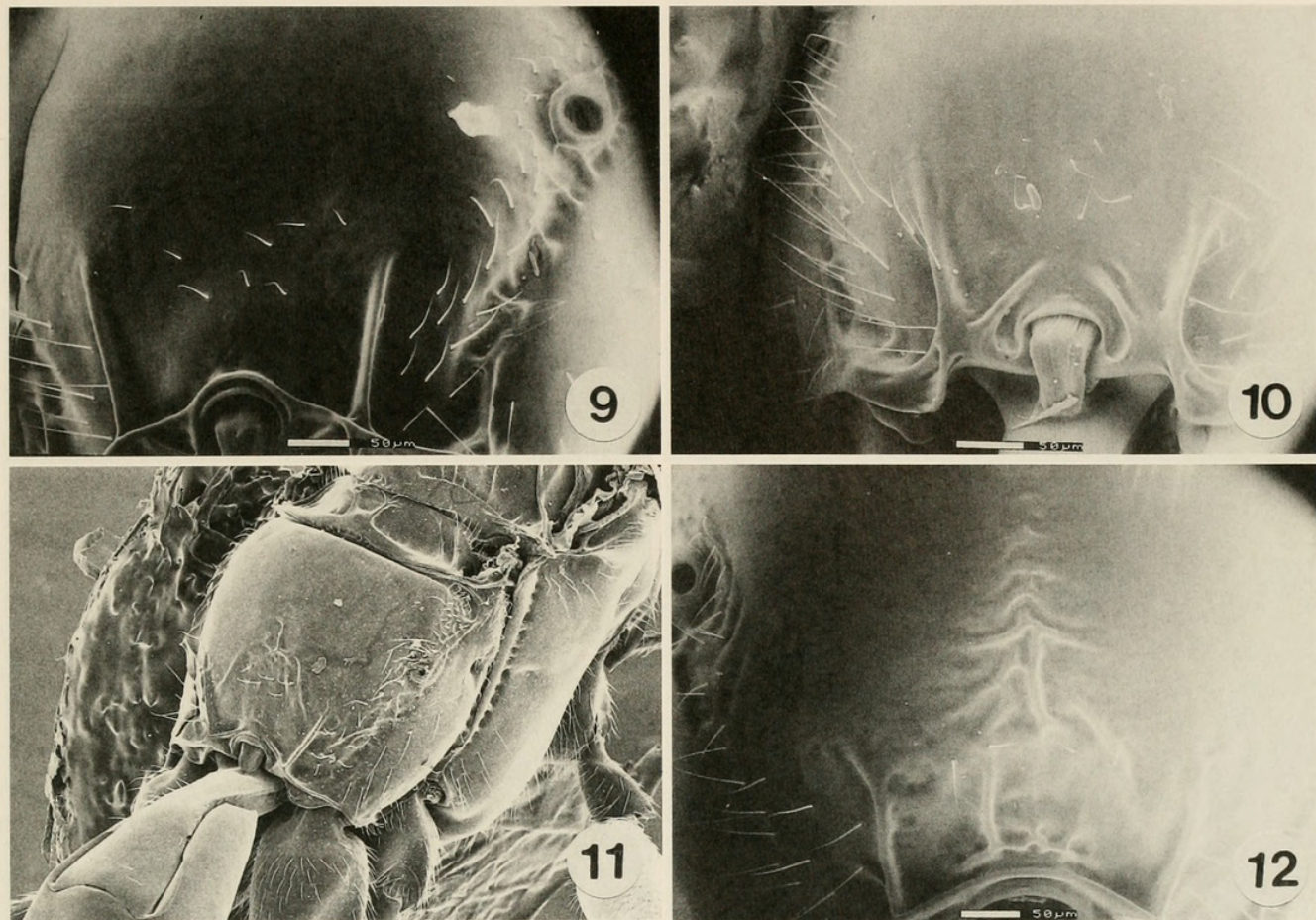
ment of Agriculture (USNM). HONDURAS: 1 ♀, Olancho, Parque Nacional La Muralla, 15 km N La Union, 15.07N, 86.45W, April 1995, R. Cave, Malaise trap in high elevation rain forest, (ZML).

Comments.—The form of the petiolate first metasomal tergum is very distinctive in this species: it is broad and flat through its entire length, parallel-sided with no median constriction, and entirely smooth except for two small longitudinally striate areas latero-medially (Fig. 4). It is most similar to *F. complanatus* but can be distinguished by the mentioned petiolar characters, and also differs by having a distinctly rugulose median area on the propodeum (Fig. 12). The wings of this species were illustrated in Marsh et al. (1987, fig. 288).

Etymology.—This species is named in honor of Guido Falco, the owner of Penguin's restaurant in Santo Domingo de Heredia, Costa Rica.

***Falcosyntretus fallax* Papp and Shaw,
new species
(Figs. 6, 11, 14)**

Description of holotype female.—Body 3 mm long. Head in dorsal view $1.7\times$ broader than long, eye somewhat shorter than temple, temple not rounded close behind eye. Ocelli forming a high triangle, distance between median and lateral ocelli as long as greatest diameter of an ocellus, posterior border of median ocellus distinctly anterad of anterior border of lateral ocelli. Antenna as long as body and with 27 antennomeres, first flagellomere $1.3\times$ as long as second flagellomere, flagellomeres proximo-distally $1.6\text{--}2.0\times$ as long as broad. Mesosoma in lateral view $1.4\times$ as long as high. Fore wing as long as body. Pterostigma $3.6\times$ as long as wide. Hind wing vein cu-a present basally. Hind femur $4.2\times$ as long as broad. Hind basitarsus as long as tarsomeres 2–4 combined. Metasoma as long as head and mesosoma combined. Petiole $1.5\times$ broader posteriorly than basally, petiole itself as long as middle tarsomeres 1–2 and half of



Figs. 9–12. Propodea of *Falcosyntretus* species, dorsal views. 9, *F. complanatus*, 210 \times . 10, *F. venustus*, 230 \times . 11, *F. fallax*, 110 \times . 12, *F. falcoi*, 200 \times .

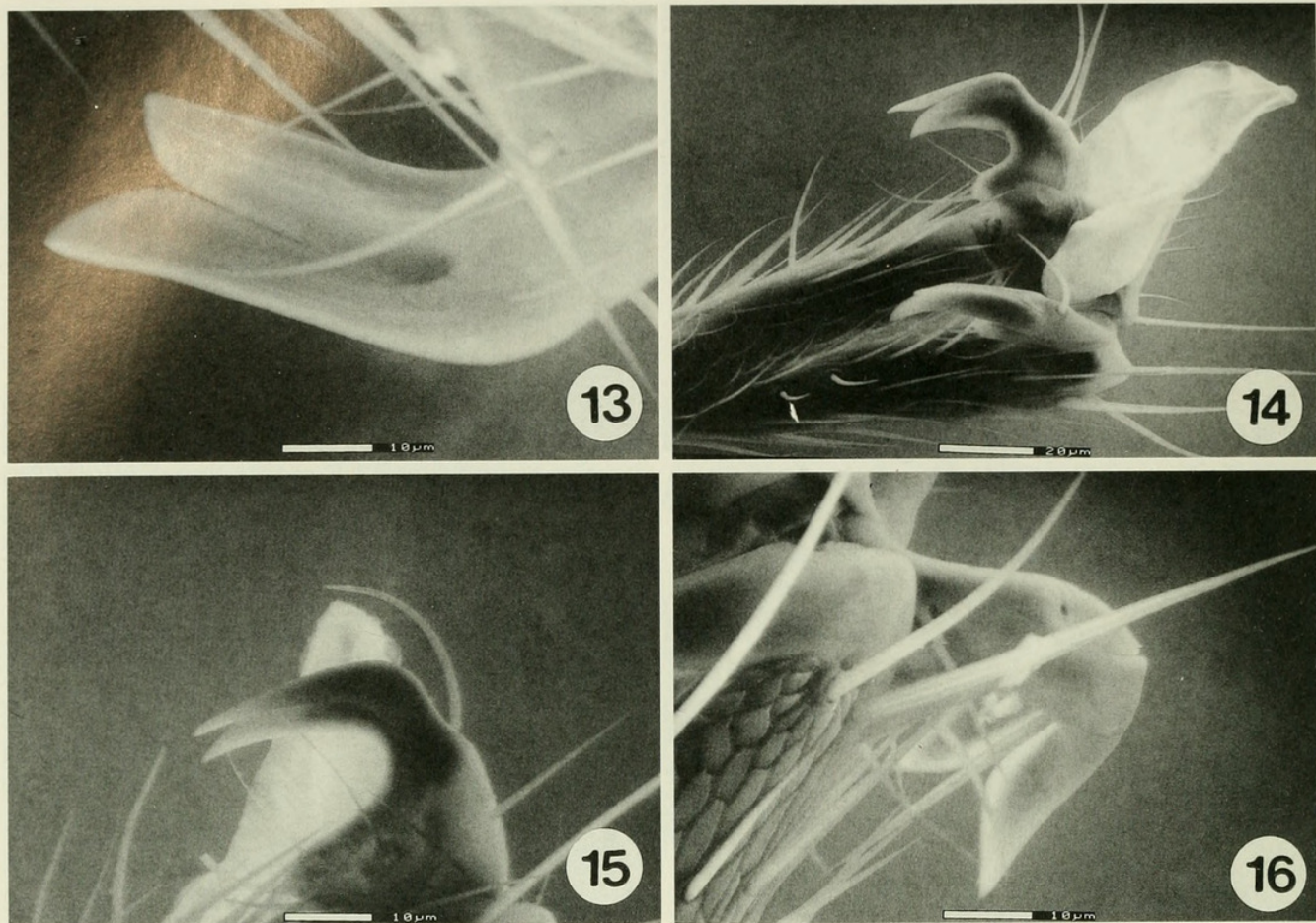
tarsomere 3. Tergites 2–3 transverse, second tergite 1.4 \times and third tergite 2.6 \times as wide posteriorly as long medially. Ovipositor sheath as long as hind basitarsus and half of second tarsomere combined.

Color: Ground color of body mostly yellow. Wide longitudinal streak of vertex brownish black. Mesosoma above (mesonotum, scutellum, metanotum and propodeum) and petiole black. Tergites brown. Legs yellow, except coxae and trochanters whitish. Wings subhyaline, pterostigma brownish opaque.

Variation, paratype females.—Similar to the holotype except body length 2.6–3.1 mm, usually 2.0–3.0 mm, long; head in dorsal view 1.57–1.67 \times , usually 1.58–1.6 \times , as broad as long; antenna about as long as body and with 25–28, usually 27–28, antennomeres; pterostigma 3.3–3.7 \times , usually 3.5–3.7 \times , as long as wide; hind femur 4.1–5.1 \times , usually 4.4–4.7 \times , as long as

broad medially; scutellum varying from yellow to brown; tergites 2–7 varying from brown to nearly black, pterostigma varying from pale brown to yellowish brown.

Material examined.—Holotype ♀: UNITED STATES: Wyoming, Albany County, Medicine Bow National Forest, 5 miles SW Lincoln Monument, mixed conifer/aspen forest, taken with Malaise trap, 20–26 August 1990. Paratypes: 1 ♀, same data as holotype; 5 ♀ with same locality data as holotype except collected (1 each) on following dates: 23–38 July 1990, 28 July–2 August 1990, 13–20 August 1990, 15–19 July 1991, and 29 July–5 August 1991; 1 ♀, same data except meadow east of highway, Malaise trap, 13–20 August 1990; 2 ♀, same data except mixed forest near sagebrush, Malaise trap, 28 August 1990; 1 ♀, same data except meadow near mixed forest, 20–27 August 1991, swept and aspirated, S. R. Shaw; 3 ♀, same data



Figs. 13–16. Cleft tarsal claws of *Falcosyntretus* species. 13, *F. falcoi*, 1,500 \times . 14, *F. fallax*, 800 \times . 15, *F. transversus*, 1,500 \times . 16, *F. venustus*, 1,500 \times .

except Happy Jack Recreation Area, mixed forest near sagebrush, Malaise trap, 13–20 August 1990. CANADA: 2 ♀, Quebec, Summit King Mountain, 26 June and 4 July 1977, M. Sanborne; 1 ♀, New Brunswick, Kouchibouguac National Park, 9 August 1977, S. J. Miller, code 5800B; 1 ♂, same locality except 18 July 1977, G. A. Calderwood, code 5649G. Holotype and 8 paratypes from Wyoming are deposited at UWL, four paratypes from Wyoming at HNHM, and the remaining (Canadian) paratypes at CNC.

Comments.—The new species, *F. fallax*, is somewhat similar to *F. venustus* (Muesebeck), but can be distinguished by the following characters. In *F. fallax* the posterior border of the median ocellus is set distinctly in front of the anterior margins of the lateral ocelli (Fig. 6), the mesonotum is entirely black, the propodeum often has some irregular rugose sculpture posteromedially (Fig.

11), and the junction of the propodeum and metasoma is bordered by a semicircular carina. In *F. venustus* the median ocellus is barely in front of the lateral ocelli, the mesonotum has at least some yellow markings anteriorly and is often extensively marked with yellow, the propodeum is entirely smooth posteromedially, and the carina bordering the propodeal/metasomal junction is broken medially to form two separate short carinae (Fig. 10). The wings and propodeum of this species were illustrated in Shaw (1997, figs. 19 and 58).

Etymology.—The species name *fallax* (= false) refers to the deceptive features of this species that might cause it to be confused with *F. venustus*.

***Falcosyntretus muesebecki* Papp and Shaw, new species**
(Figs. 1; 8)

Description of holotype female.—Body 2.7 mm long. Head in dorsal view 1.6 \times

broader than long, eye as long as temple, temple rounded close behind eye. Ocelli small and forming a high triangle, distance between median and lateral ocelli equal to greatest diameter of lateral ocellus, hind margin of median ocellus distinctly before anterior borders of lateral pair of ocelli. Antenna about as long as body and with 22 antennomeres, first flagellomere $1.2\times$ as long as second flagellomere, flagellomeres proximo-distally $1.8\text{--}2.2\times$ as long as broad. Metasoma shorter than head and mesosoma combined. First metasomal tergum as long as fore femur. Tergites 2–3 quadrate, a bit shorter medially than broad behind. Ovipositor sheath as long as middle basitarsus and second tarsomere combined.

Color: Ground color of body yellow, except flagellum, ocellar triangle, scutellum, metanotum, propodeum, and dorsum of metasoma mostly brownish black. Pterostigma opaque yellowish brown.

Variation, paratype females.—Similar to holotype except body $2.7\text{--}2.8$ mm long. Eye somewhat protruding and a bit longer than temple. Antenna about one-quarter shorter than body and with 19 antennomeres, first flagellomere slightly longer than second flagellomere. Pterostigma $2.8\times$ as long as wide. Hind femur $3.8\times$ as long as broad medially. Ovipositor sheath sometimes almost as long as hind basitarsus. Ocellar field brown to black, sometimes lateral pair of spots on mesonotum, metanotum and propodeum brownish black. Hind half of petiole and tergites 4–7 sometimes dark brown, tergites 2–3 sometimes yellow.

Variation, paratype males.—Similar to female except body $2.3\text{--}3.0$ mm long. Head in dorsal view $1.65\text{--}1.7\times$ as broad as long. Antenna with 17–23 antennomeres. Pterostigma $2.75\text{--}2.8\times$ as long as wide. Hind femur $3.5\text{--}3.6\times$ as long as broad. Mesosoma and metasoma brown to brownish black, pronotum yellow, tergites 2+3 yellow to brown. First metasomal tergum gradually wider apically, not constricted medially as in female.

Material examined.—Holotype ♀:

UNITED STATES: Georgia, Forsyth, 5–10 June 1971, ex. Malaise trap, F. T. Naumann (CNC). Paratypes: 1 ♀, same data as holotype (CNC); 1 female, Michigan, Ontonogan County, 18 June 1960, R. and K. Dreisbach; 1 ♂, New Mexico, Catron County, 8 mi. S.E. Luna, 7,500 ft, 9–14 July 1979, S. and J. Peck (CNC); 1 ♀ (HNHM), 3 ♂ (USNM), North Carolina, Alleghany County, Doughton Park, Malaise trap operated by North Carolina Department of Agriculture, 25 July 1977; 1 ♀, CANADA: Newfoundland, South Branch, July 1973, Malaise trap, Heinrich (CNC).

Comments.—The new species, *F. mue-sebecki* is most similar to *F. transversus* new species, which also has a small body length (less than 3 mm) and strongly constricted first metasomal tergum (see Fig. 1). *Falcosyntretus mue-sebecki* can be distinguished from *F. transversus* by the presence of the occipital carina dorsally, the presence of hind wing vein cu-a, and less extensive black markings on the vertex (black blotch not reaching compound eyes).

Etymology.—This new species is dedicated to the late Carl F. W. Muesebeck (1894–1987), well-known specialist of the parasitoid wasps and the first reviser of the euphorine braconids of the Nearctic Region (see Muesebeck 1936).

***Falcosyntretus transversus* Papp and
Shaw, new species**
(Fig. 5, 15)

Description of holotype female.—Body 2.2 mm long. Head in dorsal view $1.6\times$ broader than long, eye somewhat shorter than temple, temple rounded continuously, occipital carina effaced. Ocelli small and forming a high triangle, distance between median and lateral ocelli longer than greatest diameter of lateral ocellus, hind border of median ocellus distinctly anterior of anterior borders of lateral ocelli. Antenna somewhat shorter than body and with 21 antennomeres, first flagellomere hardly longer than second flagellomere, flagellomeres proximo-distally $1.8\text{--}2\times$ as long as broad.

Mesosoma in lateral view $1.4\times$ as long as high. Pterostigma $3.3\times$ as long as wide. Hind wing vein cu-a absent. Hind femur $4.4\times$ as long as broad, hind basitarsus as long as tarsomeres 2–3 plus half of tarsomere 4. Metasoma somewhat longer than mesosoma. Petiole half as long as hind tibia. Tergites 2–3 transverse, second tergite $1.6\text{--}1.7\times$ and third tergite $1.8\text{--}2\times$ as broad as long medially. Ovipositor sheath also half as long as hind tibia.

Color: Ground color of body yellow. Transverse streak on vertex dark brown. Three spots on mesonotum, scutellum, metanotum, propodeum and tergites brownish yellow to brown. Legs yellow, coxae and trochanters whitish yellow. Pterostigma opaque yellow.

Variation, partype females.—Similar to the holotype except body 2.1mm long. Head in dorsal view $1.5\times$ as broad as long. Antennae with 20–21 antennomeres. Pterostigma $3\times$ as long as wide. Hind femur $4.5\times$ as long as broad.

Material examined.—Holotype ♀: UNITED STATES: Wyoming, Albany County Medicine Bow National Forest, 2 miles N on road No. 705, willow bog, taken with Malaise trap, 19–23 July 1991 (UWL). Paratypes: 1 ♀, same data as holotype except 9–15 July 1991 (UWL). CANADA: 1 ♀, Manitoba, Riding Mountain National Park, Dead Ox Creek, hardwood forest, 400 m, 28 June 1979, Mason (CNC).

Comments.—The new species, *F. transversus*, is distinctive by the absence of the occipital carina and the transverse dark brown streak on upper part of head meeting the eyes.

Etymology.—The species name “*transversus*” refers to the transverse brown streak above on the head.

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