Two new and aberrant species of Braconidae (Hymenoptera) from Japan

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One new species of the genus *Pseudorhinoplus* Fischer, 1972, and one of the genus *Zelomorpha* Ashmead, 1900 from Japan are described and illustrated. The generic limits of both genera are discussed. The genus *Ahngeria* Kokujev, 1902 is a new junior synonym of *Coccygidium* Saussure, 1892, and the subgenus *Fopius* Wharton, 1987 is given generic rank. New combinations are: *Pseudorhinoplus taiwanicus* (Fischer, 1975), *Diachasmimorpha mellea* (Gahan, 1915), *D. longicaudata* (Ashmead, 1905), *D. aino* (Watanabe, 1938), *D. paeoniae* (Tobias, 1980), *D. tryoni* (Cameron, 1911), and *Coccygidium transcaspicum* (Kokujev, 1902).

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Introduction

Both the new taxa described in this paper were discovered during a short stay at the Entomological Laboratory of the Kyushu University at Fukuoka in 1980. Both are interesting because both are morphologically aberrant and extend the known distribution of their respective genera considerably. The genus *Pseudorhinoplus* (Opiinae) was not known before from the Palaearctic region; the nearest known locality is Taiwan. The genus *Zelomorpha* Ashmead, 1900 (Agathidinae) is unknown from the E. Palaearctic area, but Bhat & Gupta (1977) report species from Nepal. The genus occurs also in the New World and in the Oriental region. In addition the closely related genus *Coccygidium* Saussure, 1892 occurs in the S. Palaearctic area. In the past its species were partly included in the genus *Ahngeria* Kokujev, 1902. Bhat & Gupta (1977) included *Ahngeria* in the genus *Zelomorpha,* following Tobias (1971) and Chou & Sharkey (1989) synonymized *Zelomorpha* with *Coccygidium.* However, we consider the difference in shape of the fore spur significantly enough to retain the genera *Zelomorpha* and *Coccygidium* separated and to synonymize *Ahngeria* Kokujev, 1902 with *Coccygidium* Saussure (**syn. nov.**).

The biology of both species is unknown, but species of the *Diachasmimorpha*-group (to which the genus *Pseudorhinoplus* belongs) have been reared from larvae of fruit-flies (Tephritidae). The hosts of *Zelomorpha* species are unknown, but the closely related genus *Coccygidium* Saussure has been reared from Noctuidae-caterpillars. For the terminology used in this paper, see van Achterberg (1988: 5-11).

Descriptions

The genus *Pseudorhinoplus* Fischer, 1972 belongs to a predominantly Palaeotropical group of genera of Opiinae (the *Diachasmimorpha*-group), consisting of *Rhynchostere s* Fischer, 1965, *Diachasmimorpha* Viereck, 1913 (figs. 14-24; = *Parasteres* Fischer, 1967), *Fopius* Wharton, 1987, and *Pseudorhinoplus*. One genus (*Diachasmimorpha*) occurs also in the Nearctic region and two genera (*D.* and *Pseudorhinoplus*) in the E. Palaearctic area. They are comparatively large species (length of fore wing 4-6 mm) and are often (partly) yellowish, with the clypeus distinctly protruding ventrally (broadly convex (fig. 16) or with one (fig. 9) or three teeth), and are (as far as is known) parasites of Diptera-Tephritidae (fruit-flies). In the Neotropical region this group is replaced by the very similar *Doryctobracon*-group, which are also parasites of Tephritidae. However, species of this group have the clypeus subtruncate ventrally, at most weakly sinuate.

In the past both groups were included in the genus *Biosteres* Foerster, 1862 because of the short vein 3-SR of fore wing. However, both groups differ from *Biosteres* by the absence of the dorsope on the first metasomal tergite, and by their hosts (*Biosteres* species parasitize, almost exlusively, Anthomyiidae and Agromyzidae). In addition, species of the *Diachasmimorpha*-group share the following characteristics: 1. vein m-cu of hind wing present (absent in Tephritidae-parasites belonging to the genus *Opius* Wesmael, 1835 (subgenus *Psyttalia* Walker, 1860 (=*Austroopius* Szépligeti, 1900)); 2. hypoclypeal depression is absent or nearly so (at most with a narrow slit: fig. 9, if the depression is wide, cf. the *Diachasma*-group); 3. ovipositor sheath is usually as long as fore wing or longer; 4. notauli are complete (figs. 11, 15); 5. vein 1-M of fore wing is more or less curved posteriorly (fig. 1), but sometimes nearly straight (fig. 14). The statement by Wharton (1988) that the group is characterized by the separation of the clypeus from the face below the anterior tentorial pit is incorrect. This depression (which may be a deep groove) is often (nearly) absent or shallow. This depression occurs also in the genus *Opius* s.s. and proved to be a useful character only at species level.

Key to the genera of the *Diachasmimorpha*-group

1. Clypeus in lateral view bulging forwards, beyond level of face and resulting in a distinct space below it (figs. 1, 15 in van Achterberg, 1983); mandibles robust and bulging (figs. 6, 17, l.c.); length of third antennal segment 0.9-1.0 times fourth segment (figs. 1, 15, l.c.); (Afrotropical) ..... ***Rhynchosteres*** Fischer, 1965
- Clypeus in lateral view normal, not bulging beyond level of face and without distinct space below it (figs. 4, 22); mandibles normal and not or slightly bulging (figs. 9, 16); length of third antennal segment 1.1-1.4 times fourth segment (figs. 3, 21); (*Diachasmimorpha* Viereck s.l.) 2
2. Stemmaticum surrounded by complete and more or less sculptured grooves laterally; frons strongly sculptured; notauli complete and strongly crenulate; (Afrotropical) ..... ***Fopius*** Wharton, 1987 stat. nov.
   Note. *Fopius* was included by Wharton (1987) in the genus *Rhynchosteres*, but *Fopius* is more closely related to the genera *Pseudorhinoplus* and *Diachasmimorpha* as indicated in the key above. Some differences given by Wharton (1987) are

incorrect: the type-species of the genus *Fopius* has no dorsope and the shape of the ovipositor (which is normal, i.e. straight subapically) occurs also in the genus *Diachasmimorpha*, e.g. the Nearctic *D. mellea* (Gahan, 1915) **comb. nov.** It seems more appropriate to treat *Fopius* as a separate genus near *Diachasmimorpha*; an alternative is treating both *Fopius* and *Pseudorhinoplus* as subgenera of the genus *Diachasmimorpha* s.l.

- Stemmaticum at most partially surrounded by shallow and smooth grooves (fig. 6); frons largely smooth; notauli usually smooth or absent posteriorly (fig. 15), but sometimes completely crenulate (fig. 11) 3

3. Clypeus tooth-like protruding ventrally (fig. 12), sometimes with 3 teeth; vein m-cu of fore wing antefurcal to interstitial (fig. 1); ovipositor straight apically; middle lobe of mesoscutum without pair of depressions anteriorly (fig. 11), or depressions obsolescent; second metasomal tergite smooth; (E. Palaearctic, Palaeotropical) ..... ***Pseudorhinoplus*** Fischer, 1972
Note. The pronope may be absent or present in this genus and also the occipital carina may be completely absent (a species from New Guinea (RMNH)).

- Clypeus evenly curved ventrally (fig. 16), at most widely triangularly protruding; vein m-cu of fore wing slightly postfurcal (fig. 14); ovipositor of some species sinuate apically (fig. 23), but straight in several other species (e.g. *D. mellea*); middle lobe of mesoscutum with pair of depressions anteriorly usually distinctly developed (fig. 15); second tergite striate(-costate) medially (fig. 17), but in several species smooth (e.g. *D. aino*); (Holarctic, Palaeotropical) ..... ***Diachasmimorpha*** Viereck, 1913
Note. The occipital carina may be completely absent (an undescribed species from Japan (ELK)).

Pseudorhinoplus Fischer, 1972

Pseudorhinoplus Fischer, 1972: 486 (in key only; as subgenus of *Biosteres* Foerster, 1862); Wharton, 1988:342, 353, 356 (generic rank).

Type-species: *Rhinoplus fuscipennis* Szépligeti, 1914 (by original designation; examined).

Short diagnosis. — Clypeus triangularly protruding medio-ventrally (figs. 9, 12), or with 3 teeth, and not bulging forwards (fig. 4); occipital carina present or absent laterally; middle lobe of mesoscutum without pair of distinct depressions anteriorly; vein m-cu of fore wing antefurcal (fig. 1) to interstitial; dorsope absent; second metasomal tergite smooth.

Pseudorhinoplus denticulifer spec. nov.
(figs. 1-13)

Material. — Holotype, ♀ (ELK): "Mt. Ô-dake, Hakkôda, Aomori Pref., Japan, Honshu", "Aug. 13, 1980, T. Gotô leg.", "Type No. 2769 Kyushu Univ.". Paratypes: 12 ♀♀ + 3 ♂♂; 1 ♀ + 1 ♂, topotypic, (ELK, RMNH); 5 ♀♀, (id.): Mt. Hiko, Fukuoka Pref., Kyushu, 12.viii.1975 (2 ♀♀), 23.vi.1975 (2 ♀♀), Y. Yoneda &

23.vii.1979 (1 ♀), M. Kotani leg.", "Japan"; 2 ♀♀ + 1 ♂, (id.): "Kunimitôge, (1400-1600 m), Sobo, Oita Pref., 23-24.vii.1978, K. Maetô leg.", "Japan"; 1 ♂, id., but from Mt. Sobosan, 16-1750 m; 3 ♀♀, (id.): "Japan", "(Shikoku), Mt. Omogo, Kamiukena-gun, Ehime Pref., 22.vii.1980, M. Kotani leg."; 1 ♀, (ELK): "Japan", "(Hokkaido), Nakatoya, near Lake Toya, viii-12/13.1979, M. Kotani leg."

Holotype, ♀, length of body 4.5 mm, of fore wing 4.3 mm.

Head. — Antennal segments 44 (left) and 43 (right), length of third segment 1.1 times fourth segment, length of third, fourth and penultimate segments 3.0, 2.8 and 2.0 times their width, respectively (figs. 2, 3); scapus compressed and punctate; length of maxillary palp 1.1 times height of head; occipital carina remain far removed from hypostomal carina ventrally (fig. 10); occipital carina absent dorsally, and distinct laterally; length of eye in dorsal view 1.9 times temple (fig. 6); temple punctulate; OOL:diameter of ocellus:POL = 8:3:4; frons with weak median crest and largely finely punctate (fig. 6); vertex punctulate; face densely finely punctate; anterior tentorial pits obsolescent; clypeus largely smooth and slightly differentiated from face ventrally, and with wide and triangular protuberance medio-ventrally (figs. 9, 12); length of malar space 0.9 times basal width of mandible; mandible distally not twisted and basally not widened (fig. 10).

Mesosoma. — Length of mesosoma 1.3 times its height; pronope absent; propleuron flattened and with small posterior flange (fig. 4); side of pronotum crenulate medially and posteriorly, and remainder largely smooth (fig. 4); precoxal sulcus distinctly crenulate, directed downwards posteriorly, and not reaching postero-ventral corner of mesopleuron (fig. 4); remainder of mesopleuron sparsely punctulate; only ventral half of pleural sulcus finely crenulate; notauli completely impressed and distinctly crenulate, without medio-posterior pit (fig. 11); mesoscutal lobes rather convex, rather sparsely setose and punctulate; scutellum flat and largely smooth, and only laterally densely setose; surface of propodeum largely (vermiculate) reticulate-rugose, its median carina strong in anterior half of propodeum (fig. 13); posterior surface of propodeum with obsolescent areola; propodeal spiracle small and on a protrusion, and in front of middle of propodeum.

Wings. — Fore wing: 1-M slightly curved (fig. 1); r:3-SR:SR1 = 11:19:76; 1-SR+M slightly sinuate; SR1 nearly straight; cu-a straight; 1-CU1:2-CU1 = 1:20; CU1b distinct (fig. 1), shorter than 3-CU1; M+CU1 normally sclerotized; 2-SR:3-SR:r-m = 24:19:12; m-cu shortly antefurcal, and converging to 1-M posteriorly (fig. 1). Hind wing: cu-a straight, vertical and rather long (fig. 1); subbasal cell largely glabrous; m-cu present, long (nearly up to wing margin) and unsclerotized.

Legs. — Hind coxa smooth; all tarsal claws without lobe and with few brownish spiny setae (fig. 8); length of femur, tibia and basitarsus of hind leg 4.8, 10.7, and 7.1 times their width, respectively; length of both hind tibial spurs 0.2 times hind basitarsus.

Metasoma. — Length of first tergite 1.1 times its apical width, its surface largely smooth, strongly shiny, with median stria and several shorter striae posteriorly (fig. 13), concave basally and dorsal carinae distinctly developed up to about apex of tergite; spiracles of first tergite small, dorsally situated and directed upwards (fig. 13); laterope deep and pit-shaped; dorsope absent, but area slightly impressed, but not pit-like; second tergite smooth and its spiracles in its epipleuron; setae on second and third tergites spread, on remainder of metasoma in rows; ovipositor straight, but

subapically aberrant, ribbon-shaped, compressed, thin and without teeth or nodus; length of ovipositor sheath 1.60 times fore wing, setose, and basally flattened; hypopygium acute apically and medium-sized (fig. 4).

Colour. — Dark brown or blackish; palpi pale yellowish; clypeus, malar space, mandible, face laterally and medio-ventrally, frons (narrowly) laterally, scapus ventrally, pedicellus apically, annellus, tegulae, legs, pronotal side ventrally (partly), propleuron partly, mesopleuron antero-dorsally, metapleuron dorsally and ventrally (narrowly), propodeum posteriorly and metasoma ventrally, yellowish; pedicellus in lateral view partly darker than scapus; wing membrane subhyaline; apex of metasoma brown; para- and pterostigma, and veins dark brown.

Variation. — Antennal segments of ♀ 41(1), 43(3), 44(2), 45(1) and 46(4), of ♂ 43(1) and 46(1); length of ovipositor sheath (1.38 (paratype from Hokkaido)-)1.49-1.65 times fore wing; yellowish parts of body may be largley brownish; scutellum may be brownish posteriorly.

Notes. — *Pseudorhinoplus denticulifer* is easily recognizable in the Palaearctic fauna because of the triangularly protruding clypeus and by the long ovipositor. The most closely related species is *P. taiwanicus* (Fischer, 1975) **comb. nov.** from Taiwan, originally described in the genus *Biosteres*. It has a shorter ovipositor (about as long as body and about 1.1 times fore wing, and both at least 1.4 times in *denticulifer*), the vein r of fore wing is longer than width of pterostigma (shorter in *denticulifer*), length of hind femur about 5 times its width (about 4 times in *denticulifer*), and the female has about 50 antennal segments (41-46 in *denticulifer*). *P. denticulifer* differs from the type-species of the genus (the Afrotropical *P. fuscipennis* (Szépligeti, 1914) by the length of the ovipositor (about 0.5 times in *fuscipennis*), by the notauli (absent posteriorly and smooth in *fuscipennis*), by the length of the eye in dorsal view (about equal to length of temple in *fuscipennis*), by the yellowish-brown metasoma, by the large and deep pronope, and by the number of antennal segments (about 51 in *fuscipennis*).

The only other species of the *Diachasmimorpha*-group in the Holarctic region belong to the genus *Diachasmimorpha* s.s. In the Nearctic region *D. mellea* (Gahan, 1915) **comb. nov.** and the introduced Oriental *D. longicaudata* (Ashmead, 1905) **comb. nov.** In the E. Palaearctic area occurs *D. paeoniae* (Tobias, 1980) **comb. nov.**, redescribed by Fischer (1986) as *Biosteres paeoniae*, and *D. aino* (Watanabe, 1938) **comb. nov.**; the latter species has the second metasomal tergite smooth. In the SW. Palaearctic area the Australian *D. tryoni* (Cameron, 1911) **comb. nov.** has been introduced, but not recovered.

Zelomorpha Ashmead, 1900

Zelomorpha Ashmead, 1900: 129; Shenefelt, 1970: 425-427; Bhat & Gupta, 1977: 238-264. Syn.: *Zelomorphidea* Viereck, 1912 (precoxal sulcus smooth).

Type-species: *Zelomorpha arizonensis* Ashmead, 1900 (original designation; examined).

Diagnosis. — Fore claw bifurcate (fig. 35); area between antennal sockets with pair of protuberances (fig. 33); length of fore tibial spur 0.7 times fore basitarsus or

shorter, and at most with a short glabrous spine apically (fig. 34); area behind antennal sockets flat; both hind tarsal claws similar and with small inner tooth (fig. 36); head not (fig. 43) to moderately elongated (fig. 33); propodeal spiracle elliptical; ovipositor sheath short, not exceeding apical width of metasoma (fig. 40); hind trochantellus with pair of ventral carinae (figs. 32, 42); length of inner spur of middle tibia 0.9-1.1 times middle basitarsus; apex of antenna with spine (fig. 28); vein M+CU of hind wing distinctly shorter than vein 1-M (fig. 37); ramellus of second submarginal cell of fore wing absent (fig. 25); notauli present.

Biology. — Unknown, but its sister-group, *Coccygidium* Saussure, parasitizes Noctuidae.

Distribution. — Predominantly circumtropical medium-sized genus, which intrudes into the southern parts of the Holarctic region. The genus *Zelomorpha* is reported by Tobias et al. (1986) from the S. Palaearctic region (*Z. transcaspica* (Kokujev, 1902); = *Z. opaca* (Shestakov, 1928)), but this species belongs to the genus *Coccygidium* (*C. transcaspicum* (Kokujev, 1902) **comb. nov.**). As a result the new species described below is the first species of the genus *Zelomorpha* to be found in the Palaearctic region.

Zelomorpha varipes spec. nov.
(figs. 25-26)

Material. — Holotype, ♀ (ELK): Komono, Mie Pref., 23.viii.1979, K. Maetô leg.", "Japan", "Type No. 2770 Kyushu Univ.". Paratype, ♂ (ELK): "Mt. Hyônosen, (700-1250 m), Hyogo Pref., 21-22.viii.1978, K. Maetô leg.", "Japan".

Holotype, ♀, length of body 6.0 mm, of fore wing 6.9 mm.

Head. — Antennal segments 41, with many tyloids and densely bristly setose, length of third segment 1.1 times fourth segment, length of third, fourth, and penultimate segments 2.8, 2.6 and 2.0 times their width, respectively; length of maxillary palp 0.7 times height of head; eyes not emarginate (fig. 33); length of eye in dorsal view 2.8 times temple (fig. 29); double elevation between antennal sockets weak (figs. 29, 33); POL:diameter of ocellus:OOL = 5:4:7; frons more or less flat, without any trace of carinae or lamellae behind antennal sockets (fig. 29); vertex with some punctures; face rather flat, strongly punctate, but weaker laterally (fig. 33); clypeus convex and finely punctate; epistomal suture largely absent (fig. 33); length of malar space 2.3 times basal width of mandible.

Mesosoma. — Length of mesosoma 1.4 times its height; mesosternum punctulate and microsculptured (but in paratype rather coarsely punctate); pronotum with shallow and narrow depression anteriorly; side of pronotum smooth, but posteriorly finely punctate and crenulate, its ventral margin thin and rather upcurved (fig. 27); precoxal sulcus completely crenulate, (but in paratype rugose anteriorly: fig. 27); remainder of mesopleuron rather sparsely punctate; area below precoxal sulcus densely punctate (fig. 27); metapleuron coarsely punctate, and ventrally with rugae (fig. 27); notauli completely impressed and largely smooth anteriorly, and posteriorly with some crenulae; mesoscutal lobes distinctly and densely punctate, antero-medially with pair of shallow grooves (fig. 26); scutellum punctate, with its subposterior

transverse crest moderately developed (fig. 26); surface of propodeum completely areolated and its interspaces smooth, but posteriorly rugulose (fig. 26); propodeal spiracle large, about 2.5 times as long as its maximum width (fig. 27).

Wings. — Fore wing: first submarginal cell subtriangular (fig. 25); r:3-SR:SR1 = 3: 2:61; SR1 slightly sinuate (fig. 25); cu-a straight, interstitial and rather long; submedial cell largely glabrous; 2-SR:3-SR:r-m = 10:2:9.

Legs. — Hind coxa densely punctate and with some striae apico-dorsally; length of fore spur 0.6 times fore basitarsus (fig. 34); inner spur of middle tibia as long as middle basitarsus; length of femur, tibia and basitarsus of hind leg 4.1, 6.7, and 9.4 times their width, respectively; length of hind tibial spurs 0.4 and 0.6 times hind basitarsus; apex of hind tibia with 2 spines.

Metasoma. — Length of first tergite 2.0 times its apical width, its surface smooth and strongly shiny, medio-basally concave, and its dorsal carinae absent (fig. 31); second suture narrow, distinct and smooth; second tergite smooth and without depressions; length of ovipositor sheath 0.08 times fore wing.

Colour. — Black; head (including stemmaticum), pronotum, propleuron, tegula (but humeral plate brown), fore and middle legs (but middle coxa, middle trochanter and trochantellus and base of middle femur dark brown, and middle telotarsus brown), and basal half of metasoma ventrally, yellow; mesonotum, veins, para- and pterostigma dark brown; first tergite and sides of second tergite pale yellowish, remainder of second tergite dark brown; apical half of wing membrane somewhat infuscated, remainder subhyaline.

Male. — The paratype-male is very similar to the holotype. Length of fore wing 7.0 mm, of body 7.5 mm; length of penultimate segment of antenna 2.2 times its width; length of maxillary palp 0.8 times height of head; length of eye in dorsal view 3.0 times temple; length of malar space 2.0 times basal width of mandible; precoxal sulcus less crenulate (fig. 27); notauli smooth (fig. 26); length of first metasomal tergite 1.7 times its apical width; first and second tergites largely brown.

Note. — Differs considerably from the known species of *Zelomorpha* species (type-species: figs. 37-46) because of the completely smooth frons, with no carinae (cf. figs. 29, 41), the median elevation of the middle lobe of the mesoscutum, and the extensive sculpture on the mesopleuron and hind coxa. However, after examination of several undescribed species, it was obvious that these characters are quite variable in the genus *Zelomorpha*. It seems best to include the new species in *Zelomorpha*, despite the fact that it is a highly aberrant member of that genus.

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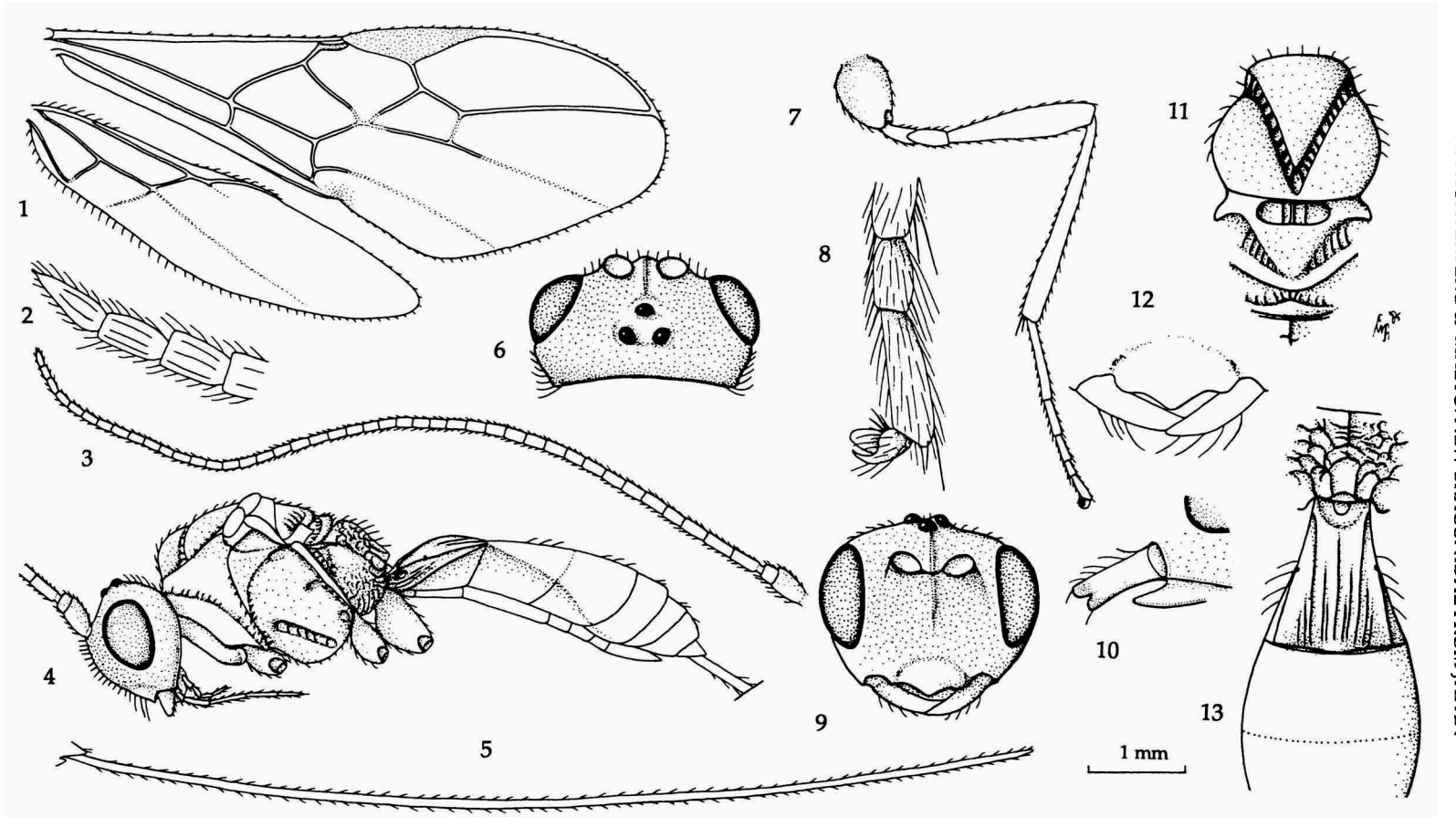
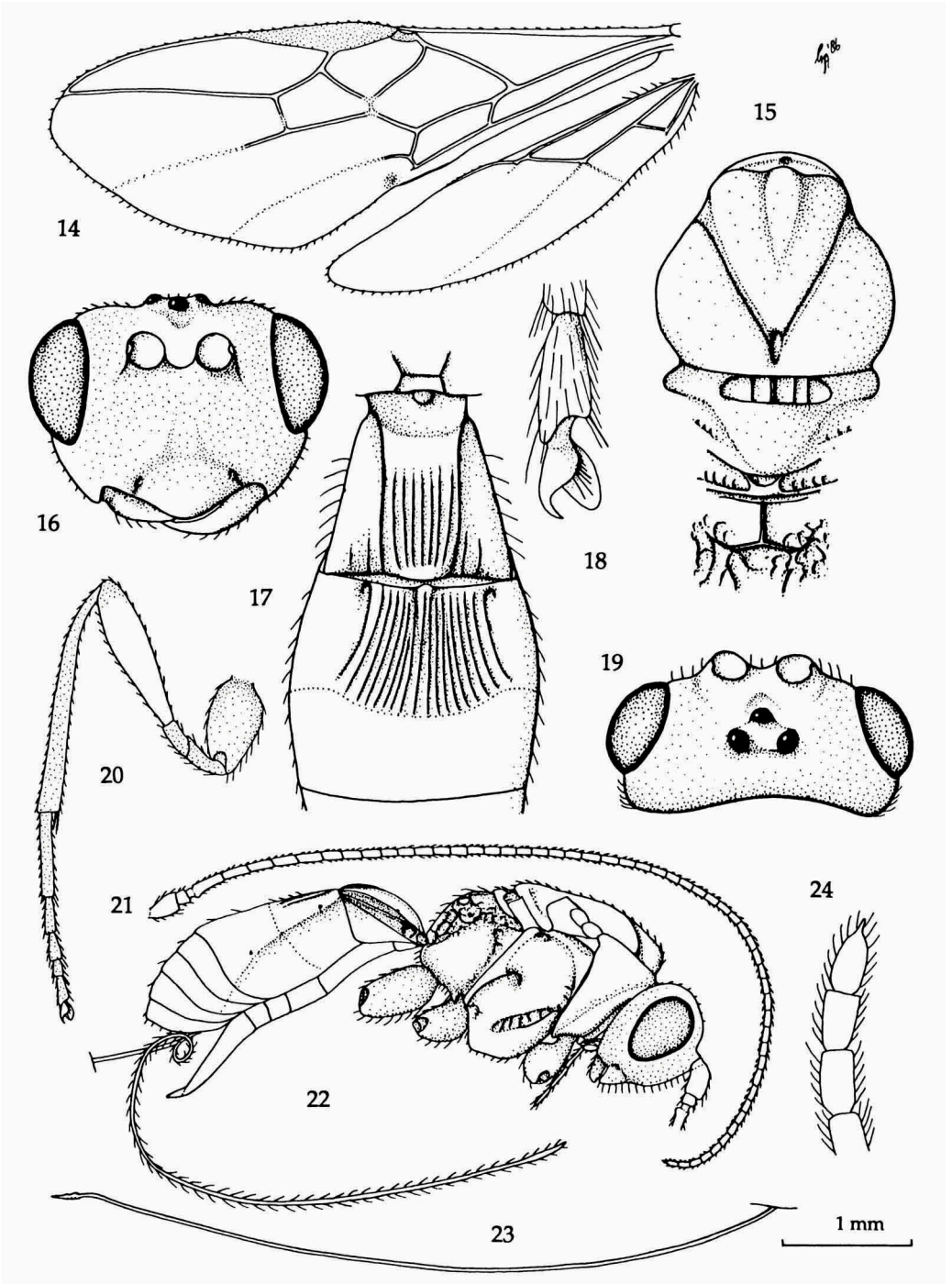
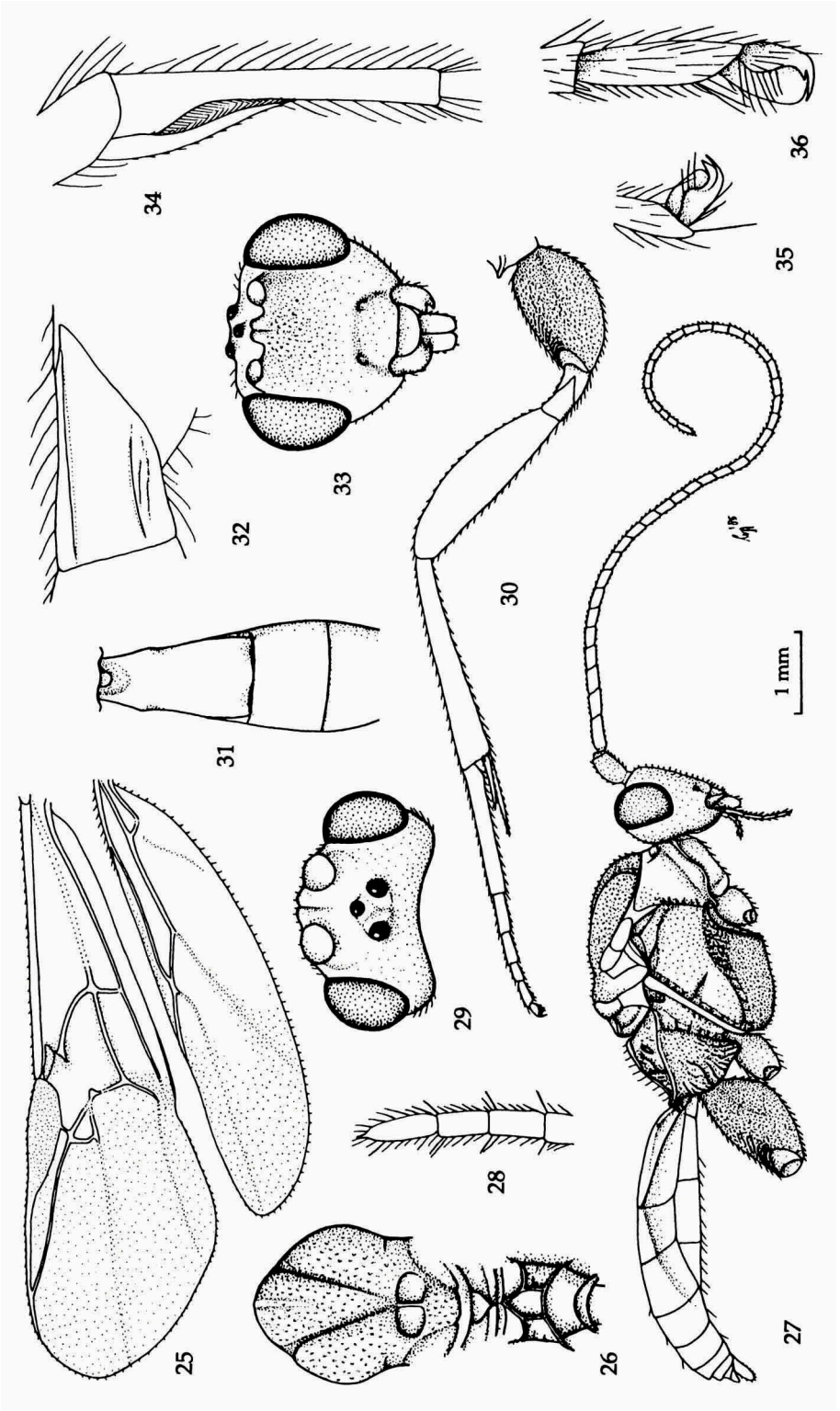


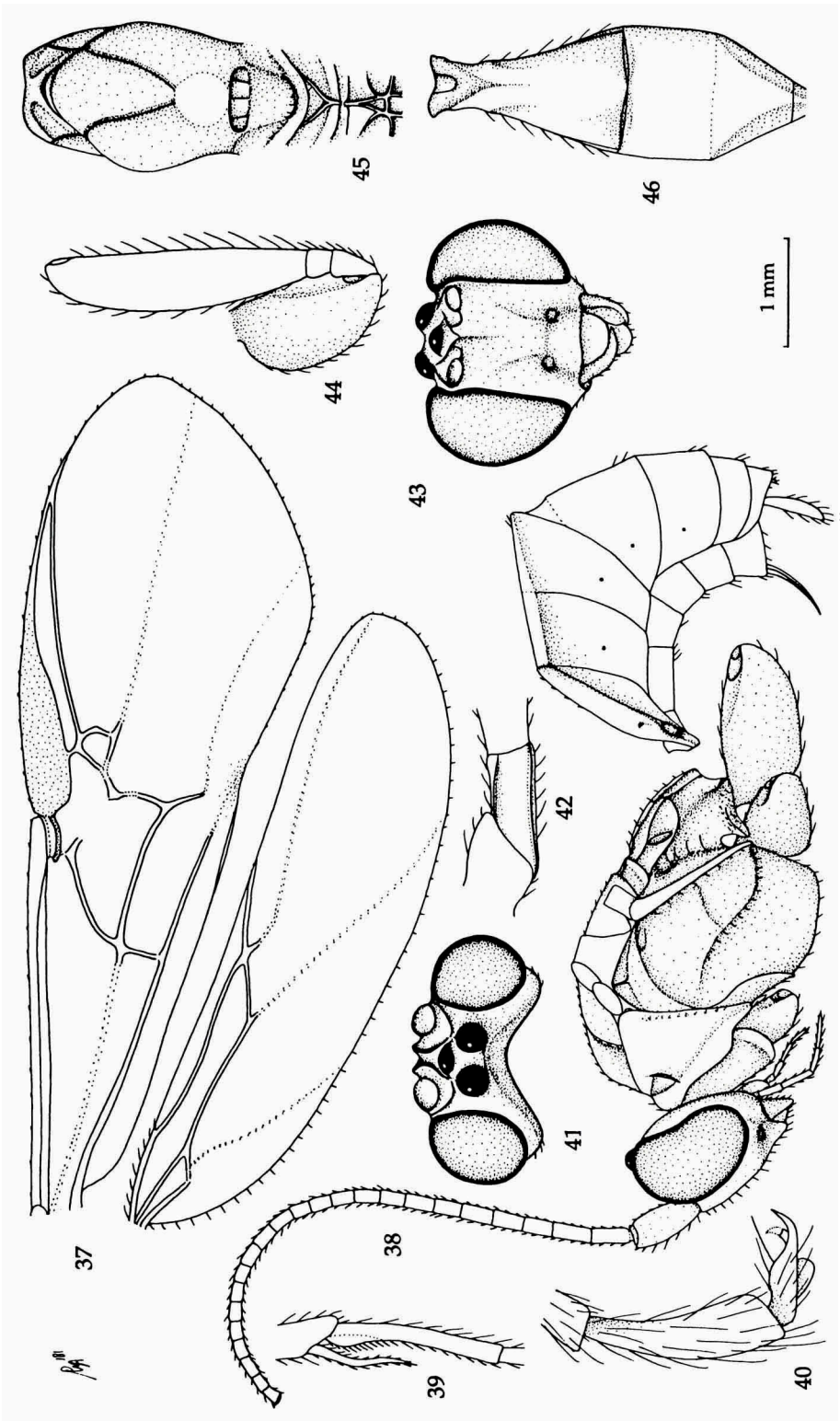
Figs. 1-13, *Pseudorhinoplus denticulifer* spec. nov., ♀, holotype. 1, wings; 2, apex of antenna; 3, antenna; 4, habitus, lateral aspect; 5, ovipositor sheath; 6, head, dorsal aspect; 7, hind leg; 8, outer hind claw; 9, head, frontal aspect; 10, mandible and ventral part of occipital carina; 11, thorax, dorsal aspect; 12, clypeus, frontal aspect; 13, propodeum, first and second metasomal tergites, dorsal aspect. 1, 3-5, 7: scale-line (= 1 mm); 2, 8: 5 ×; 6, 9-11, 13: 2 ×; 12: 3 ×.



Figs. 14-24, *Diachasmimorpha comperei* Viereck, ♀, holotype. 14, wings; 15, mesosoma, dorsal aspect; 16, head, frontal aspect; 17, first-third metasomal tergites, dorsal aspect; 18, fore claw; 19, head, dorsal aaspect; 20, hind leg; 21, antenna; 22, habitus, lateral aspect; 23, ovipositor; 24, apex of antenna. 14, 20-23: scale-line (= 1 ×); 15-17, 19: 2 ×; 18, 24: 5 ×.



Figs. 25-36, *Zelomorpha varipes* spec. nov., ♂, paratype. 25, wings; 26, mesosoma; 27, habitus, lateral aspect; 28, apex of antenna; 29, head, dorsal aspect; 30, hind leg; 31, first and second metasomal tergites, dorsal aspect; 32, hind trochantellus, ventral aspect; 33, head, frontal aspect; 34, fore spur; 35, outer fore claw; 36, inner hind claw. 25, 27, 30: scale-line (= 1 ×); 26, 31: 1.2 ×; 28, 32, 34-36: 5 ×; 29, 33: 2 ×.



Figs. 37-46, *Zelomorpha arizonensis* Ashmead, ♀, holotype. 37, wings; 38, habitus, lateral aspect; 39, fore spur; 40, inner fore claw; 41, head, dorsal aspect; 42, hind trochantellus, ventral aspect; 43, head, frontal aspect; 44, hind coxa and tibia; 45, mesosoma, dorsal aspect; 46, first-third metasomal tergites, dorsal aspect. 37, 38, 44: scale-line (1 ×); 39, 42: 2 ×; 40: 5 ×; 41, 43, 45, 46: 1.3 ×.