

A Review of the World Species of *Orthomiscus* Mason (Hymenoptera: Ichneumonidae: Tryphoninae)*

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Abstract.—The world species of the exenterine genus *Orthomiscus* Mason are reviewed. *O. amurensis* Kasparyan is transferred to *Kristotomus*, leaving six species under *Orthomiscus* in the Holarctic Region: *O. eridolius* Kasparyan, *medusae* Kasparyan, *pectoralis* (Hellén), *platyura* Mason, *simplex* (Mason) and *unicinctus* (Holmgren). Diagnostic characters, species relationships and a key to the species are given. Diagnostic characters are illustrated by diagrams and photographs.

INTRODUCTION

The genus *Orthomiscus* was described by Mason (1955) to accommodate two new Nearctic species, *O. platyura* and *O. leptura*. It belongs to the *Kristotomus*-Complex of genera in the tribe Exenterini (Gupta 1990), including *Kristotomus* Mason, *Kerrichia* Mason and *Orthomiscus* Mason. This group is characterized by having the apical rim of the hind tibia with a fringe of long, close bristles on the inner side and with a flat polished area on the lower and inner sides between the apical fringe of bristles and the tarsal socket; by having the hind tibia widest at apex and truncate; and by its short ovipositor which hardly surpasses the tip of abdomen. These genera also exhibit the usual exenterine characters such as the presence of only one spur on the middle tibia and the absence of spurs on the hind tibia.

Mason (1962) commented on the relationships of the genus and included two European species: *Exenterus unicinctus* Holmgren, 1858 (with which he synonymized *O. leptura*) and *Cteniscus pectoralis* Hellén, 1951. Kasparyan (1976, 1986, 1990) described three additional new species from Russia:

O. medusae, *O. amurensis*, and *O. eridolius*. Gupta (1990) transferred the Japanese *Kristotomus simplex* Mason, 1962 to this genus. In the present study, *O. amurensis* Kasparyan is transferred to the genus *Kristotomus* as it exhibits most of the characters of that genus, like the tapered and slender ovipositor and sheaths, lower valve of ovipositor without teeth and egg with a simple stalk and anchor. *Orthomiscus* thus is recognized as a Holarctic genus with six species.

Biology.—Not much is known about the biology of *Orthomiscus* except that *O. pectoralis* has been reared from late larval cimbicids (*Trichiosoma lucorum* L. and *T. tibiale* Stephens) that feed on birch and ash (*Betula* and *Crataegus*) in Europe (Jussila 1975).

Material.—This paper is based on the specimens present in the collection of the American Entomological Institute, Gainesville (GAINESVILLE). The types of the Russian species were borrowed from the collections of the Zoological Institute, Russian Academy of Science, St. Petersburg (ST. PETERSBURG) through the kindness of Dr. D. R. Kasparyan. Under synonymy of various species, the location of the type is indicated by the

*Florida Agricultural Experiment Station Journal Series R-03128.

city where the type is housed (see Townes, Momoi & Townes 1965 for details). The key to the species is based on the females which are more diagnostic.

Genus **ORTHOMISCUS** Mason

Orthomiscus Mason, 1955. Canadian Journal of Zoology, 33: 63.

Type: *Orthomiscus platyura* Mason; original designation.

Taxonomy: Mason 1962: 1273; Gupta 1990: 7; Kasparyan 1990: 36.

Diagnostic characters.—Head subcuboidal, swollen behind eyes. Mandibular teeth equal or subequal. Occipital and hypostomal carinae complete. Occipital carina bent inwards, meeting hypostomal carina at a right angle above base of mandible by a distance equal to the basal width of mandible. Epomia distinct. Epicnemial carina extending at least to the middle of hind margin of pronotum. Basal area of propodeum confluent with areola or only partly separated from it. Legs slender, elongate. Tarsal claws with 2-6 basal teeth. Areolet present, oblique, sometimes second intercubitus partly weak. Nervellus inclivous, intercepted in its lower 0.15 to 0.3. Tergite 1 elongate, usually about 2.0x as long as its apical width, its dorsomedian and dorsolateral carinae sharp and distinct; dorsolateral carina usually extending to the entire length of the tergite and passing just dorsad of spiracle and not broken there. Tergite 2 usually with a pair of strong to weak oblique basolateral grooves. Ovipositor short, stout and

decurved, not tapered apically and not extending beyond apex of abdomen. Upper valve of ovipositor flattened dorsally in basal half. Lower valve of ovipositor with an obliquely serrated edge (Figs. 10, 12, 18, 29). Ovipositor sheaths short, broadly triangular or sometimes a little slender. Female subgenital plate thin, creased medially and pinched apically. Egg stalk short, anchor simple, button-like or flattened and enclosing part of the egg (Figs. 4-14).

SPECIES RELATIONSHIPS

On the basis of egg structure, the six species of *Orthomiscus* form two distinct species groups. Group 1 comprises *platyura* Mason (type-species), *medusae* Kasparyan and *eridolius* Kasparyan (Figs. 4, 7, 9), where the egg stalk is short and wide and the anchor is four-pronged and encloses part of the egg. Group 2 comprises *pectoralis* (Hellén), *unicinctus* (Holmgren) and *simplex* (Mason) (Figs. 8, 12, 30) where the egg has a simple short stalk and a short button-like anchor. In the latter group, the stalk arises apicoventrally in *pectoralis* and *unicinctus* while in *simplex* it is central and the anchor is flat and oval.

Gupta (1990) stated that the plesiomorphic state of the egg in Cteniscini was probably an egg with a short stalk and anchor. This type of egg is seen in some generalized members of the genus *Kristotomus* (like *claviventris*, *santoshae* and *ctenonyx*). *Kristotomus* also exhibits more general-

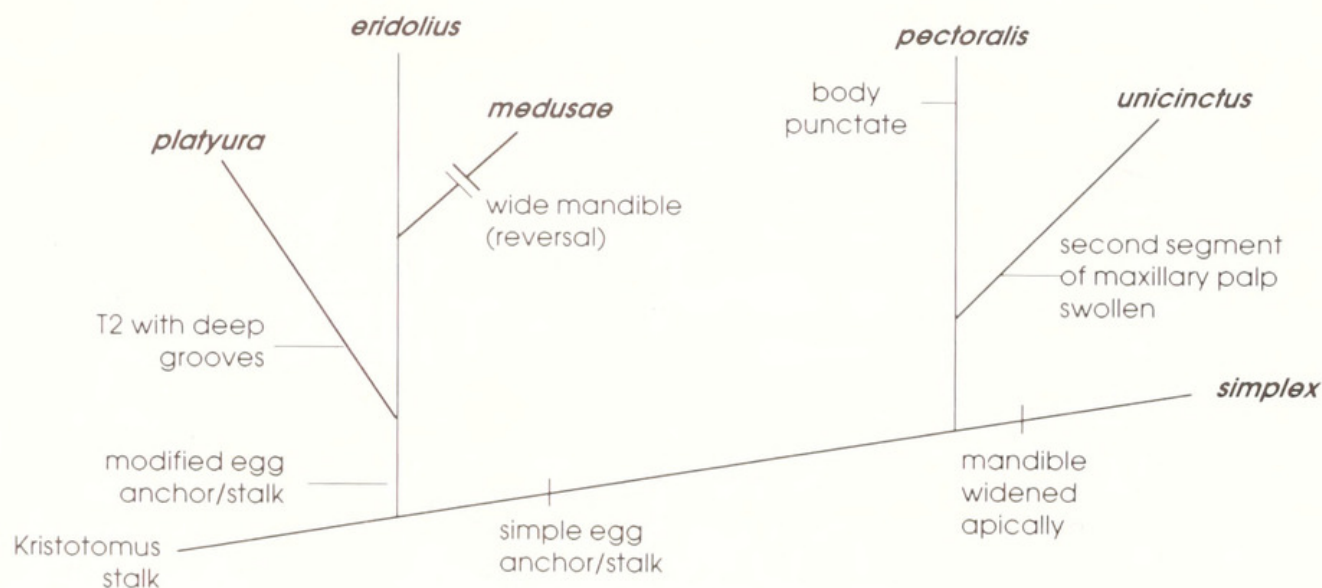


Diagram depicting the relationships of *Orthomiscus* species.

ized characters from which *Orthomiscus* and *Kerrichia* may be derived. The *Orthomiscus* species closest to *Kristotomus* appears to be *O. simplex*, which was originally described in *Kristotomus* and considered a primitive member of the genus by Mason (1962), primarily because the mandible is slightly widened apically in this species and in several species of *Kristotomus*. *O. medusae* also exhibits a widened mandible but the egg structure is very different. I consider that the widened mandible of these two species arose by convergence. The relationships of all *Orthomiscus* species may be depicted as follows:

Under group 1, *Orthomiscus platyura* has deep oblique grooves on tergite 2 separating it from *O. medusae* and *eridolius*. In *medusae* the mandibles are widened apically and the lower tooth is longer than the upper (reversal). It also has the basal vein more strongly curved medially (Fig. 38). Under group 2, *O. simplex* has the mandible widened apically with the lower tooth longer than the upper. This is not the condition in *O. pectoralis* and *O. unicinctus*. *O. pectoralis* has the body, including face, punctate and the propodeum rugose and punctate in places. *O. unicinctus* has the second segment of maxillary palp swollen (Fig. 39).

KEY TO THE SPECIES

- 1a Basal vein of fore wing slightly curved close to its junction with the medius vein. Petiolar area of propodeum almost pentagonal, about 0.75x the combined length of areola and basal area (Fig. 3). Apical transverse carina of propodeum angulate at its junction with lateral and median longitudinal carinae (Fig. 23). Mandibular teeth equal in length (Figs. 2, 15). Hypostomal carina not raised at its junction with occipital carina. Egg stalk situated apicoventrally or in the middle 2
- 1b Basal vein of fore wing more strongly curved, curvature in the middle of the vein. Petiolar area of propodeum small, circular, about half the combined length of areola and basal area. Apical transverse carina of propodeum almost evenly curved between the lateral longitudinal carinae. Mandible slightly widened apically and the lower tooth longer than the upper (Figs. 27, 31). Hypostomal carina slightly raised at its junction with occipital carina. Egg stalk situated in the middle of the egg (Figs. 7, 30) ... 5
- 2a Second segment of maxillary palp swollen, about 2.0x as wide as the rest. Abdomen black dorsally, tergites 2-3 often with triangular yellow patches or their apical margins yellow. Pronotum yellow. Mesopleurum partly yellow. Mesosternum yellow. Ovipositor slender (Figs. 20, 21). Egg stalk short and apicoventral (Figs. 6, 11). Egg anchor button shaped. Holarctic 2. *unicinctus* (Holmgren)
- 2b Second segment of maxillary palp similar to the others, not swollen. Abdomen beyond first tergite black or brown with middle segments of ten with large yellowish brown patches. Egg stalk and anchor various (Figs. 4, 8, 9) 3
- 3a Face with definite punctures. Propodeum rugose and punctate in places. Tergites 4-5 as long as wide. Ovipositor sheaths slender. Propleurum yellow. Mesopleurum largely black. Abdominal tergites black with narrow apical yellow stripes. Egg stalk short and apicoventral (Figs. 8, 12). Egg anchor button-shaped. Eurasia, Japan 1. *pectoralis* (Hellén)
- 3b Face polished, only with sparse punctures. Propodeum polished to subpolished, without distinct punctures or rugosities. Tergites 4-5 transverse. Ovipositor thick, its sheaths triangular (Figs. 18, 25). Egg oval, its stalk very short, central. Egg anchor partly enclosing the egg (Figs. 4, 5, 9, 14) 4
- 4a Tergite 2 with deep oblique basolateral grooves. Abdominal tergites beyond first largely reddish brown. Pronotum, mesopleurum ventrally and mesosternum yellow. Nervellus intercepted at its lower 0.25-0.3. Egg stalk short (Fig. 4), anchor 4-pronged (Fig. 5). U.S.A., Canada 5. *platyura* Mason
- 4b Tergite 2 without oblique grooves. Abdominal tergites black, with margins of tergites 2-3 (sometimes 4-5 also) yellow. Mesosternum of female black. Nervellus intercepted at its lower 0.15-0.2. Egg anchor (Fig. 9) broad and partly enclosing the egg. Russia: Far East 6. *eridolius* Kasparyan
- 5a Mesopleurum of female yellow ventrally, in male with yellow spots. Tarsal claws with 4-5 teeth. Female subgenital plate sharply creased medioventrally. Ovipositor slender (Fig. 29). Egg with a simple, oval anchor (Fig. 30). Japan 3. *simplex* (Mason)
- 5b Mesopleurum black. Tarsal claws with a pair of weak teeth. Female subgenital plate convex ventrally, not strongly creased. Ovipositor thick (Fig. 10). Egg with a 4-lobed anchor (Fig. 7). Russia: Far East, Japan 4. *medusae* Kasparyan

1. *Orthomiscus pectoralis* (Hellén)

Figs. 8, 12

Cteniscus pectoralis Hellén 1951. Notulae Entomologicae Helsingfors, 31: 31. F. des. Type: Female, Finland: Esbo (HELSINKI). — Kerrich 1952. Bulletin of the British Museum (Natural History) Entomology Series, 2 (6): 432. F. des., distr.

Orthomiscus pectoralis: Mason, 1962. Canadian Entomologist, 94: 1274. n. comb. Japan: Nagano Prefecture: Kamikochi. — Townes, Momoi & Townes, 1965. Memoirs of the American Entomological Institute, 5: 109. cat. — Jussila, 1975. Acta Entomologica Fennica, 41 (2): 53. des. of male, host records. — Kasparyan, 1976. Entomologicheskoe Obozrenie, 55: 137. — Kasparyan, 1977. Nasekomye Mongoliaca, 5: 463. Mongolia. — Kasparyan, 1990. Fauna of USSR Insecta, Hymenoptera, 3 (2): 43. key, des., fig. Russia.

No specimens of this species were available for study. Kerrich (1952) and Kasparyan (1990) have provided detailed descriptions of this species. The description that follows is adapted from Kerrich (1952).

Diagnosis.—This species appears different from the others by having the face and thorax extensively punctate and the propodeum rugoso-punctate (cf. Kerrich, 1952 description). All other species have only weak to indistinct body punctation. Tergites 4-5 as long as wide. The egg has a short apicoventral stalk and a small button-like anchor (Fig. 8).

Male and female.—Face moderately punctate. Clypeus with fine punctures. Epomia short and weak. Mandibular teeth equal in length. Notauli sharply impressed. Scutellum strongly convex, finely punctate. Epicnemial carina incomplete medially. Sternaulus superficially impressed. Propodeum rugose to punctate in places. Areola about as long as wide, confluent with basal area. Abdomen elongate and slender. Abdomen elongate and slender. Tergite 1 about 1.6x as long as its apical width, its dorsomedian and dorsolateral carinae strong. Postpetiole with a pitlike depression bounded by carinae. Tergite 2 with small but distinct thyridia. Tergites 4-5 as long as their basal width. Apical abdominal segments compressed in female. Female subgenital plate less sharply folded than in *O. uncinatus* (with which Kerrich compared this species). Ovipositor sheaths slender. Ovipositor comparatively stout as is usual in the genus (Fig. 12).

Color.—Ground color black. Mouthparts, clypeus, face, and temples broadly, yellow. Scape

and pedicel pale brownish. Thorax and propodeum black, with pronotum, scutellum, metascutellum, a mark above epicnemial carina, mark above middle coxa, tegula and subtegular ridge, yellowish brown. Propleurum yellow. Fore and middle coxae and trochanters yellow. Fore and middle femora yellowish brown, their tibiae and tarsi paler. Hind coxa reddish brown. Hind femur, tibia and tarsus more brownish to reddish brown. Abdomen black above, yellow below. Tergites 1-6 with narrow, pale apical margins and tergite 7 with an obscure, triangular yellow mark. Ovipositor sheaths yellow, infusate above and rufous towards apex.

Egg.—(Fig. 8) Egg with a short apicoventral stalk and a button-like anchor.

Length.—5.0-10.0 mm. Fore wing 3.8-8.5 mm.; Ovipositor about 0.5 mm.

Distribution.—Europe (Finland), Russia, Mongolia, Japan.

Mason (1962) reported this species from Japan and included two females from Nagano Prefecture: Kamikochi, collected by Townes in 1954. These specimens could not be located in the AEI collections.

2. *Orthomiscus uncinatus* (Holmgren)

Figs. 6, 11, 19-23, 36, 39

Exenterus uncinatus Holmgren, 1858. Svenska Vetensk.-Akad. Handlirsch (n. f.), 1: 234. M. F. key, des. Lectotype (selected by Roman, 1914), Female, Sweden: Lapland: Tarna (STOCKHOLM).

Exenterus macrocephalus Holmgren, 1858. Svenska Vetensk.-Akad. Handlirsch (n. f.), 1: 243. M. des. Type: Male, Sweden (STOCKHOLM). Syn. by Roman, 1914.

Cteniscus macrocephalus: Jacob & Tosquinet, 1896. Annales de la Societe Entomologique Belge, 34: 108. new comb.

Cteniscus uncinatus: Roman, 1914. Arkiv for Zoologie, 9 (2): 17. syn., des. — Kerrich, 1942. Transactions of the Society for British Entomology, 8 (2): 63-64. Britain. — Kerrich, 1952. Bulletin of the British Museum (Natural History) Entomology Series, 2 (6): 434. key, des., fig. Localities in Britain, France, Belgium, Germany, Sweden.

Orthomiscus leptura Mason, 1955. Canadian Journal of Zoology, 33: 64. M. F. key, des., fig. Type: Female, U.S.A.: New Hampshire: Pinkham Notch (AEI, Gainesville). Examined. Syn. by Mason, 1962.

Orthomiscus uncinatus: Mason, 1962. Canadian Entomologist, 94: 1274. syn., distr. Japan: Sapporo. — Townes, Momoi & Townes, 1965. Memoirs of the American Entomological Institute, 5: 109. cat. — Mason, 1966. Canadian Entomologist, 98: 48. key. Japan. — Carlson, 1979. Catalog of Hymenoptera in America North of Mexico, 1: 377. cat. U.S.A., Canada. — Kasparyan, 1990. Fauna of

USSR Insecta, Hymenoptera, 3 (2): 45. key, des., fig. Russia.

Diagnostic features.—Second segment of maxillary palp widened and flat, about 2.0x as wide as the rest (Fig. 39). Oblique impressions on tergite 2 faint. Ovipositor comparatively more slender than in the previous species (Figs. 20, 21). Egg with a short apicoventral stalk and a button-like anchor (Figs. 6, 11). Temple yellow only on its basal half. Scutellum black except at apex. Hind coxa with blackish brown patches. Abdomen largely black and with yellow patches on tergites 2 and 3. Thorax of male largely black, that of female generally yellow in lower half, but color variable.

Male and female.—Flagellum with 23-24 segments in male and 23-26 segments in female. First segment about 1.4x as long as the second. Second segment of maxillary palp widened and flat, about 2.0x as wide as the rest of the segments (Fig. 39). Mandibular teeth equal in length but lower tooth more prominent than the upper. Hypostomal carina of normal shape, not conspicuously raised at its junction with occipital carina. Vertex widened posteriorly. Interocellar distance 0.25x the ocellocular distance.

Thorax subpolished. Mesoscutum rather strongly convex. Notauli distinctly impressed up to middle of mesoscutum. Lateral carinae of scutellum distinct only at base of scutellum. Epomia sharp across pronotal collar. Sternaulus and epicnemial carina moderately impressed. Propodeum convex, subpolished. Areola (Fig. 23) widened at its junction with costulae, confluent with basal area. Basal vein of fore wing uniformly but weakly arched (Fig. 36). Nervellus intercepted in its lower 0.25-0.33.

Abdomen subpolished. Tergite 1 slender (Fig. 19), its dorsomedian carinae strong and extending to 0.7-0.8 the length of the tergite, its dorsolateral carina sharp and extending to the entire length of the tergite. Tergite 2 with distinct thyridia and faint oblique grooves. Female subgenital plate folded medially and pointed apically. Ovipositor slender, of uniform diameter (Fig. 21). Ovipositor sheaths (Figs. 20, 21) comparatively narrow. Egg anchor small and situated apicoventrally (Fig. 6).

Color.—Ground color black. Thorax almost wholly black in male and some females. Abdominal tergites largely black. Scape, pedicel below, mouthparts, clypeus, face, inner orbits up to top of

eyes, malar space, and temples on lower half, yellow. Propleurum, lower half of pronotum, its upper margin, tegula, subtegular ridge, tip of scutellum, epicnemium, mesosternum, lower half of mesopleurum, abdominal venter, and sides of abdomen, yellow. Legs yellow to yellowish brown. Fore and middle coxae and trochanters yellow. Hind coxa largely brownish or yellow with large black or brown patches. Hind femur brown. Hind coxa largely yellow in specimens from Ontario and blackish in specimens from Alaska. Tergites 2 and 3 often with triangular yellow patches or with their apical margins yellow. In males the yellow along the inner orbits extending only to the level of antennal sockets, temple yellow on its lower 0.3, and thorax almost wholly black. The color is quite variable.

The European specimens were not examined to ascertain the range of variation. Kerrich (1952: 434) and Kasparyan (1990: 45) have described this species in detail.

Egg.—(Fig. 6, 11, 21). Egg small, oval, with a short apicoventral stalk and a button-like anchor.

Length.—6.0-8.5 mm.; fore wing 5.0-7.0 mm.; ovipositor 0.4-0.6 mm. Kerrich (1952) stated that a female measuring 4.0 mm. was seen from Lapland.

Specimens examined.—CANADA: Quebec: Stoneham, 1 male, 1 female, 21.VI.1938, H. & M. Townes. U.S.A.: New Hampshire: Pinkham Notch, 1 female, 25.VI.1938, H. & M. Townes; Mt. Madison, 3 males, 24.VI.1938, H. & M. Townes. Vermont: L. Willoughby, 2 male, 17, 25.VI.1945, C.P. Alexander. (Types and paratypes in AEI, Gainesville). Non-type material: U.S.A.: Oregon: Corvallis, 2 males, 1 female, V-VII. 1978, H. & M. Townes. Alaska: Anchorage, 1 female, 6-16.VII.1976, Petre Rush. CANADA: Ontario: Cumberland, 1 male, 3 females, VI.1975, L. Ling.

Distribution.—U.S.A., Canada, Europe (Britain, France, Belgium, Germany, Sweden), Russia, Japan.

3. *Orthomiscus simplex* (Mason)

Figs. 26-30, 42

Kristotomus simplex Mason, 1966. Canadian Entomologist, 98: 46. M, F. key, des., fig. Type: Female, Japan: Nagano Prefecture: Kamikochi (GAINESVILLE. Examined. — Kasparyan, 1976. Entomologicheskoe Obozrenie, 55: 150. (Entomological Review, 55: 108). key.

Orthomiscus simplex: Gupta, 1990. Contrib. Amer. Ent. Inst., 25 (6): 8. n. comb. — Kasparyan, 1990. Fauna of USSR Insecta, Hymenoptera, 3 (2): 44. key, des., fig. Japan.

Diagnostic features.—Mandible widened apically, its lower tooth wider and longer than the upper (Fig. 27). Hypostomal carina slightly raised at its junction with occipital carina (Fig. 42). Basal vein of fore wing curved. Egg reniform-ovate, with a short central stalk and a simple anchor. Egg surface coarsely granular. Head and thorax in female yellow on lower half and black on upper half, in male largely black. Abdominal tergites black, their apical margins yellow.

Male and female.—Scape about 1.5x as long as wide. Flagellum with 24 segments. First flagellar segment 1.4x as long as the second. Face (and rest of head also) smooth and shiny. Mandible widened apically, the lower tooth wider and slightly longer than the upper (Fig. 27). Malar space 0.4x the basal width of mandible. Maxillary palp segments normal, not swollen. (Fig. 42). Hypostomal carina slightly raised at its junction with occipital carina (Fig. 42). Vertex widened behind eyes (Fig. 26). Interocellar distance 0.4x the ocellular distance.

Thorax largely smooth and shiny. Notauli distinct anteriorly. Lateral carinae of scutellum distinct. Epomia normal, not very sharp. Epicnemial carina extending to half the height of mesopleurum. Sternaulus indistinct. Propodeum normally areolated. Petiolar area small and round. Apical transverse carina uniformly curved between its junction with lateral longitudinal carinae. Basal vein in fore wing medially curved, more strongly so than in the preceding species. Second intercubitus of areolet sometimes absent.

Abdomen smooth and shiny. Tergite 1 about 2.25x as long as its apical width, its dorsomedian carinae extending up to about 0.75 its length, its dorsolateral carina complete, sinuate and passing just above the spiracle (Fig. 28). Tergite 2 with weak basolateral oblique grooves. Female subgenital plate strongly creased and pointed apically. Ovipositor (Fig. 29) somewhat slender and cylindrical, its teeth weak but present at the tip. Ovipositor sheaths small and slender. Male claspers broader than in other species.

Color.—Ground color black. Male comparatively darker than the female. Face, clypeus, mandibles, lower half of temples, pronotal collar, hind corner of pronotum, whole of fore and middle legs, hind coxae and trochanters, and abdominal venter, yellow. Ventral side of scape and pedicel and apex of scutellum yellowish-brown. Hind

femur, tibia and tarsus blackish brown (male) to yellowish brown (female). Pronotum of female more extensively yellow and mesosternum and lower part of mesopleurum may also be yellow. Abdominal tergites black with yellow apical stripes, particularly on tergites 2-3.

Egg.—Reniform-ovate (Fig. 30). Stalk shorter than its own diameter, arising near the middle of the egg. Anchor about 0.33 as long as the egg, flat and oval. Egg surface coarsely granular.

Length.—4.5-6.5 mm.; fore wing 4.5-6.0 mm.; ovipositor about 0.5 mm. long.

Specimens examined.—JAPAN: Nagano Prefecture: Kamikochi, 6 males and 2 females (holotype, allotype and paratypes), 23-31.VII.1954, Townes family (AEI, Gainesville).

Distribution.—Japan.

Discussion.—Mason (1966) placed this species under *Kristotomus*, stating that it was the most primitive member of the genus and closely related to *Orthomiscus*, particularly in the structure of the egg and development of the dorsolateral carina of the petiole. Apart from the widened mandible, this species shares most characters of *Orthomiscus*, particularly the structure of the ovipositor, in which the lower valve has teeth-like indentations. The dorsolateral carina of the petiole and the egg structure also relate it to the present genus.

4. *Orthomiscus medusae* Kasparyan

Figs. 7, 10, 31, 38, 41

Orthomiscus medusae Kasparyan, 1976. Entomologicheskoe Obozrenie, 55: 140 (Entomological Review, 55 (1): 99). M, F. des., fig. Type: Female, Russia: Sakhalin: Kunashir Island (ST. PETERSBURG). Examined. — Kasparyan, 1990. Fauna of USSR Insecta, Hymenoptera, 3 (2): 42. key, des., fig. Russia.

Diagnostic features.—Mandible widened apically, the lower tooth longer than the upper (Fig. 31). Hypostomal carina raised at its junction with occipital carina. Scutellum subconvex. Basal vein of fore wing strongly curved medially (Fig. 38). Tergite 2 with very faint to indistinct oblique grooves. Female subgenital plate convex ventrally, not sharply creased. Egg (Figs. 7, 10) with a short medioventral stalk and a four-pronged anchor enclosing the egg. Thorax and abdomen black; sometimes pronotal collar and prosternum yellow and tergites 2-3 with yellow marks, particularly in females.

Male and female.—Flagellum with 23-24 segments in male and 25-27 segments in female. First flagellar segment about 1.3x as long as the second. Face and clypeus subpolished, with sparse punctures. Malar space about 0.33–0.4x (male) to 0.4–0.5x (female) the basal width of mandible. Mandible slightly widened apically (Fig. 31), its lower tooth a little longer than the upper. Maxillary palp slender, normal (Fig. 41). Vertex widened posteriorly, smooth and shiny. Interocellar distance 0.25x the ocellocular distance.

Epomia present but not very strong. Notauli distinct to middle of mesoscutum. Scutellum subconvex, its lateral carinae confined to base. Epicnemial carina strong, ending in middle of hind margin of pronotum. Sternaulus weakly indicated anteriorly. Propodeum areolated but its longitudinal dorsal and sublateral carinae quite often erased beyond the costulae or absent; combined length of basal area and areola approximately 1.5x the length of apical area (according to the original description). In one paratype and in the Japanese specimens examined in the AEI collection, the areola is narrow, 2.0x as long as wide, confluent with the basal area, and a little widened at the costulae. Basal vein curved medially (Fig. 38). Tarsal claws with a pair of weak teeth at base.

Tergite 1 2.0x as long as its apical width; its dorsomedian carinae extending to 0.75 its length and its dorsolateral carinae strong and complete. Postpetiole with a median oval depression. Tergite 2 with rather weak oblique basolateral impressions. Female subgenital plate convex, not strongly creased ventrally, apically narrow and pinched. Ovipositor stout (Fig. 10). Ovipositor sheaths broad.

Color.—Ground color black. Scape and pedicel reddish brown dorsally and lighter ventrally. Flagellum yellow. Face, clypeus, mouthparts, and lower half of temple, yellow. Thorax black with pronotal collar and prosternum yellow in female. Apex of scutellum brown. Coxae and trochanters yellow. Fore and middle legs otherwise yellowish brown. Hind femur, tibia and tarsus blackish brown. Abdomen black with tergites 2 and 3 with triangular yellow marks. Tergite 4 with a faint yellow mark in the paratype examined. In one male studied only yellow apical lines are present on the abdominal tergites.

Egg.—Oval in shape (Fig. 7, 10), with a medioventral short stalk, its anchor four-pronged,

enclosing part of the egg, somewhat similar to that seen in *O. platyura*.

Length.—7.0–9.0 mm.; fore wing 5.5–7.0 mm.; Ovipositor about 0.5 mm.

Specimens examined.—RUSSIA: SAKHALIN: Kunashir Island: Sernovodsk, 1 female (paratype), 26.VIII.1973, D. R. Kasparyan. JAPAN: Nagano Prefecture: Kamikochi, 1 male, 22.VII.1954, 1 male, 24.VII.1954 (labeled *O. uncinatus* Tow.), Townes family (AEI, Gainesville).

Distribution.—Russia, Japan.

Relationships.—Structurally this species is close to *O. simplex* (Mason) from which it differs mainly in the complex structure of the egg anchor, black mesopleurum, male tarsal claws with a pair of weak teeth at base, female subgenital plate convex but not strongly creased ventrally and by possessing a comparatively thicker ovipositor. The egg structure relates it to *O. platyura*.

5. *Orthomiscus platyura* Mason

Figs. 1-5, 15-18, 37, 40

Orthomiscus platyura Mason, 1955. Canadian Journal of Zoology, 33: 66. M, F. key, des., fig. Type: Female, U.S.A.: Rhode Island: Westerly (GAINESVILLE). Examined. — Carlson, 1979. Catalog of Hymenoptera in America North of Mexico, 1:377. cat. U.S.A. New Hampshire, Vermont, California. Canada: Quebec, Ontario.

Diagnostic features.—Areola narrow, parallel-sided and confluent or partly separated from the basal area. Tergite 2 with rather deep oblique basolateral grooves. Ovipositor stout, its sheaths broadly triangular. Egg with a four-lobed anchor, as large as the egg. Scutellum mostly yellow. Hind coxa yellow. Abdominal tergites beyond first reddish brown to reddish yellow.

Male and female.—Scape about 1.5x as long as wide. Flagellum with 24 segments in male and 26 segments in female. First segment 1.32 to 1.35x as long as the second segment. Face (Fig. 15) polished, depressed laterally. Clypeus convex and polished. Mandibular teeth subequal, upper tooth slightly longer than the lower. Malar space 0.45x the basal width of mandible. Second segment of maxillary palp slender and similar to other segments (Fig. 40). Vertex polished, quadrate, widened behind eyes, 1.75x as wide as eye in dorsal view. Interocellar distance 0.22x the ocellocular distance. Temple in lateral view 1.7x to 1.75x as wide as eye.

Thorax mostly smooth and shiny. Mesoscutum convex, pubescent. Notauli deep and distinct to middle of mesoscutum. Scutellum flat, with lateral carina confined to base. Pronotum somewhat dull, epomia strong and extending close to upper edge of pronotum. Epicnemium dull, epicnemial carina strong and extending to 0.75 the height of mesopleurum. Sternaulus indicated on anterior 0.4 of mesopleurum. Propodeum convex, shiny. Areola narrow, parallel-sided, about 2.0x as long as wide (Fig. 3), confluent with basal area or only partly separated from it.

Abdomen shiny. Tergite 1 2.0x as wide at apex as at base, about 2.0x as long as its apical width, its dorsomedian carinae extending up to about 0.8 its length (carinae weaker apically, widened, and enclosing a depressed area between them), its dorsolateral carina complete and strong (Fig. 17). Tergite 2 with deep, oblique, basolateral grooves. Ovipositor thick, decurved (Fig. 18). Ovipositor sheaths short, broadly triangular.

Color.—Black and yellow. Lower 0.66 of head, scape, flagellum beyond 4th segment, pronotum, scutellum, metascutellum, prosternum, mesosternum, lower part of mesopleurum, fore and middle coxae and trochanters, sternites, ovipositor sheaths, and subgenital plate, yellow. Legs otherwise and abdomen (except tergite 1), yellowish brown. Tergite 1 black. Brown to blackish patches present on abdominal tergites and pronotum. Wings hyaline.

Egg.—(Figs. 4, 5, 18). Short, oval, ventrally flat and bearing on nearly half its length a short but wide stalk; egg anchor large and enclosing most of the egg. Anchor bearing two long posterior and two long anterolateral arms that extend toward the dorsal surface of the egg.

Length.—6.0–8.0 mm.; fore wing 5.0–6.5 mm.; ovipositor about 0.4 mm.

Specimens examined.—CANADA: Ontario: Cumberland, 1 female, 11.VI.1975, L. Ling. U.S.A.: Rhode Island: Westerly, 1 male, 2 females, 9–11.VI.1936, M. Chapman. New York: McLean Bogs, Tompkins Co., 1 female, 30.VI.1939, J. G. Franclemont. New Jersey: Tabernacle, 1 male, 11.VI.1939, H. K. Townes; Millwood, 1 female, 21.VI.1936, H. K. Townes. Maryland: Takoma Park, 1 male, 2.VII.1944, H. & M. Townes. Pennsylvania: Trout Run, 1 female, 29.V.1938, H. K. Townes; Spring Brook, 1 female, 27.VI.1945, H. K. Townes; Michigan: Huron Mts., 2 males, 2 females, VI.1961, H. & M. Townes; Iron River, 1 female, 23.VI.1969,

H. & M. Townes. South Carolina: Cleveland, 3 females, V–VI.1971, G. Townes. Alabama: Gulf Shores, 1 male, 22.IV.1968, H. & M. Townes. All these specimens are in the AEI collection at Gainesville, and those collected prior to 1955 are paratypes (see Mason, 1955: 67). Additional paratypes were described by Mason from Maine, Vermont, New Hampshire, Massachusetts, Connecticut, and Quebec.

Distribution.—U.S.A., Canada.

6. *Orthomiscus eridolius* Kasparyan

Figs. 9, 14, 24–25

Orthomiscus eridolius Kasparyan, 1990. Fauna of USSR Insecta, Hymenoptera, 3(2):44. M. F. key, des., fig. Type: Female, Russia: Far East: Khabovsk Region (ST. PETERSBURG). Paratypes examined.

This species has been described in detail by Kasparyan (1990). Structurally it resembles *O. simplex* (Mason) but shows differences in the curvature of the basal vein, shape of the areola, shape of tergite 2, and in the egg structure. The diagnostic features are given below.

Diagnosis.—Temple more buccate than in *O. simplex*. Mandibular teeth equal. Epomia present, moderately strong. Areola slightly widened at its junction with costulae and confluent with basal area. Apical transverse carina of propodeum angulate at its junction with lateral and median longitudinal carinae. Petiolar area appearing pentagonal. Basal vein of fore wing only slightly curved near its junction with the medius vein. Nervellus intercepted at its lower 0.15–0.2. Tergite 2 without oblique grooves. Ovipositor short and thick (Fig. 25). Ovipositor sheaths short, tapered. Egg (Figs. 9, 14, 25) oval, with a ventral flattened anchor that encloses almost half of the egg.

Coloration essentially similar to that of *O. simplex*. Head and thorax in female yellow in lower half and black in upper half. Mesosternum of female black or brownish-black. Face of male partly yellow. Abdomen beyond tergite 1 brownish black, with yellow spots. Mesosternum black in female. Face of male largely black.

Length.—4.5–6.0 mm.; fore wing 3.8–4.8 mm.; ovipositor about 0.4 mm.

Distribution.—Russia: Far Eastern Region.

Orthomiscus amurensis Kasparyan, 1986 is hereby transferred to *Kristotomus*.

Kristotomus amurensis (Kasparyan),
new combination
Figs. 13, 32-35

Orthomiscus amurensis Kasparyan, 1986: 55. Kasparyan, 1990. Fauna of USSR Insecta, Hymenoptera, 3 (2): 40. key, des., fig. Type: Female, Russia: Far East: Khabovzavodsk Region (ST. PETERSBURG). Examined.

The holotype of this species was examined in 1992. The ovipositor and its sheaths are tapered and slender and both extend beyond the apex of abdomen. The lower valve of the ovipositor is without teeth. The egg has a simple stalk and anchor. The interocellar distance is about 0.8x the ocellular distance. The malar space is 0.5x the basal width of mandible. The temple is moderately swollen, and is about as wide as the eye width. The dorsolateral carina of tergite 1 is interrupted just above the spiracle.

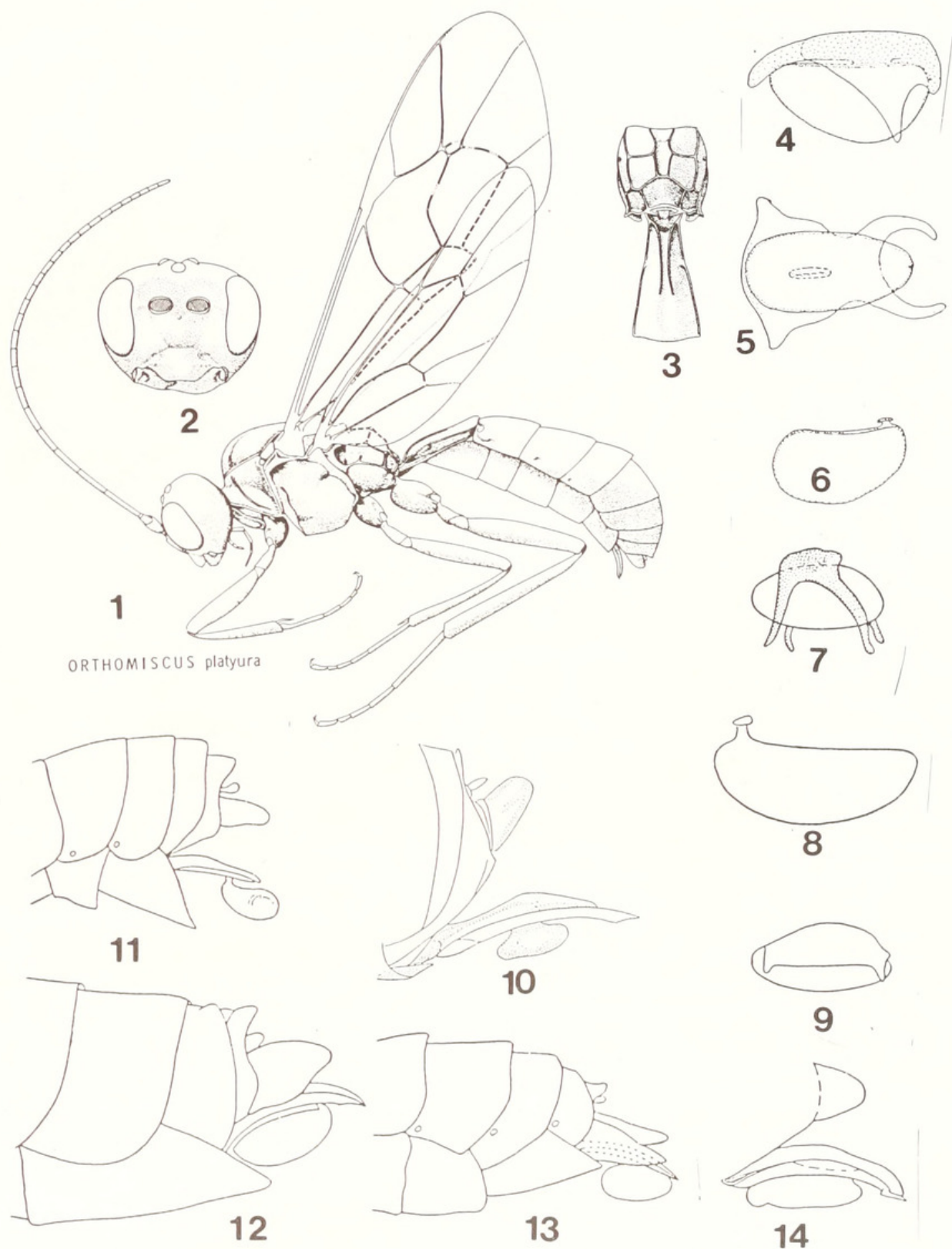
The above mentioned characters and the general body form would place this species in *Kristotomus*, to which genus this species is hereby transferred. It appears related to *Kristotomus buccatus* Kasparyan.

ACKNOWLEDGMENTS

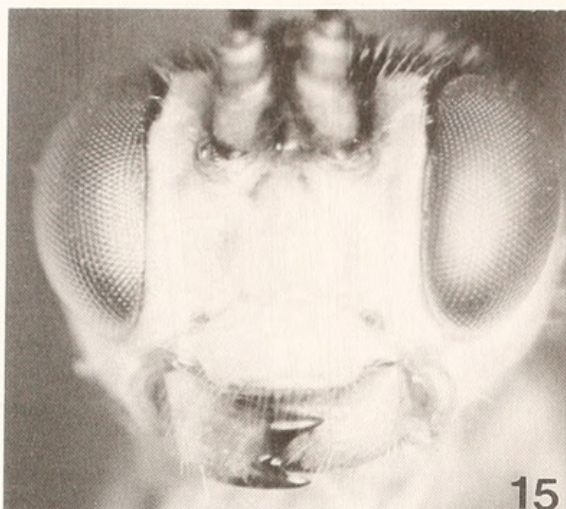
My thanks are due to Dr. D. R. Kasparyan (St. Petersburg) for the loan of the type specimens and for his comments. The collections of the American Entomological Institute (AEI) were readily available for my studies, for which I am thankful to the President of the Institute. The draft of the paper was kindly read by and commented upon by Drs. John Barron and Charles Porter and their comments have been incorporated. I am also thankful to Mr. Andrei Sourakov for translating Kasparyan's key to the Russian species of the genus for my use. Subsequently I received a similar translation from Dr. Kasparyan. The use of published figures from the works of Henry Townes, D. R. Kasparyan and W. R. M. Mason is duly acknowledged and the source is cited under figure legends.

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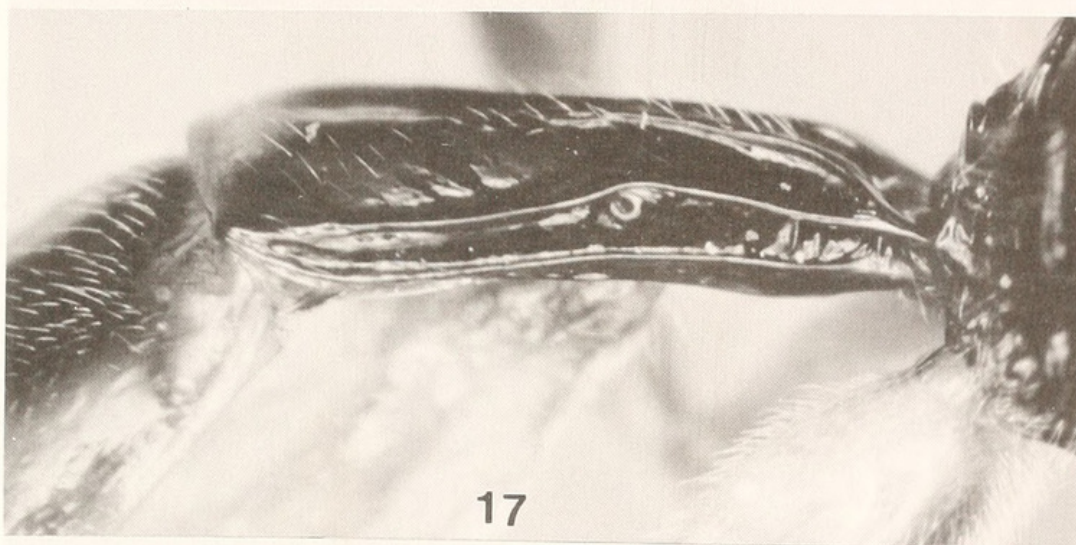
Figs. 1-14. 1-5. *Orthomiscus platyura* Mason: 1, habitus; 2, head; 3, propodeum and tergite 1; 4, lateral view of egg; 5, ventral view of egg. Figs. 6-9. Lateral view of egg of: 6, *O. uncinatus* (Holmgren); 7, *O. medusae* Kasparyan; 8, *O. pectoralis* Hellén; 9, *O. eridolius* Kasparyan. Figs. 10-14. Apex of abdomen showing subgenital plate, ovipositor and ovipositor sheath of: 10, *O. medusae*; 11, *O. uncinatus*; 12, *O. pectoralis*; 13, *O. [=Kristotomus] amurensis* (Kasparyan); 14, *O. eridolius*. [Figs. 1-3 after Townes, 1969; 4-6 after Mason, 1955; 7-14 after Kasparyan, 1990.]



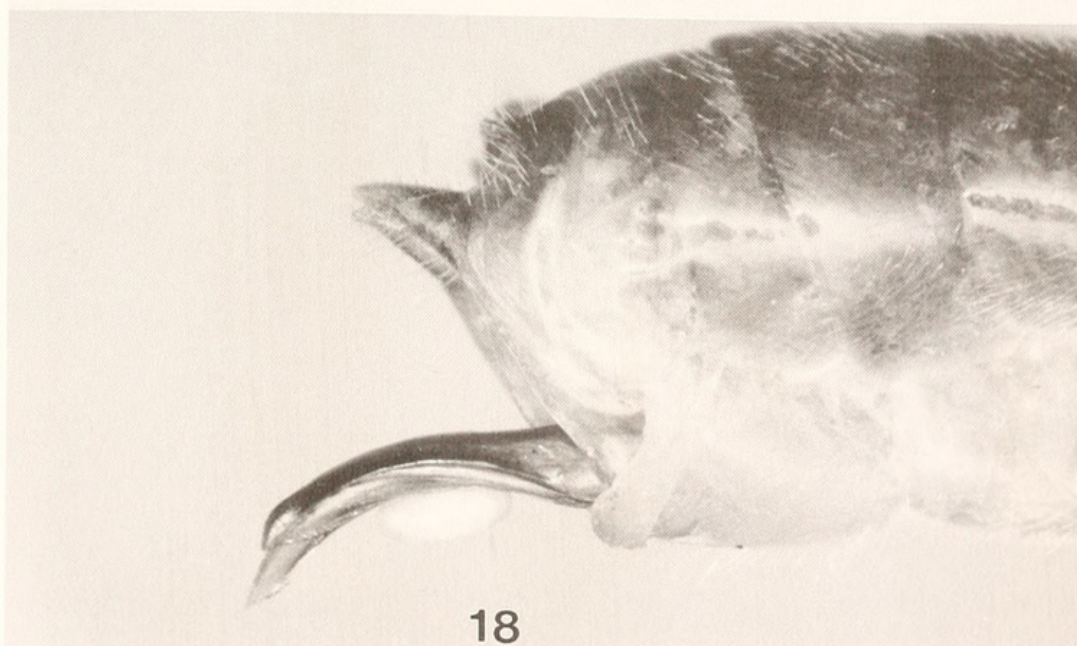
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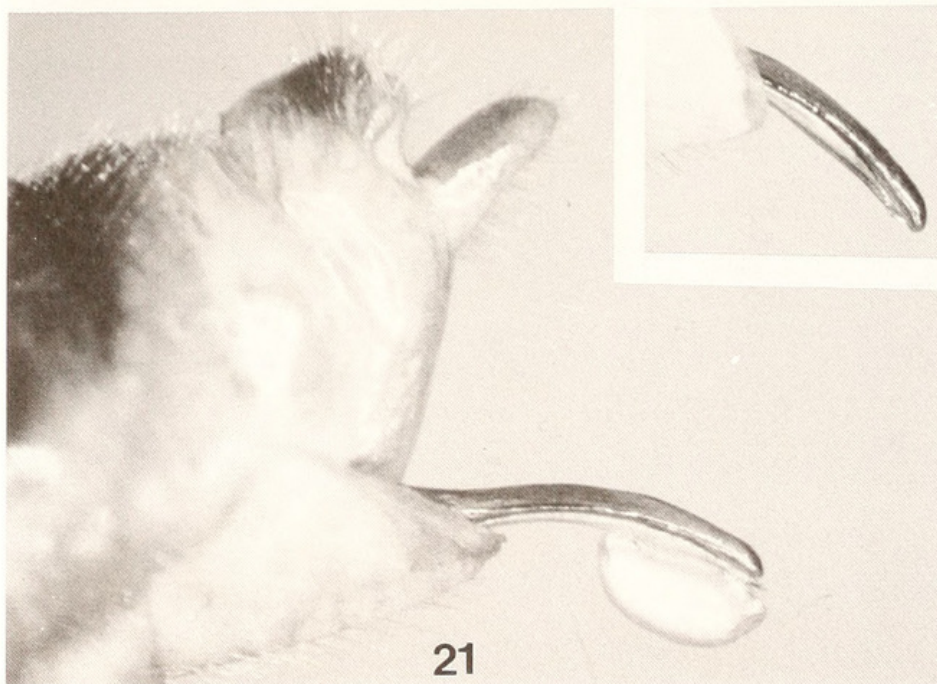
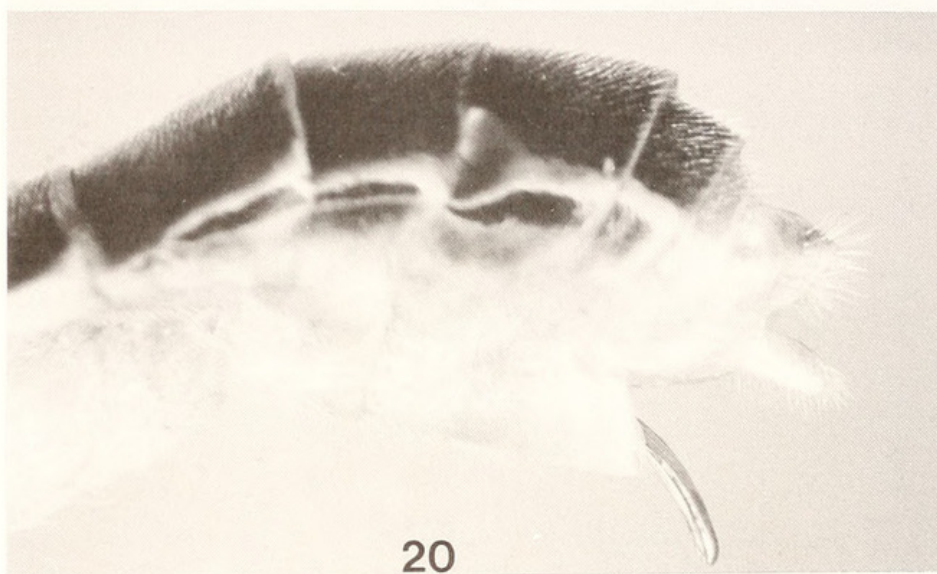


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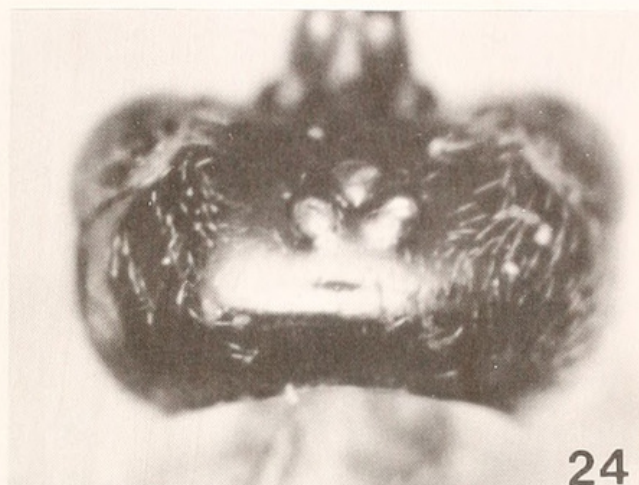
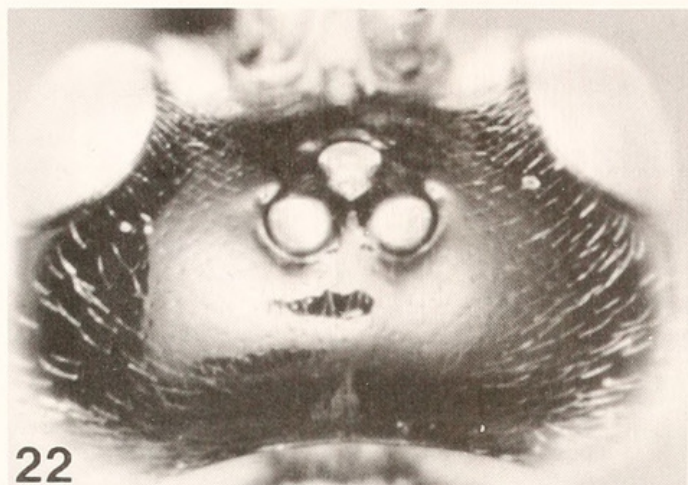


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Figs. 15-18. *O. platyura*: 15, face and mandible; 16, tip of abdomen showing ovipositor, subgenital plate and ovipositor sheath; 17, tergite 1; 18, enlarged view of ovipositor + egg.



Figs. 19-21. *Orthomiscus unicinctus*: 19, tergite 1; 20, apical half of abdomen; 21, ovipositor with egg, ovipositor sheath and subgenital plate. [Photos taken from specimens of *O. leptura* Mason.]



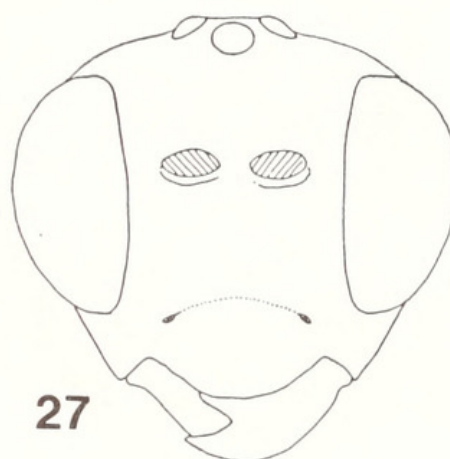
Figs. 22-25. 22, vertex of *Orthomiscus uncinatus*; 23, propodeum of *O. uncinatus*; 24, vertex of *O. eridolius*; 25, ovipositor + egg of *O. eridolius*. [22-23 of *O. leptura* Mason; 24-25 from holotype of *eridolius*.]



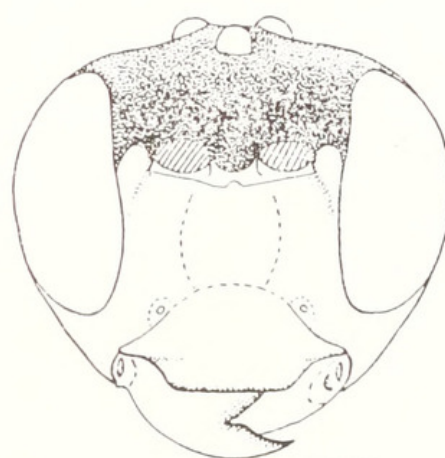
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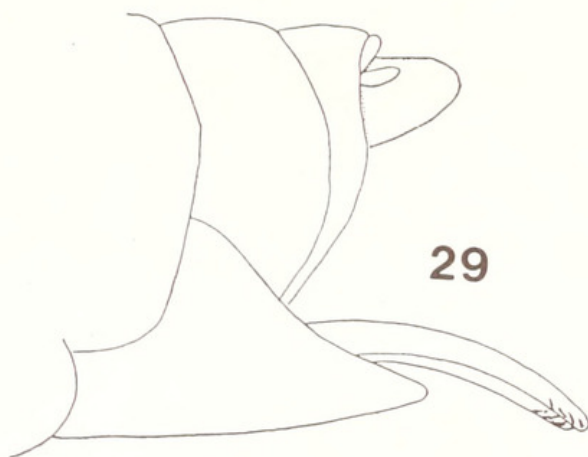
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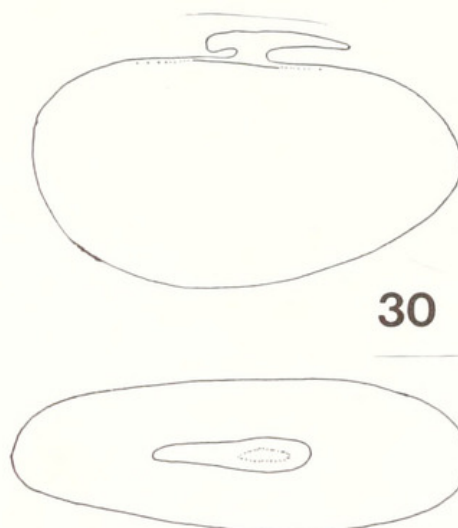
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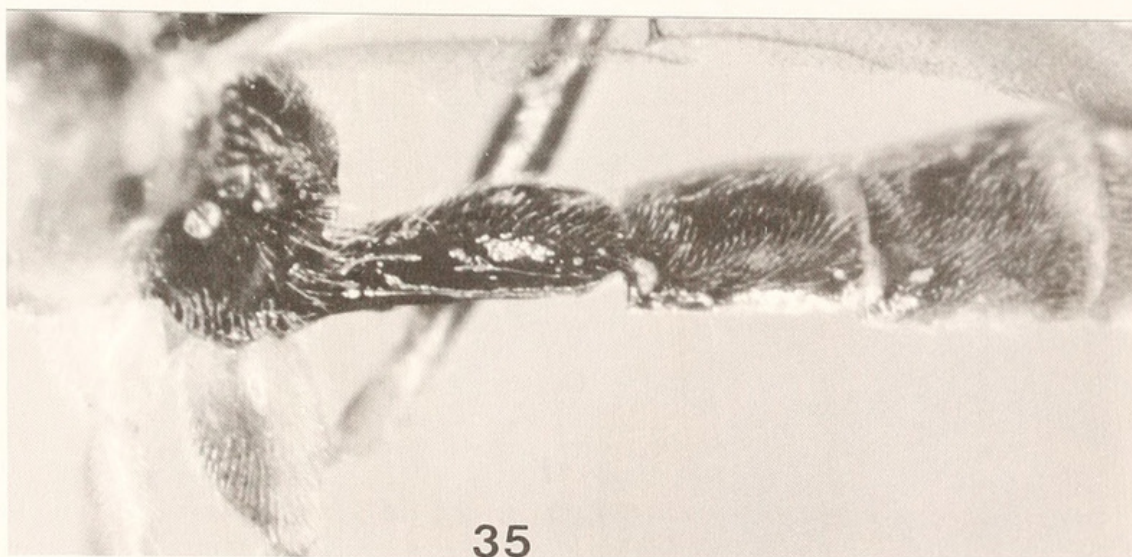
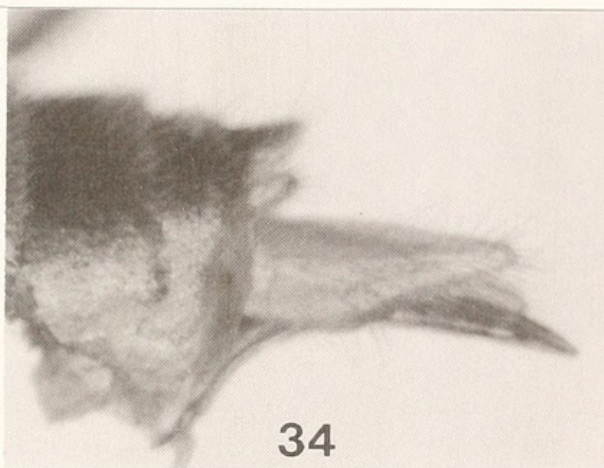
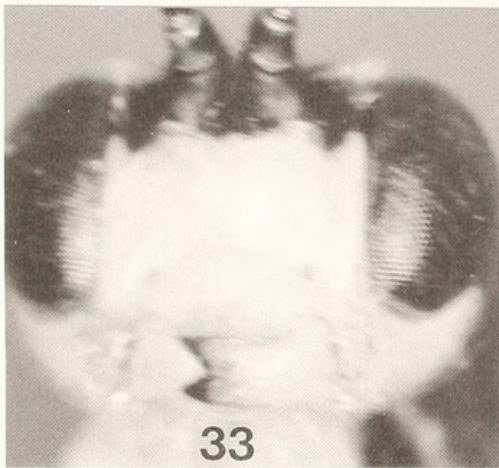


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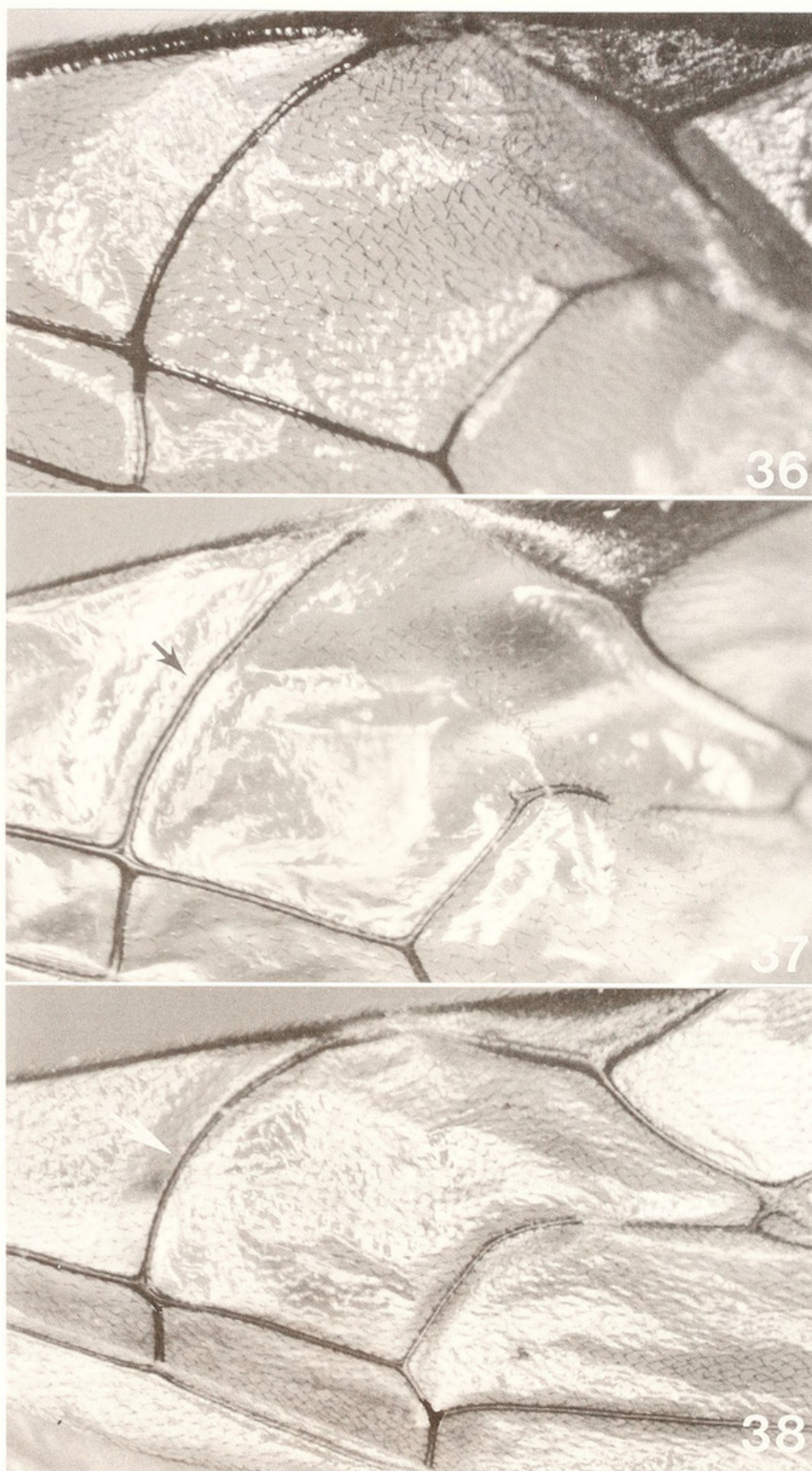


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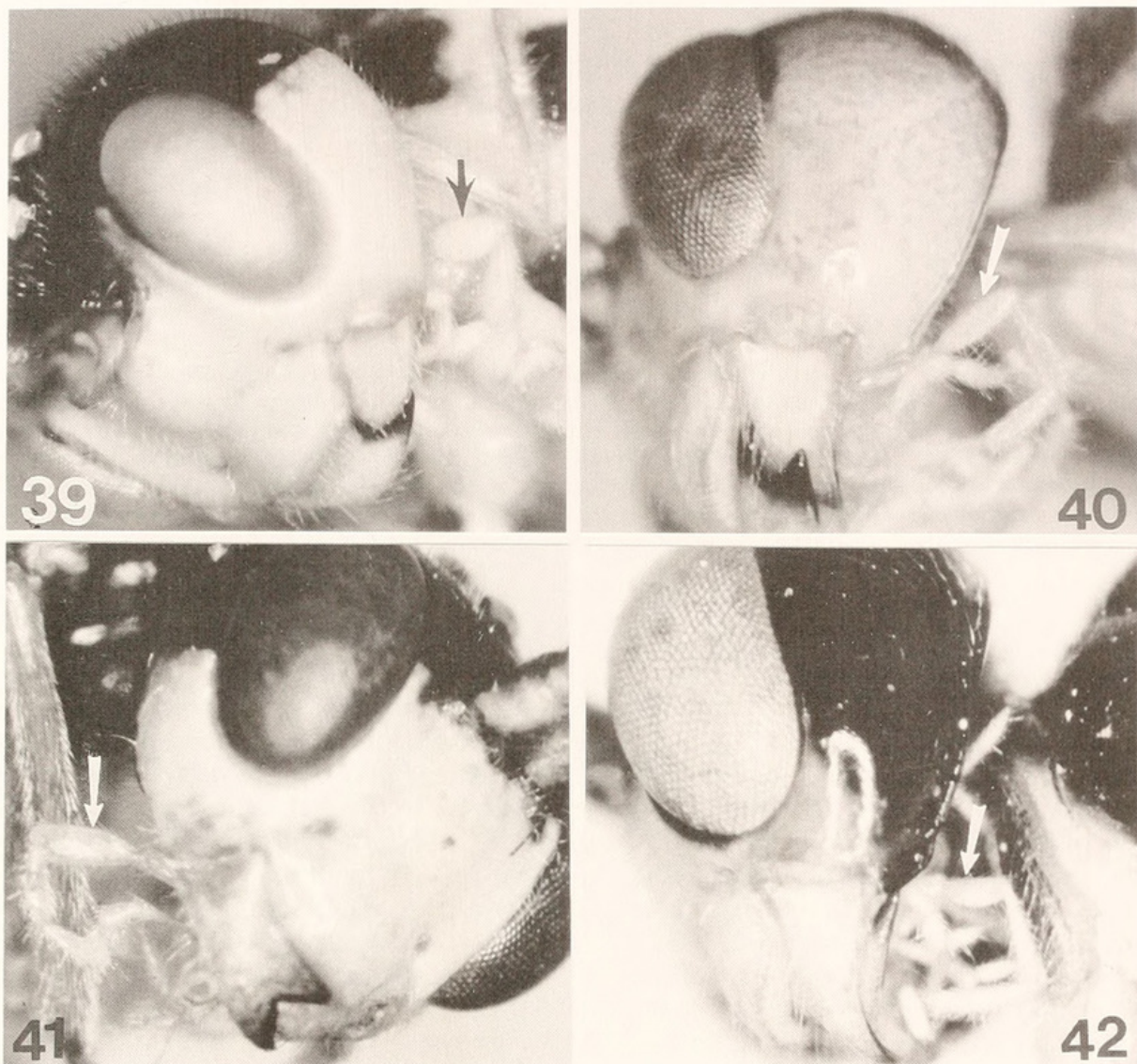
Figs. 26-31. 26-30. *Orthomiscus simplex* (Mason): 26, vertex; 27, face and mandible; 28, tergite 1; 29, tip of abdomen showing ovipositor and subgenital plate; 30, egg. 31, Face and mandible of *O. medusae*. [Figs. 27, 29, 30 after Mason, 1966; 26 and 28 of paratype and 30 after Kasparyan, 1990.]



Figs. 32-35. *Kristotomus amurensis* (Kasparyan): 32, habitus; 33, face; 34, ovipositor and sheaths; 35, abdomen. [Photos of holotype, *Orthomiscus amurensis* Kasparyan.]



Figs. 36-38. Fore wing showing the curvature of the basal vein in: 36, *Orthomiscus uncinatus*; 37, *O. platyura*; 38, *O. medusae*.



Figs. 39-42. Maxillary palp: 39, *Orthomiscus unicinctus*; 40, *O. platyura*; 41, *O. medusae*; 42, *O. simplex*.



Gupta, V. 1994. "A Review of the World Species of *Orthomiscus* Mason (Hymenoptera: Ichneumonidae: Tryphoninae)." *Journal of Hymenoptera research* 3, 157–173.

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