Beitr. Ent., Berlin 26 (1976) 1, S. 5—47

Kagoshima University*
Faculty of Agriculture
Entomological Laboratory
Kagoshima (Japan)

Fukuoka University**
School of Medicine
Department of Parasitology
Fukuoka (Japan)

AKIRA NAGATOMI* & KUSUO IWATA**

Female terminalia of lower Brachycera — I

(Diptera)

With 34 text figures

Introduction

This paper describes and illustrates the female terminalia of the following families: Solvidae (= Xylomyidae), Xylophagidae s. lat. (Rachiceridae, Xylophagidae, Coenomyiidae and Exeretoneuridae), Rhagionidae s. lat. (Pelecorhynchidae and Rhagionidae), Athericidae and Vermileonidae as well as the genus *Austroleptis* (which probably belongs to the Rhagionidae). The paper on the female terminalia of Tabanidae is in press (by IWATA and NAGATOMI) and that on the Stratiomyidae and Pantophthalmidae is in preparation (by NAGATOMI and IWATA).

(1) STUCKENBERG (1973) separated *Atherix* et al. from Rhagionidae and erected the family Athericidae, (2) NAGATOMI (1975) defined the extent and limit of Coenomyiidae and (3) NAGATOMI (in press) modified the classification of the lower Brachycera adopted by BRAUER (1883), MALLOCH (1917), MACKERRAS and FULLER (1942), HENNIG (1967), etc. The present study will support the results mentioned by (1), (2), (3) just quoted.

Techniques and Terminology

The posterior part of abdomen cut off was put in 5—10% KOH for about 20 hours and then in 75% alcohol where the intestines of abdomen were removed by the aid of pincette. After washing it was mounted by Neo-shigaral (which is a commercial name and made by Shiga-kontyu-fukyu Company, Tokyo) and examined by 80—400 times microscope.

The abdomen is composed of 10 segments, each of which consists of sternum (or sternite) and tergum (or tergite), and an intersegmental membrane is present between each segment. There are a pair of cerci at the apex of abdomen. The sternum 9 is usually absent in the lower Brachycera. The tergum 10 is sometimes divided into a pair which often become very small or are entirely absent.

It must be noticed that the material examined was small both in number of individuals and species in each genus or family and not a few misinterpretations or hasty generalizations might be unavoidable.

In the illustrations, the genital furca may not be exactly drawn, and the following abbreviations are used: *A*: posterior part of abdomen, dorsal view; *B*: sternum 8, ventral view; *C*: cercus; *C1*: segment 1 of cercus; *C2*: segment 2 of cercus; *T7—10*: terga 7—10; *S8—10*: sterna 8—10.

Acknowledgements

We are much indebted to Dr. J. L. GRESSITT (Bishop Museum, Honolulu), Dr. S. ITO (University of Osaka Prefecture, Sakai), Professor Emeritus KUNIO IWATA (Kôbe University, Kôbe), Dr. K. KUSIGEMATI (Kagoshima University, Kagoshima), Drs. I. M. MACKERRAS and D. H. COLLESS (CSIRO, Canberra), Dr. L. L. PECHUMAN (Cornell University, Ithaca), Messrs. T. SAIGUSA and H. SHIMA (Kyushu University, Fukuoka), Dr. E. I. SCHLINGER (University of California, Berkeley),

DOI: 10.21248/contrib.entomol.26.1.5-47

Dr. B. R. STUCKENBERG (Natal Museum, Pietermaritzburg), Dr. S. TAKAGI (Hokkaido University, Sapporo) and Dr. I. TOGASHI (Ishikawa Agricultural College, Ishikawa Pref.) for their generous gift or loan of the material and to Dr. J. YUKAWA (Kagoshima University) for his assistance in many ways.

One of us (NAGATOMI) expresses his hearty thanks to Professor Emeritus M. SHIBUYA (Kagoshima University) and ProfessorEmeritus K. YASUMATSU (Kyushu University) and one of us (IWATA) expresses his sincere gratitude to Professor I. MIYAZAKI and Dr. T. KIFUNE (Fukuoka University) for their encouragement and support.

Key to families of lower Brachycera (excluding Pantophthalmidae) (based on ♀ terminalia)

1(2) A pair of cerci adjacent to each other or if not so, tergum 10 not protruded posteriorly 2
— A pair of cerci far distant from each other; tergum 10 conspicuously protruded posteriorly . . . . . Stratiomyidae

2(1) Cercus 2-segmented 3
— Cercus 1-segmented 11

3(2) Cercus simple in shape or its terminal segment distinct in situation 4
— Cercus peculiar in shape or its terminal segment not distinct in situation (when cercus is interpreted to be 2-segmented) (Figs. 31—32) . . . . Vermileonidae

4(3) Each segment of cercus elongate and segment 1 of cercus not dilated outward (or downward from a lateral view) 5
— No great difference present between length and width in each segment of cercus, and segment 1 of cercus dilated outward 10

5(4) Terga 7 and 8 wide or at least comparatively so 6
— Terga 7 and 8 elongate (much longer than wide) . . . . (Xylophagidae s. lat.) 7

6(5) In cercus, segment 1 conspicuously longer and wider than segment 2 (Figs. 1—3) . . . . . Solvidae
— In cercus, segment 1 not much larger and usually as long as or shorter than segment 2 . . . . (the genera *Atherimorpha*, *Ptiolina*, *Spania*, *Spaniopsis*, etc.) . . . . . Rhagionidae

7(5) Tergum 9 elongate; tergum 8 longer than in Coenomyiidae and Exeretoneuridae 8
— Tergum 9 wider than long; tergum 8 shorter than in Rachiceridae and Xylophagidae 9

8(7) Anterior margin of tergum 9 widely and deeply concave; sternum 8 thinner posteriorly and with lateral margin curved . . . . . Rachiceridae
— Tergum 9 rectangular; sternum 8 with lateral margins parallel sided . . . . . Xylophagidae

9(7) Tergum 9 not narrower than sternum 8 . . . . . Coenomyiidae
— Tergum 9 narrower than sternum 8 . . . . . Exeretoneuridae

10(4) Sternum 8 elongate, thinner posteriorly, with lateral margins roughly parallel sided, and with mid-posterior margin deeply concave; membranous part belonging to tergum 8 conspicuously developed (Fig. 11) . . . . Pelecorhynchidae
— Sternum 8 with lateral margins strongly curved; membranous part belonging to tergum 8 not so developed . . . . . Rhagionidae

11(2) Cercus simple 12
— Cercus with some (2 in principle) processes (Figs. 31—32) . . . Vermileonidae

12(11) Sternum 9 absent; terga 7 and 8 wider and intersegmental membrane between terga 7 and 8 hardly visible 13
— Sternum 9 present; terga 7 and 8 narrower and intersegmental membrane between terga 7 and 8 well developed . Genus *Austroleptis* (probably Rhagionidae)

13(12) Tergum 9 much larger than tergum 10 and not divided into a pair; mid-distal part of genital furca protruded anteriorly (toward base of abdomen) . Athericidae
— Tergum 9 is smaller than or as large as tergum 10 and is divided into a pair but in Pangoniinae it is not divided into a pair and sometimes larger than tergum 10; mid-distal part of genital furca is usually not protruded anteriorly . . . . . Tabanidae

DOI: 10.21248/contrib.entomol.26.1.5-47

Family Solvidae (=Xylomyidae) (Figs. 1—3)

Characters of family. Ovipositor is short and may be said to consist of abdominal segment 8 or 7—8. Intersegmental membrane between terga 7 and 8 is short or may be hardly visible and ovipositor may be not telescope. Cercus 2-segmented, with each segment elongate and segment 1 much larger than segment 2. Sternum 10 divided into a pair which are roughly an acute-angled triangular. Tergum 10 is small or may be entirely absent; in *Solva* (*Solva*) *procera*, it is divided into a pair which are elongate transversely and pointed inwardly. Tergum 9 is roughly rectangular (in *Solva* (*Macroceromys*) *galloisi*) or a pair of areas connecting with genital furca are strongly chitinous and the remainder becomes transparent membrane (in *Solva* (*Solva*) *japonica* and *S.* (*S.*) *procera*). Sternum 8 roughly a square or rectangular with basal margin narrower than the apical, and not longer than wide in 3 species examined. Tergum 8 wider than long and wider than sternum 8.

Solvidae are distinguished from Stratiomyidae by having a pair of segment 1 of cerci adjacent to each other and are distinguished from Rachiceridae, Xylophagidae, Coenomyiidae and Exeretoneuridae by having sternum 8 and tergum 8 wider and intersegmental membrane between terga 7 and 8 not well developed. Solvidae are superficially most similar to the genus *Spania* of Rhagionidae but are at once separated from the latter by having a pair of segment 1 of cerci more adjacent to each other and much larger than segment 2.

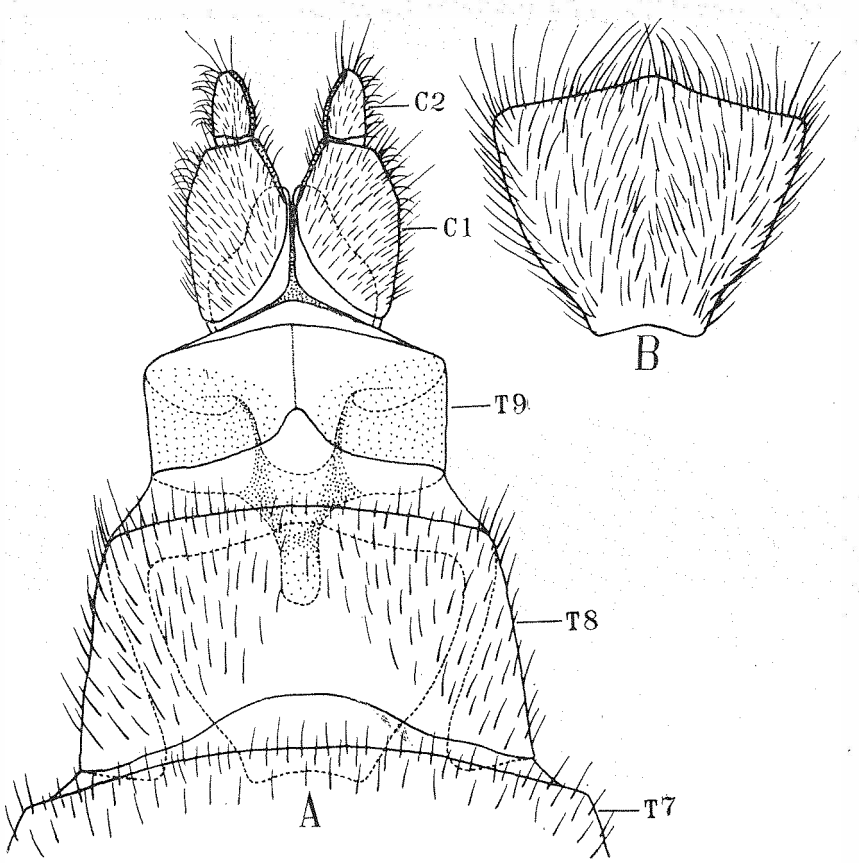

Fig. 1. *Solva* (*Macroceromys*) *galloisi* SÉGUY, 1956 (Solvidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

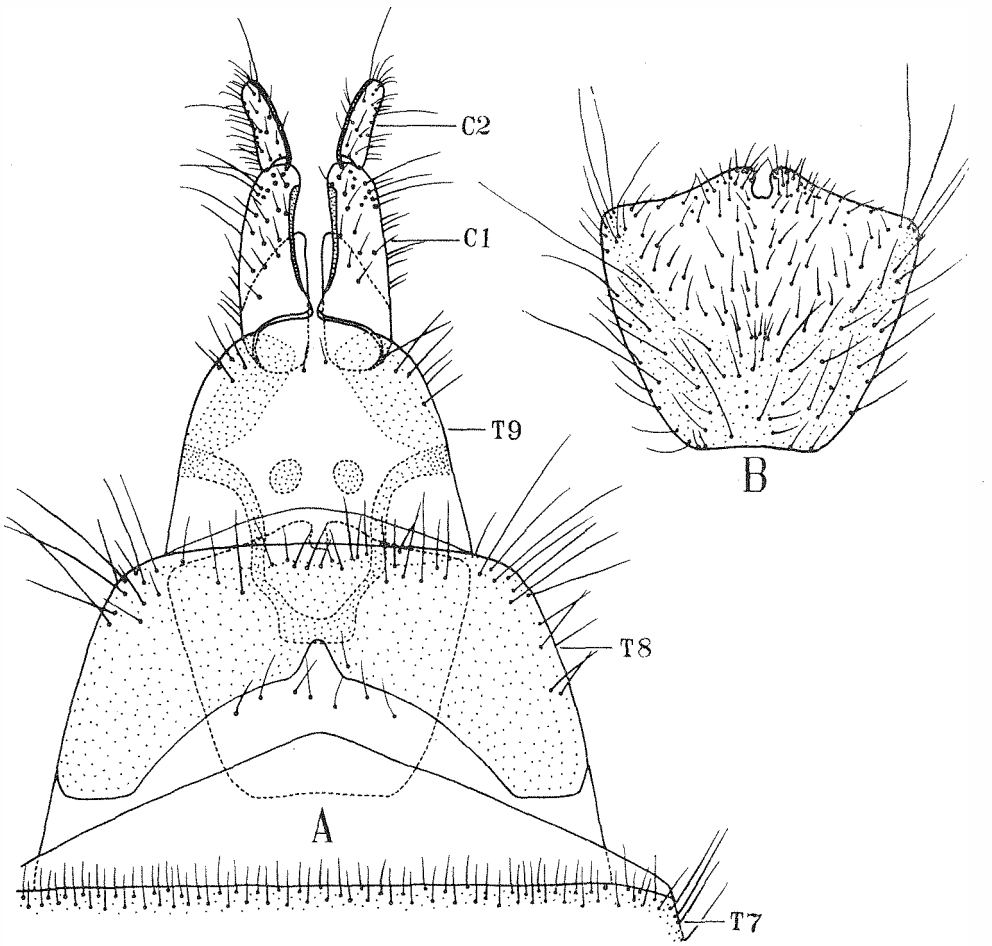

Fig. 2. *Solva* (*Solva*) *japonica* FREY, 1960 (Solvidae)

Characters of genus. *Solva* (*Macroceromys*) BIGOT, 1877 (= so called *Xylomya*) (Fig. 1): Tergum 9 roughly rectangular; cercus especially segment 1 wider than in *Solva* (*Solva*); transparent membrane belonging to tergum 8 hardly developed; species examined 1 in number.

Solva (*Solva*) WALKER, 1859 (Figs. 2—3): Of tergum 9 only a pair of areas connecting with genital furca strongly chitinous; each segment of cercus more elongate than in *Solva* (*Macroceromys*); transparent membrane belonging to tergum 8 more developed than in *Solva* (*Macroceromys*); species examined 2 in number.

Characters of species. *Solva* (*Macroceromys*) *galloisi* SÉGUY, 1956 (Fig. 1): There is transparent membrane connected with dorso-inner margin of segment 1 of cercus, and it is uncertain that this membrane belongs to cercus or tergum 10; sternum 8 appears to be not concave at middle of posterior margin and with anterior margin shorter than the posterior; tergum 8 not so strongly concave at anterior margin. Specimens dissected: 2♀, Senjodake, Shinano, 5. vii. 1963, A. NAGATOMI; 1♀, Senjodake, Shinano, 7. vii. 1963, S. UESHIMA.

DOI: 10.21248/contrib.entomol.26.1.5-47

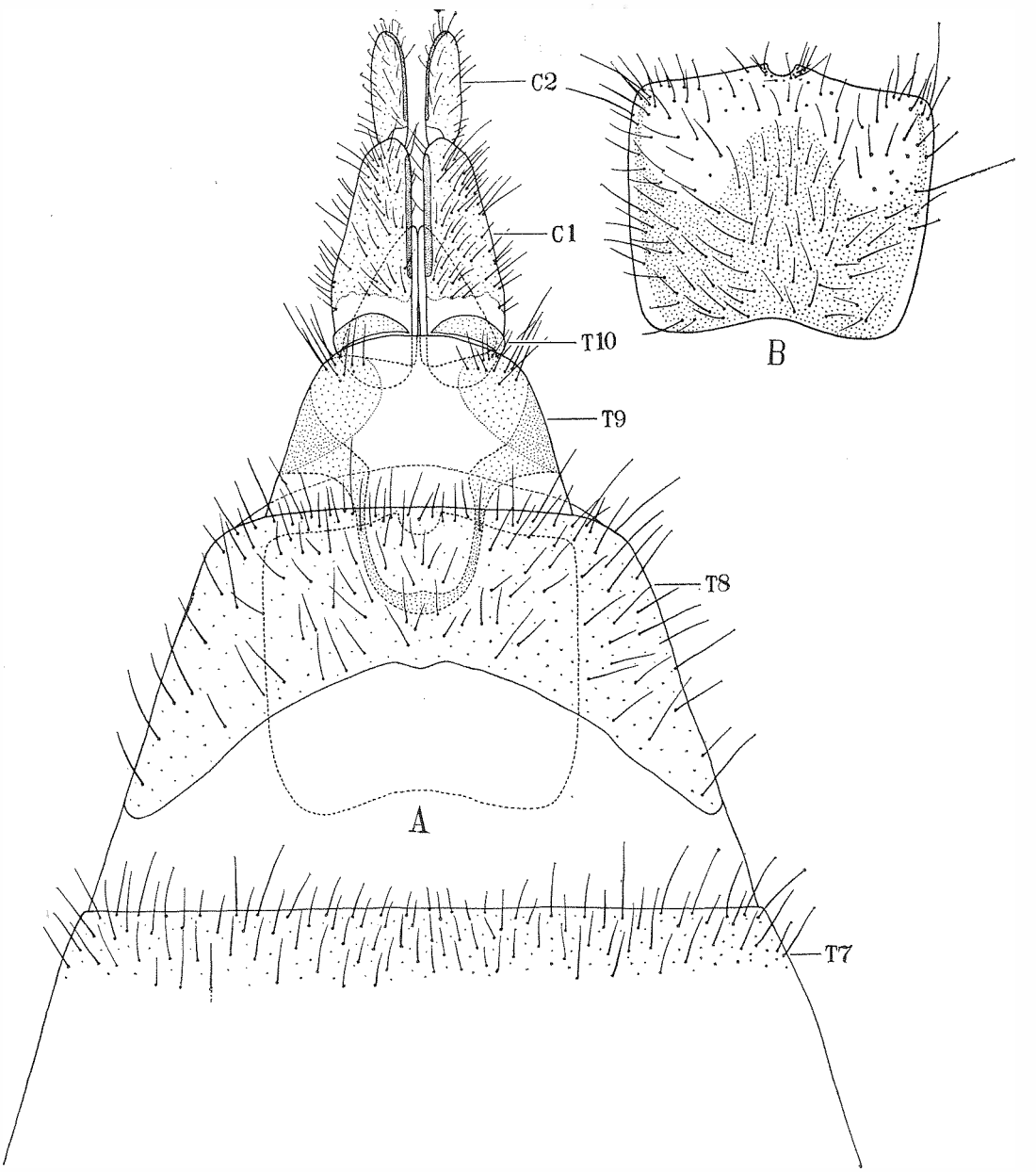

Fig. 3. *Solva* (*Solva*) *procera* (FREY, 1960) (Solvidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

Solva (*Solva*) *japonica* FREY, 1960 (Fig. 2): Tergum 10 appears to be entirely absent; a pair of strongly chitinous portions belonging to tergum 9 narrower than in *procera* and angular at an intersecting point between lateral and posterior margins; a pair of rounded chitinous portions are present and appear to be connected with genital furca by transparent membrane; sternum 8 concave to some extent at middle of posterior margin and its anterior margin shorter than the posterior; tergum 8 widely concave at anterior margin. Specimens dissected: 2♀, Ashoro, Hokkaido, 15. vii. 1964, A. NAGATOMI.

Solva (*Solva*) *procera* (FREY, 1960) (Fig. 3): Tergum 10 present and divided into a pair which are elongate transversely and pointed inwardly; a pair of strongly chitinous portion belonging to tergum 9 wider than in *japonica* and rounded at posterior margin; sternum 8 roughly a square and shallowly concave at middle of posterior margin; tergum 8 widely concave at anterior margin. Specimens dissected: 1♀, Kunimidake, Higo, 24. v. 1952, S. ITO; 2♀, Mt. Osuzu, Hyuga, 21. v. 1966, K. KUSIGEMATI.

Family Rachiceridae (Fig. 4)

Characters of family. Ovipositor composed of abdominal segments 6—8. Cercus 2-segmented and with each segment much longer than wide. It appears that sternum 10 is longer than wide and tapering posteriorly, and tergum 10 is divided into a pair which are very small, elongate transversely, and more strongly chitinous than cercus and sternum 10. Tergum 9 more strongly chitinous than cercus, tergum 8, and sternum 8, wider posteriorly, and with anterior margin widely and deeply concave. Sternum 8 very elongate and with apical portion thinner, rounded, and concave at middle. Tergum 8 very elongate, about 3 times as long as preceding intersegmental membrane, and its apical portion with strongly chitinous part. In segment 8, tergum is narrower than sternum, although their basal portions are subequal in width, and membrane between tergum and sternum is visible only at basal portion of segment. Some of the characters just mentioned may not be significant as the family diagnoses.

Rachiceridae are most closely related to Xylophagidae but may be distinguished from the latter in the following points: (1) ovipositor composed of abdominal segments 6—8, (2) tergum 10 present as a pair of small sclerite, (3) anterior margin of tergum 9 becoming a pair of elongate projections, (4) sternum 8 with lateral margin curved and apical portion thinner and rounded, and (5) intersegmental membrane between terga 7 and 8 shorter.

Specimen dissected. *Rachicerus* WALKER, 1854: *R. galloisi* SÉGUY, 1948: 1♀, Kosugidani, Yakushima, Kagoshima Pref., 27. vii. 1968, A. NAGATOMI.

Family Xylophagidae (Figs. 5—6)

Characters of family. Ovipositor composed of abdominal segments 7—8. Cercus 2-segmented and with each segment much longer than wide; in segment 1, a pair (except apical portion) entirely connected with each other. Sternum 10 convex posteriorly. Tergum 10 appears to be entirely absent. Tergum 9 roughly rectangular and longer than wide. Sternum 8 very elongate; apical margin appears to be concave and is not rounded (point between apical and lateral margins is angular). Tergum 8 very elongate an dabout 2 times as long as preceding intersegmental membrane. In segment 8, sternum is nearly equal in width to tergum, and membrane between tergum and sternum is well developed and is visible up to apical portion of segment.

Xylophagidae are most closely related to Rachiceridae but may be distinguished from the latter in the following points: (1) ovipositor composed of abdominal segments 7—8, (2) tergum 10 appears to be entirely absent, (3) tergum 9 roughly rectangular, (4) sternum 8 with lateral margins parallel sided and with apical portion not pointed, and (5) intersegmental membrane between terga 7 and 8 longer.

Characters of species. It is uncertain that significant difference is present between the species (at least in *matsumurai* and *sachalinensis*).

DOI: 10.21248/contrib.entomol.26.1.5-47

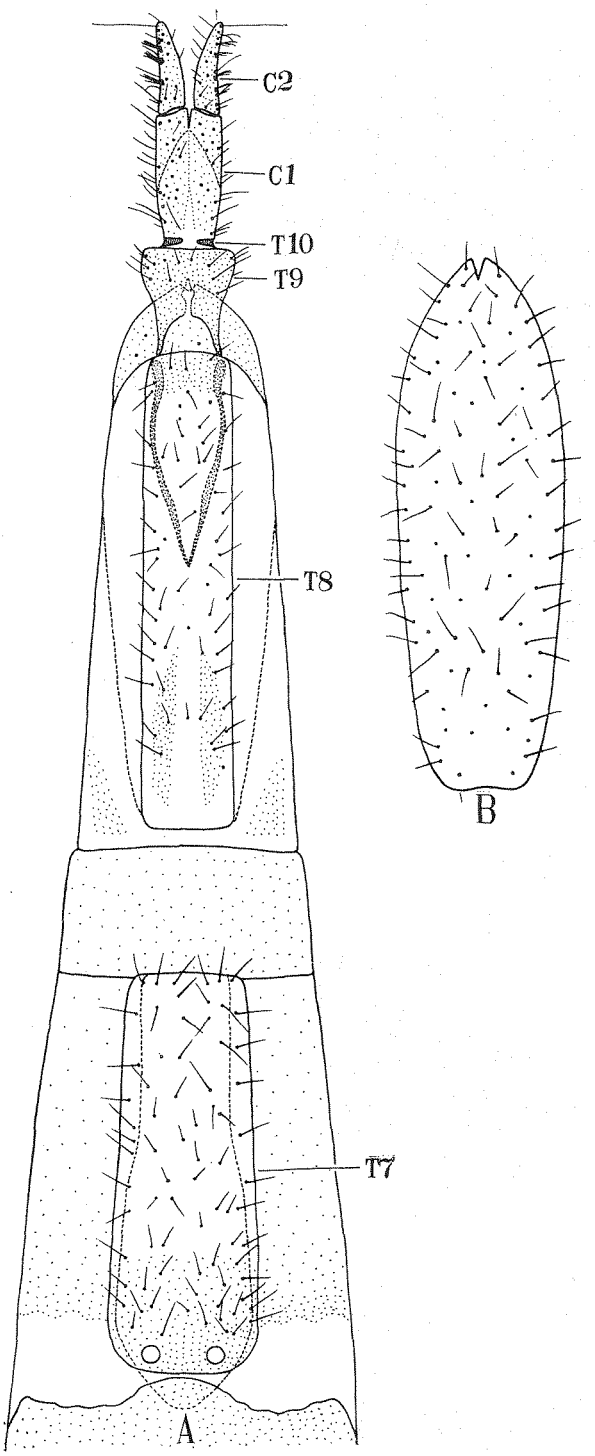

Fig. 4. *Rachicerus galloisi* SÉGUY, 1948 (Rachiceridae)

DOI: 10.21248/contrib.entomol.26.1.5-47

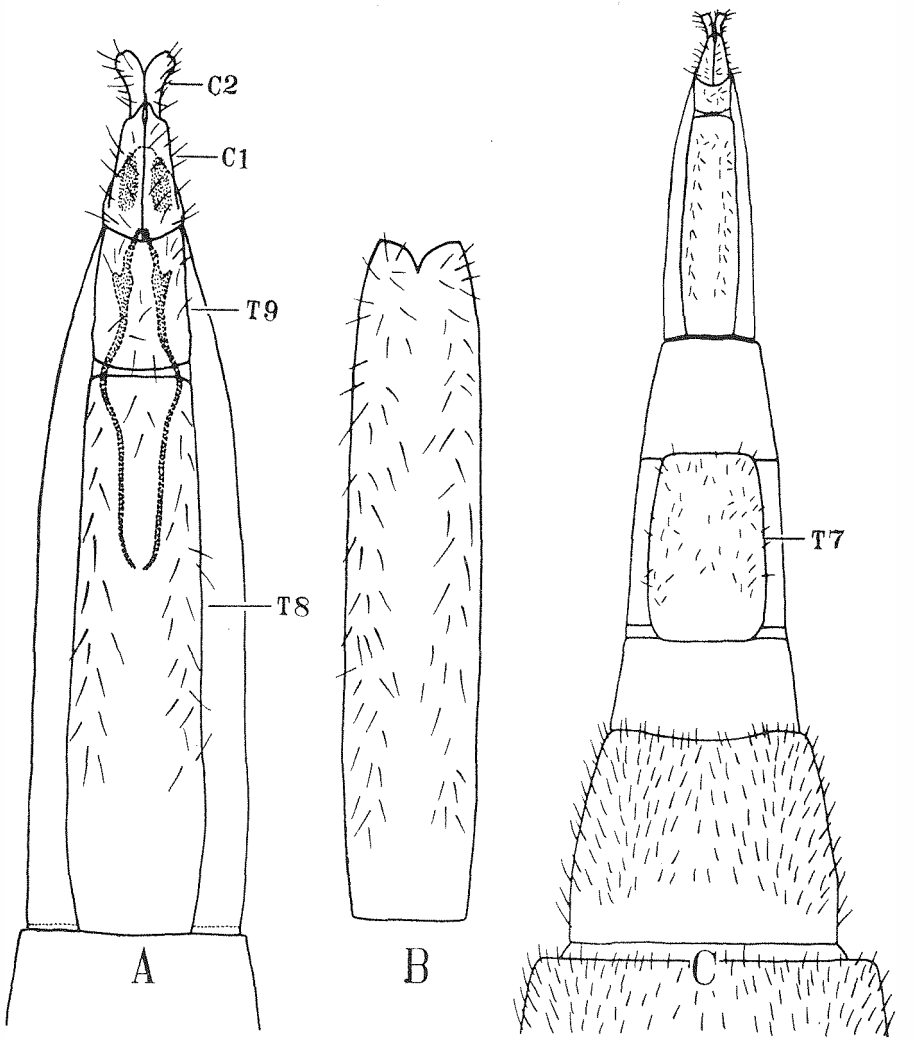

Fig. 5. *Xylophagus matsumurai* MIYATAKE, 1965 (C: abdomen, dorsal view) (Xylophagidae)

Specimens dissected. *Xylophagus* MEIGEN, 1803: *X. matsumurai* MIYATAKE, 1965 (Fig. 5): 1♀, Tenninkyo, Hokkaido, 9. vi. 1967, T. SAIGUSA; 1♀, Nukabira, Hokkaido, 14. vi. 1967, T. SAIGUSA. *X. sachalinensis* PLESKE, 1925 (= *X. merus* NAGATOMI & SAIGUSA, 1969) (Fig. 6): 1♀, Mt. Daisetsu, Hokkaido, 13. vii. 1960, S. TAKAGI.

Family Coenomyiidae (Figs. 7—9)

Characters of family. Ovipositor composed of abdominal segments 5—8. Cercus 2-segmented and with each segment much longer than wide. Sternum 10 roughly as long as wide and with posterior portion rounded. Tergum 10 smaller than sternum 10. Tergum 9 roughly trapezoid and wider than long. Sternum 8 elongate; apical portion thinner, somewhat rounded, and at middle distinctly concave. Tergum 8 elongate and 1.2—1.3 times as long as preceding intersegmental membrane. In segment 8, posterior portion of sternum is wider than that of tergum and membrane between tergum and sternum is well developed and is visible up to the posterior margin of sternum.

DOI: 10.21248/contrib.entomol.26.1.5-47

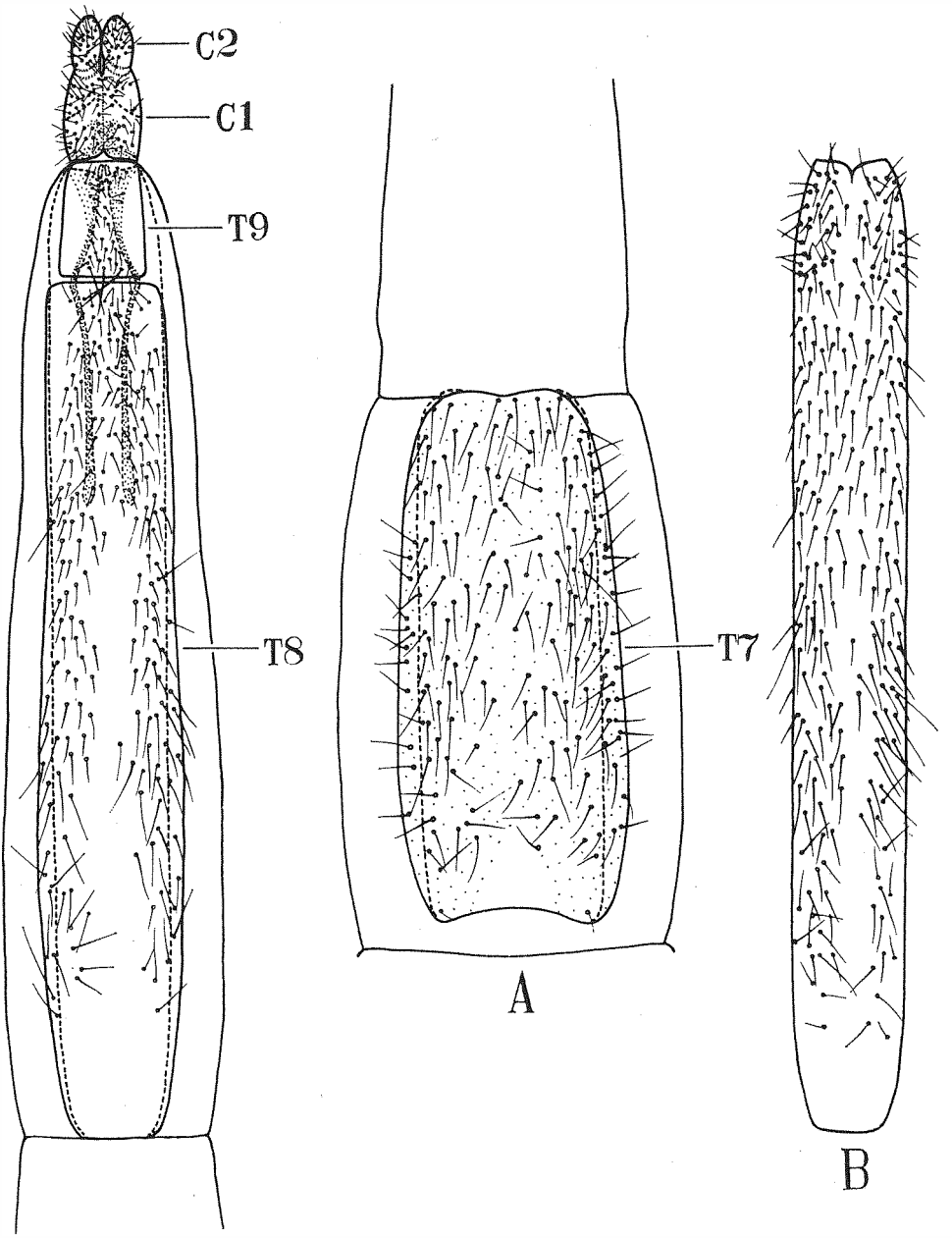

Fig. 6. *Xylophagus sachalinensis* PLESKE, 1925 (Xylophagidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

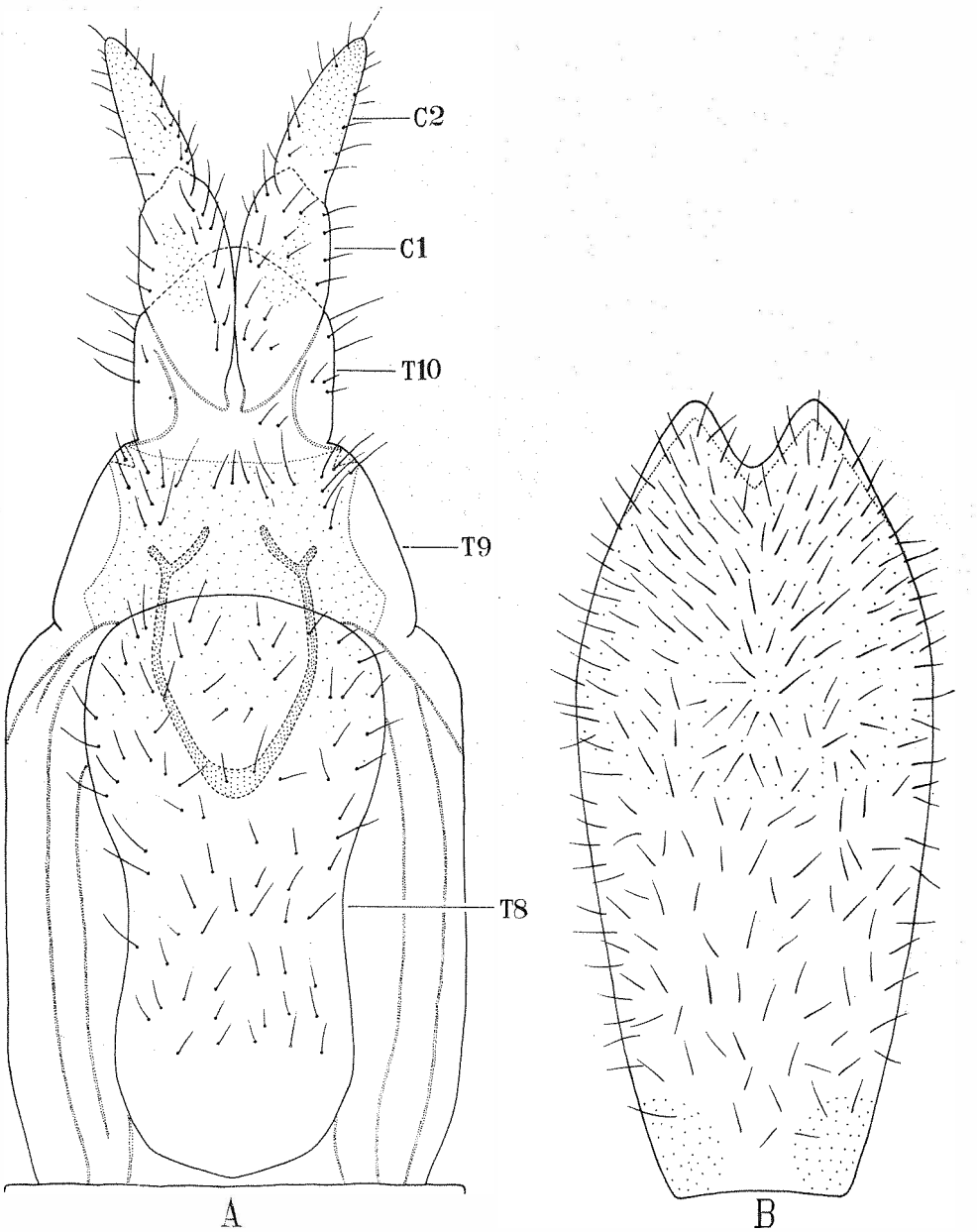

Fig. 7. *Coenomyia basalis* MATSUMURA, 1915 (Coenomyiidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

Coenomyiidae may be distinguished from Exeretoneuridae in the following points: ovipositor composed of abdominal segments 5—8, segment 2 of cercus longer, sternum 10 roughly as long as wide, tergum 10 more developed, tergum 9 rather trapezoid and not narrower than sternum 8, and sternum 8 less elongate. Coenomyiidae are distinguished from Rachiceridae and Xylophagidae in the following points: tergum 9 wider, sternum 8 and tergum 8 much shorter than in Rachiceridae and Xylophagidae, and ovipositor composed of abdominal segments 5—8. Coenomyiidae are at once separated from the genus *Ptiolina* of Rhagionidae by having sternum 8 and tergum 8 elongate and intersegmental membrane between terga 7 and 8 longer.

Characters of genus. No striking differences appear to be present between the genera. Tergum 10 is indistinct in the borderline between tergum 10 and cercus, but posterior margin may be more strongly concave and area may be smaller in *Coenomyia basalis* than in *Dialysis iwatai* and *Odontosabula gloriosa*.

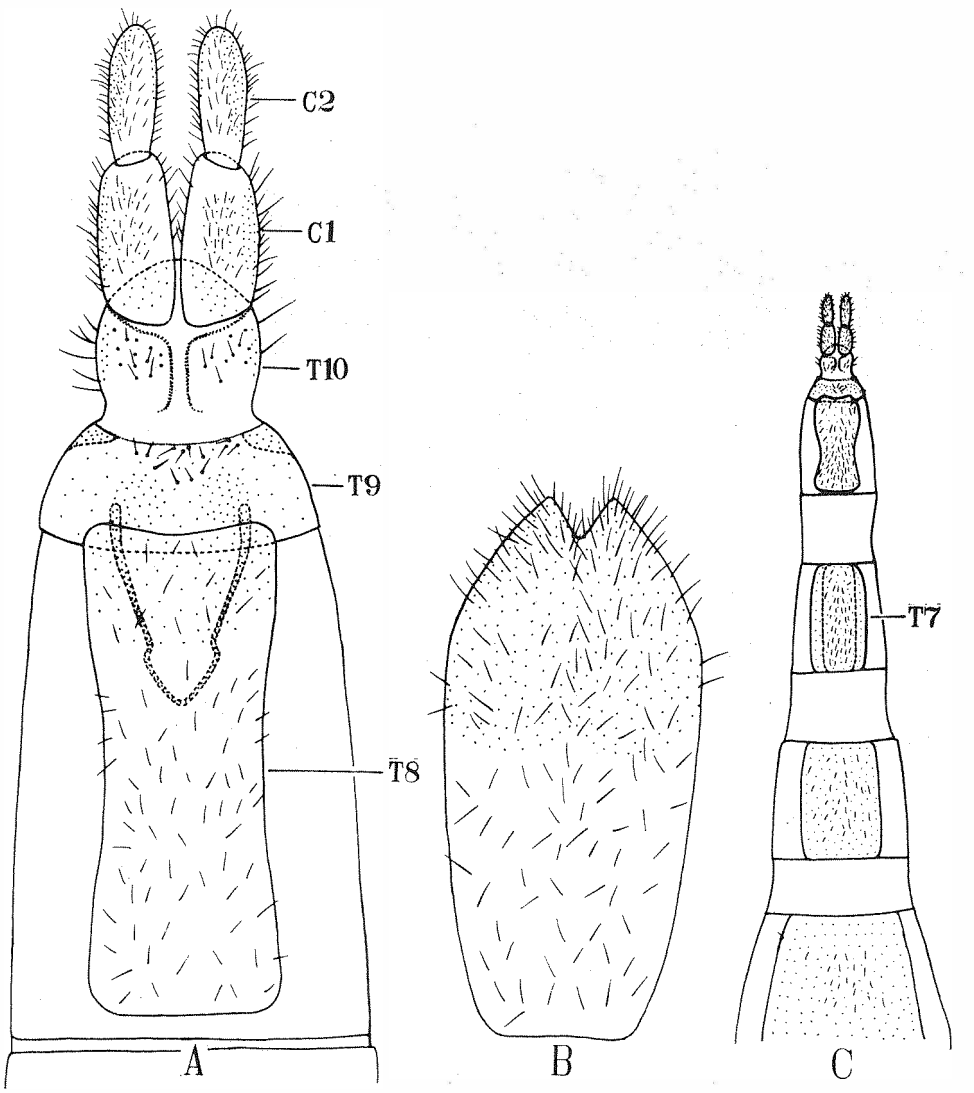

Fig. 8. *Dialysis iwatai* NAGATOMI, 1953 (C: abdomen, dorsal view) (Coenomyiidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

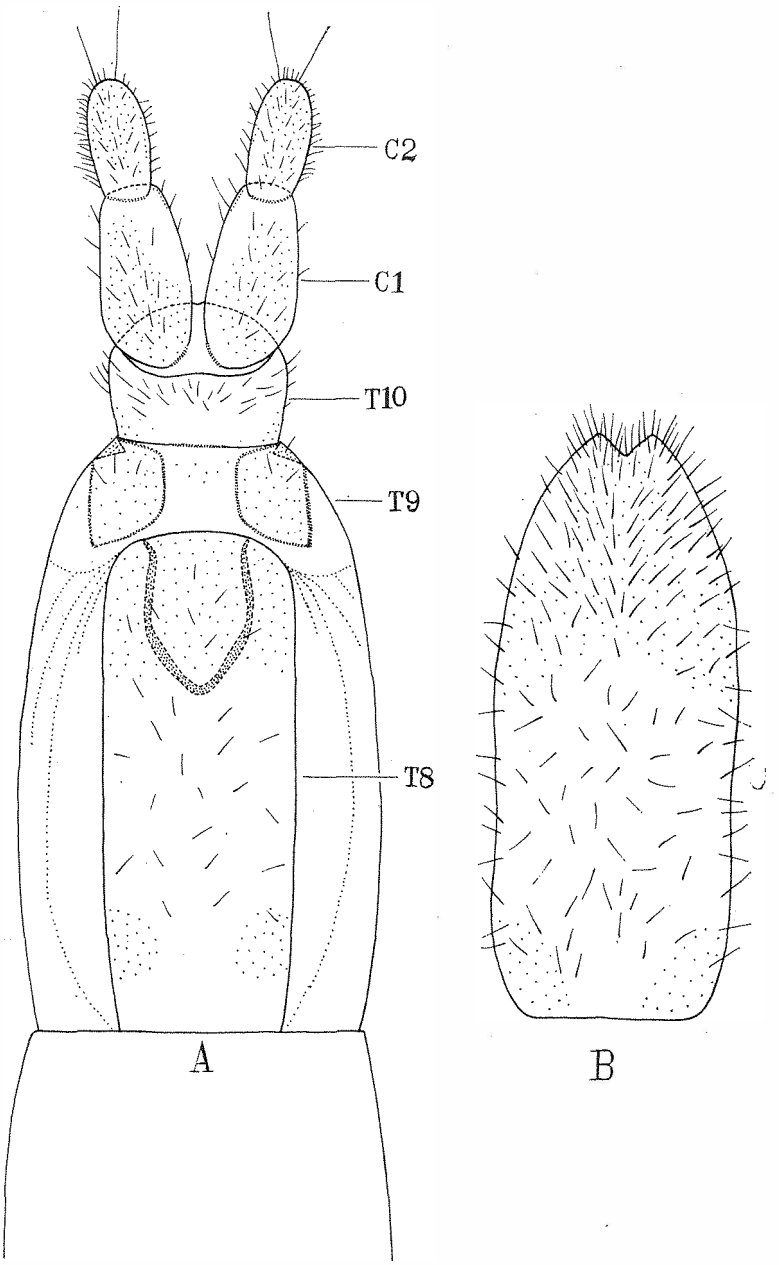

Fig. 9. *Odontosabula gloriosa* MATSUMURA, 1905 (Coenomyiidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

Specimens dissected. *Coenomyia* LATREILLE, 1796: *C. basalis* MATSUMURA, 1915 (Fig. 7): 1♀, Koganedake, Tamba, 28. v. 1958, K. IWATA; 1♀, Sapporo, Hokkaido, 10. vii. 1953, S. ITO.

Dialysis WALKER, 1850: *D. iwatai* NAGATOMI, 1953 (Fig. 8): 1♀, Sasayama, Tamba, 7. vii. 1951, A. NAGATOMI; 1♀, Sasayama, Tamba, 11. vii. 1953, NAGATOMI.

Odontosabula MATSUMURA, 1905 (= *Stratioleptis* PLESKE, 1925): *O. gloriosa* MATSUMURA, 1905 (Fig. 9): 1♀, Mt. Kirishima, Hyuga, 23. vii. 1963, K. KUSIGEMATI; 1♀, Senganbira, Satsuma, 3. vi. 1966, KUSIGEMATI.

Family Exeretoneuridae (Fig. 10)

Characters of family. The female terminalia of *Exeretoneura* are most closely related to those of the genera belonging to Coenomyiidae but may be distinguished from the latter in the following points: ovipositor composed of abdominal segments 6—8, segment 2 of cercus shorter, sternum 10 wider than long, tergum 10 less developed (or possibly absent), tergum 9 rather rectangular and narrower than sternum 8, and sternum 8 more elongate.

In Fig. 10, mid-anterior part of tergum 8 has a deep incision but this incision may possibly be a mere scratch.

Specimen dissected. *Exeretoneura* MACQUART, 1846: *E. maculipennis* MACQUART, 1846 (det. by D. H. COLLESS) (Fig. 10): 1♀, Pebby Beach, Australia, Jan. 1964.

Family Pelecorhynchidae (Fig. 11)

Characters of family. Ovipositor composed of abdominal segments 5—8. Cercus 2-segmented, with segment 1 dilated outward (or downward from a lateral view) and with segment 2 rounded; base of segment 1 situated near base of sternum 10. Sternum 10 wider than long and with posterior margin gently concave at middle at least in *fulvus*. It appears that tergum 10 is divided into a pair which are small and triangular. Tergum 9 roughly rectangular and comparatively long. Sternum 8 longer than wide, with lateral margins roughly parallel sided, although apical portion somewhat thinner, and with mid-distal part widely and deeply concave. Tergum 8 distinctly wider than sternum 8 and with anterior margin of chitinous part widely concave; transparent membrane belonging to tergum 8 (which are situated between tergum 8 and intersegmental membrane) very well developed.

Pelecorhynchidae may be difficult to separate from Rhagionidae but in the former (1) tergum 9 longer, (2) sternum 8 with lateral margins not strongly curved but roughly parallel sided, and (3) transparent membrane belonging to tergum 8 very well developed.

Characters of species. Sternum 10, tergum 9, sternum 8, and tergum 8 may possibly vary in shape to some extent with the species (see Figs. 11—13 in MACKERRAS and FULLER, 1942: 15).

Specimens dissected. *Pelecorhynchus* MACQUART, 1850: *P. fulvus* RICARDO, 1910 (det. by I. M. MACKERRAS) (Fig. 11): 2♀, near Braidwood, New South Wales, Australia, xii. 1962, I. M. MACKERRAS.

Family Rhagionidae (Figs. 12—25)

Characters of family. Ovipositor is composed of abdominal segments 5—8. Cercus 2-segmented, with segment 1 dilated outward (or downward from a lateral view) and segment 2 rounded; base of segment 1 situated near either base or apex of sternum 10. Sternum 10 protruded posteriorly, broad, and sometimes divided into a pair. Tergum 10 broad, often divided into a pair, and sometimes (in *Glutops* and *Pseudoerinna*) probably absent. Tergum 9 broad, and roughly rectangular or trapezoid. Sternum 8 about as long as wide or somewhat longer than wide, widest at or behind middle, with lateral margin strongly curved and with mid-distal part usually concave. Tergum 8 usually wider than long but in some genera somewhat longer than wide, and wider than sternum 8. Tergum 7 about as long as wide.

DOI: 10.21248/contrib.entomol.26.1.5-47

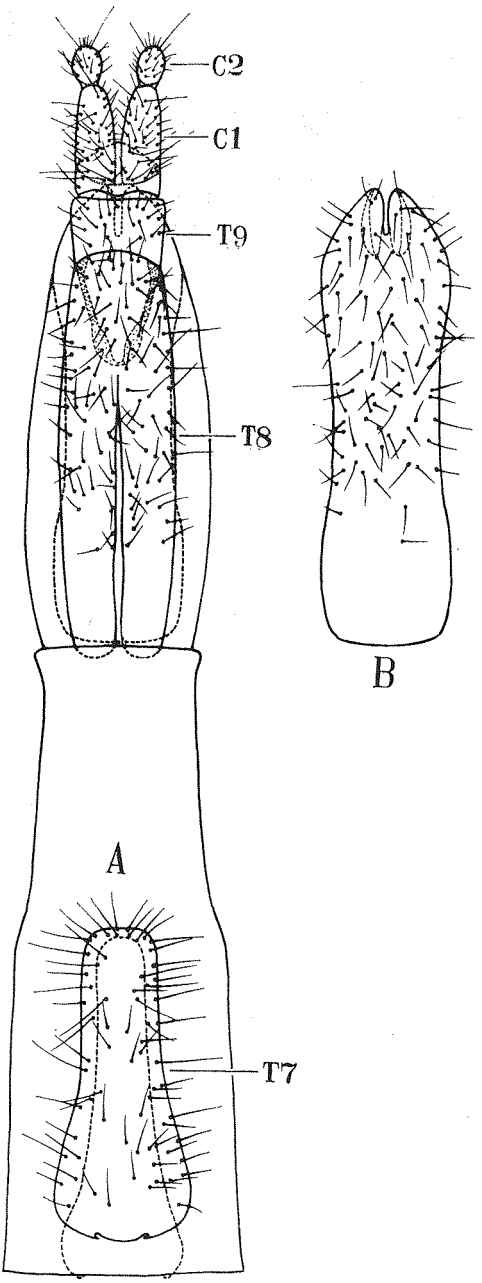

Fig. 10. *Exeretoneura maculipennis* MACQUART, 1846 (Exeretoneuridae)

DOI: 10.21248/contrib.entomol.26.1.5-47

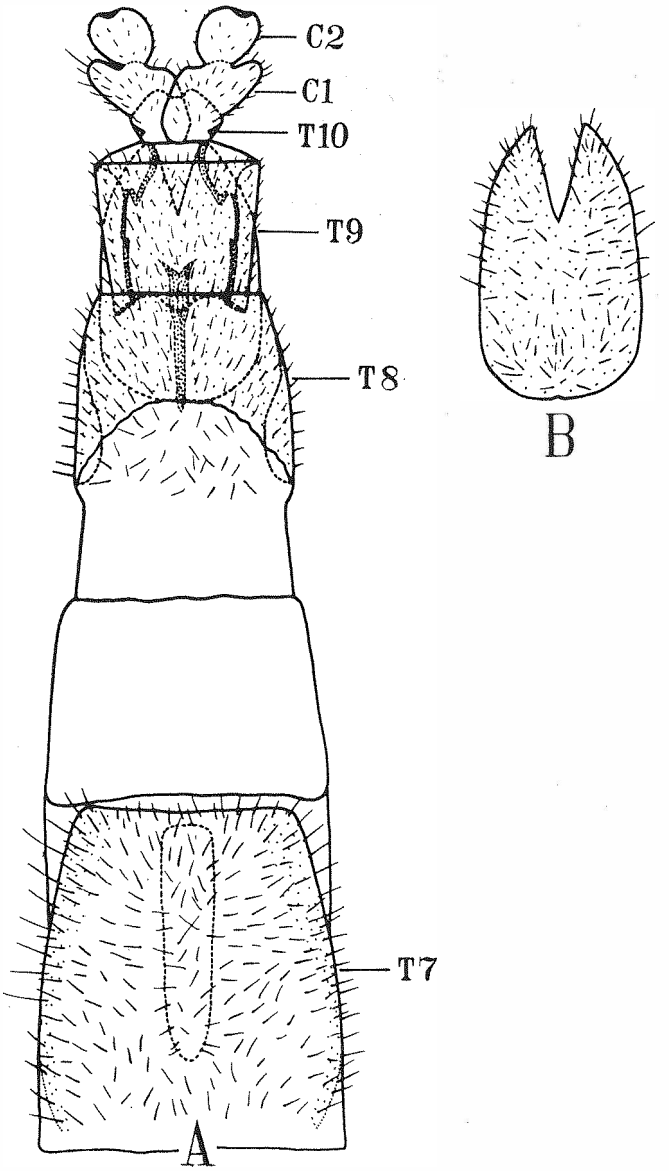

Fig. 11. *Pelecorhynchus fulvus* RICARDO, 1910 (Pelecorhynchidae)

Intersegmental membrane between terga 7 and 8 is short or not well developed in *Ptiolina*, *Spania* and *Spaniopsis*. Segment 2 (or 1 and 2) of cercus elongate in *Atherimorpha*, *Ptiolina* and *Spania*, and segment 1 of cercus not dilated outward in *Ptiolina* and *Spania* and with a distinct section at inner part in *Atherimorpha* and *Spaniopsis*. Sternum 8 roughly square or rectangular (wider than long) in *Spania* and *Spaniopsis*. Tergum 8 distinctly narrower than sternum 8 in *Ptiolina*. Tergum 7 distinctly wider than long in *Ptiolina*, *Spania* and *Spaniopsis*.

DOI: 10.21248/contrib.entomol.26.1.5-47

Rhagionidae are most closely related to Pelecorhynchidae, but in the former (1) sternum 8 with lateral margin strongly curved (but sternum 8 is a square or rectangular in *Spania* and *Spaniopsis*), and (2) transparent membrane belonging to tergum 8 not so well developed. Rhagionidae are at once separated from Coenomyiidae in the following points: sternum 8 and tergum 8 much shorter and cercus (excepting the genera *Ptiolina* and *Spania*) with segment 1 dilated outward and segment 2 rounded. Rhagionidae (excepting the genus *Austroleptis*) are easily separated from Athericidae and Tabanidae by having the cercus 2-segmented.

Discussion. The female terminalia are constructed in substantially the same way throughout the Pelecorhynchidae (which contain 1 genus) and Rhagionidae except for the genera *Ptiolina*, *Spania*, and *Spaniopsis* (12 genera of Rhagionidae are examined). But the 3 genera in question appear to be transitive as follows: *Spaniopsis* → *Spania* → *Ptiolina* → *Bolbomyia*.

Characters of genus. Only 1 species is examined in most of the genera here discussed and some of the characters given below may not be significant as generic diagnoses. When many species are examined and wide variations are found, the genera *Arthroceras*, *Arthroteles*, *Chrysopilus*, *Rhagina*, *Rhagio*, and *Symphoromyia* may become difficult to separate from one another by the characters given below. It is probable that the character in the couplet 9 of the key to genera (marked with *) is meaningless.

Arthroceras WILLISTON, 1886 (Fig. 12): Segment 1 of cercus wider than long and its base situated near apex of sternum 10. Tergum 10 is roughly rectangular and its anterior margin is narrowly and deeply concave at middle or may be divided into a pair. Sternum 8 roughly circular. Tergum 8 about as long as but wider than sternum 8.

Arthroceras is most closely related to *Chrysopilus* but may possibly be distinguished from the latter by having the sternum 8 roughly circular. *Arthroceras* may be separated from *Rhagina* and *Rhagio* by having the segment 1 of cercus shorter than wide and from *Bolbomyia* by tergum 8 longer and sternum 8 narrowly and deeply concave at mid-posterior margin.

Specimens dissected: *A. japonicum* NAGATOMI, 1954: 1♀, Naidaijin, Higo, 25. v. 1952, T. KODAMA; 1♀, Sata, Osumi, 28. iv. 1962, A. NAGATOMI.

Arthroteles BEZZI, 1926 (Fig. 13): Segment 1 of cercus is comparatively long, dilated outward long and thickly, and may have an indistinct section at inner part; its base situated near apex of sternum 10. Tergum 10 comparatively long. Sternum 8 longer than wide, widest behind middle and with a pair of knob-like processes at posterior margin at least in *cinerea*. Tergum 8 wider than sternum 8.

Arthroteles is most closely related to *Rhagio* but may be distinguished from the latter by having segment 1 of cercus with a section at inner part (this section is not as distinct as in *Spaniopsis*, however). The posterior margin of sternum 8 is developed as a pair of knob-like processes at least in *cinerea*, and this is possibly one of useful generic diagnoses.

Specimen dissected: *A. cinerea* STUCKENBERG, 1956 (det. by B. R. STUCKENBERG): 1♀, Cathedral Peak, Forestry Reserve, Natal Drakensberg, South Africa, iii. 1959, B. R. & P. J. STUCKENBERG.

Atherimorpha WHITE, 1915: Judging from the figures given by MACKERRAS and FULLER (1942: 15), the female terminalia of *Atherimorpha vernalis* WHITE known from Australia (New South Wales) and Tasmania are as follows: each segment of cercus elongate and segment 1 with a distinct section at inner part and about as long as segment 2; tergum 10 comparatively long and undivided.

Atherimorpha may be separated from *Ptiolina* by having segment 1 of cercus with a distinct section and from *Spaniopsis* by having segment 1 of cercus elongate and tergum 10 distinct.

Bolbomyia LOEW, 1850 (Fig. 14): Segment 1 of cercus wider than long, and its base situated near apex of sternum 10. Sternum 10 divided into a pair and with inner margin longer than the outer. Tergum 10 comparatively long (but shorter than wide). Sternum 8 roughly circular and with posterior margin widely, shallowly, and gently concave. Tergum 8 short and broad.

DOI: 10.21248/contrib.entomol.26.1.5-47

Bolbomyia is similar to *Arthroceras* but may be distinguished from the latter in the following points: tergum 8 short and sternum 8 with posterior margin widely, shallowly, and gently concave. *Bolbomyia* differs from *Ptiolina* and *Spania* by having cercus with segment 1 dilated outward and segment 2 rounded, and intersegmental membrane between terga 7 and 8 well developed.

Specimens dissected: *B.* sp. (= possibly *wuorentausi* Szilády, 1935): 2♀, Karasawa, Mt. Hotaka, Shinano, 10. vii. 1963, A. Nagatomi.

Chrysopilus Macquart, 1826 (Figs. 15—16): Segment 1 of cercus wider than long (in *subaquilus* it is extended obliquely). Sternum 10 produced posteriorly. Tergum 10 divided into a pair which may vary in shape according to species; it may possibly be undivided in some species. Sternum 8 longer than wide and thinner anteriorly. Tergum 8 wider than sternum 8.

The shapes of segment 1 of cercus, tergum 10, tergum 8, sternum 7, etc. may be useful in separating the species (see Figs. 15—16). The shape of sternum 8 and the degree of concavity at mid-posterior margin of sternum 8 may vary with the species.

Chrysopilus is most closely related to *Arthroceras* but may possibly be distinguished from the latter by having the sternum 8 longer than wide and tapering anteriorly. *Chrysopilus* is similar in the shape of sternum 8 to *Glutops* but is separated from the latter in the following points: segment 1 of cercus not so strongly dilated outward as in *Glutops*; tergum 10 well developed; tergum 8 shorter than in *Glutops*.

Specimens dissected: *C. ditissimis* Bezzi, 1912 (Fig. 15): 1♀, Sekinomiya, Yabu-gun, Tajima, 18. vi. 1953, A. Nagatomi. *C. subaquilus* Nagatomi, 1968 (Fig. 16): 1♀, Rishiri, Hokkaido, 4. viii. 1958, S. takagi; 1♀, Senjodake, Kai, 16. vii. 1963, A. Nagatomi.

Glutops Burgess, 1878 (Fig. 17): Segment 1 of cercus dilated postero-outwardly as a slender lobe and its base situated near base of sternum 10. Sternum 10 appears to be divided into a pair which are nearly triangular and narrower than width of segment 1 of cercus (near its base). Tergum 10 appears to be absent. Sternum 8 longer than wide and thinner anteriorly. Chitinous part of tergum 8 roughly as long as wide and anterior membranous part belonging to tergum 8 well developed.

Glutops may be distinguished from *Pseudoerinna* by having the sternum 10 smaller and the sternum 8 longer.

Specimen dissected: *G. itoi* (Nagatomi, 1955): 1♀, Hanase, Yamashiro, 7. vi. 1961, S. Ito.

Pseudoerinna Shiraki, 1932 (= *Bequaertomyia* Brennan, 1935) (Fig. 18): Segment 1 of cercus dilated postero-outwardly as a slender lobe and its base situated near base of sternum 10. Sternum 10 appears to be divided into a pair which are bulged out from base of segment 1 of cercus. Tergum 10 appears to be absent. Sternum 8 roughly circular and with posterior margin deeply concave. Anterior membranous part belonging to tergum 8 well developed.

Pseudoerinna may be distinguished from *Glutops* by having the sternum 10 larger and sternum 8 roughly circular.

Specimen dissected: *P. fuscata* Shiraki, 1932: 1♀, Hakusan, Ishikawa Pref., 23. vii. 1972, I. Togashi.

Ptiolina Zetterstedt, 1842 (Fig. 19): Segments 1—2 of cercus elongate; segment 1 not dilated outward. Sternum 10 divided into a pair and with inner margin longer than outer margin. Tergum 10 is elongate transversely and appears to be not divided. Sternum 8 not longer than wide, with posterior margin having a pair of knob-like processes, and with anterior margin straight. Tergum 8 nearly trapezoid, not wider than sternum 8, and short. Tergum 7 wide. Intersegmental membrane between terga 7 and 8 short.

Ptiolina is similar to *Spania* but is separated from the latter by having segment 1 of cercus about as long as segment 2, tergum 8 not wider than sternum 8 and short, and intersegmental membrane between terga 7 and 8 distinct.

Specimen dissected: *P.* sp.: 1♀, Kagoshima City, 16. iv. 1962, A. Nagatomi.

Rhagina Malloch, 1932 (Fig. 20): *Rhagina* may possibly be characterized by having sternum 10 circular in shape. *Rhagina* is similar to *Rhagio* but may be distinguished from the latter by having tergum 10 divided into a pair. *Rhagina* may be separated from *Arthroceras* and *Chrysopilus* by having segment 1 of cercus not wider than long.

DOI: 10.21248/contrib.entomol.26.1.5-47

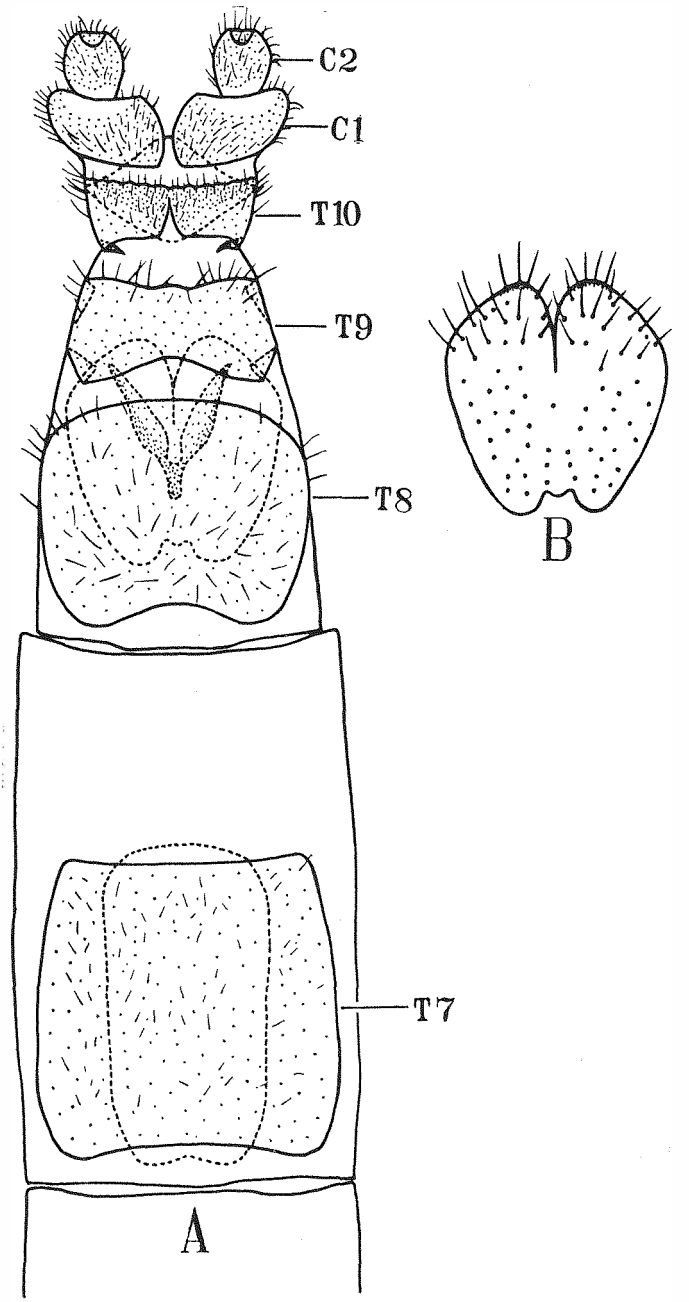

Fig. 12. *Arthroceras japonicum* NAGATOMI, 1954 (Rhagionidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

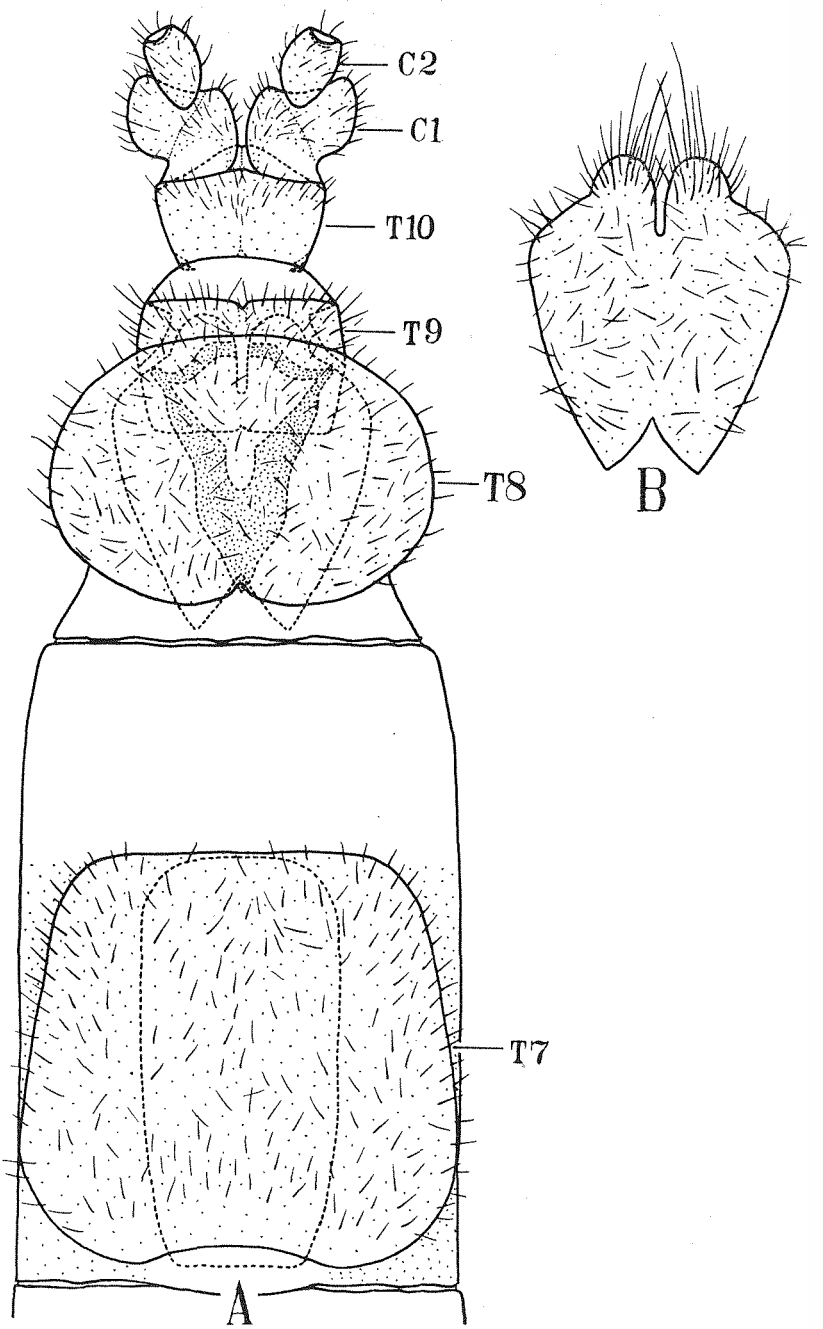

Fig. 13. *Arthroteles cinerea* STUCKENBERG, 1956 (Rhagionidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

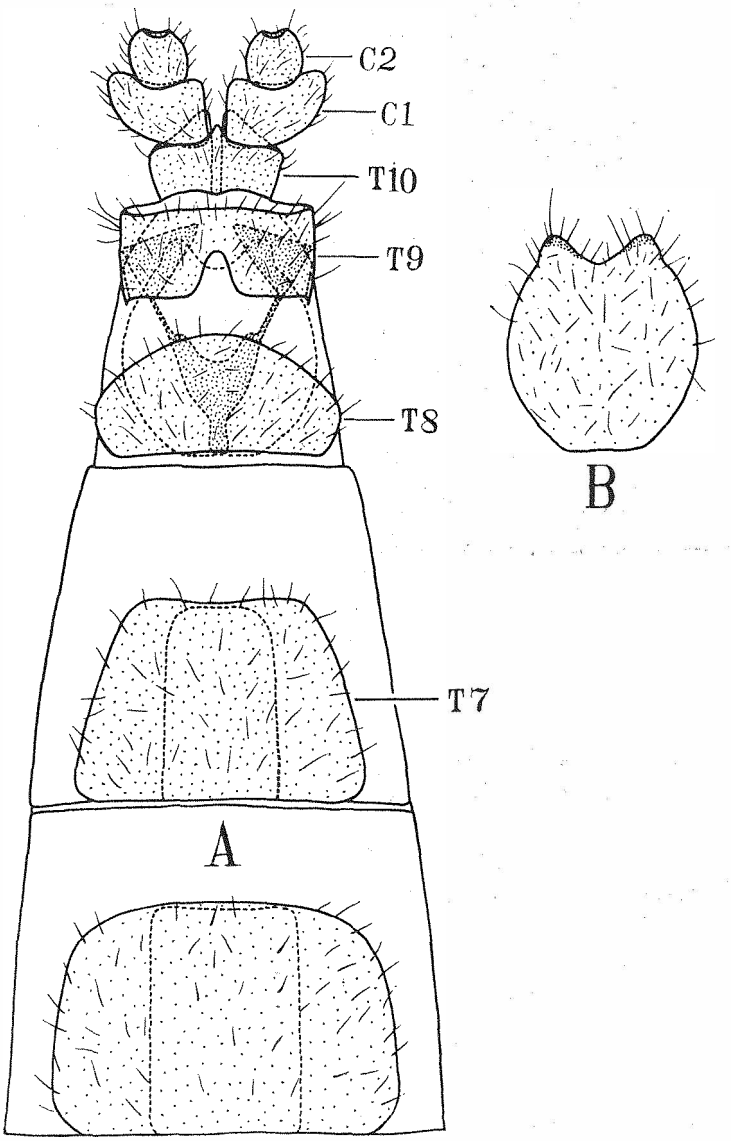

Fig. 14. *Bolbomyia* sp. (Rhagionidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

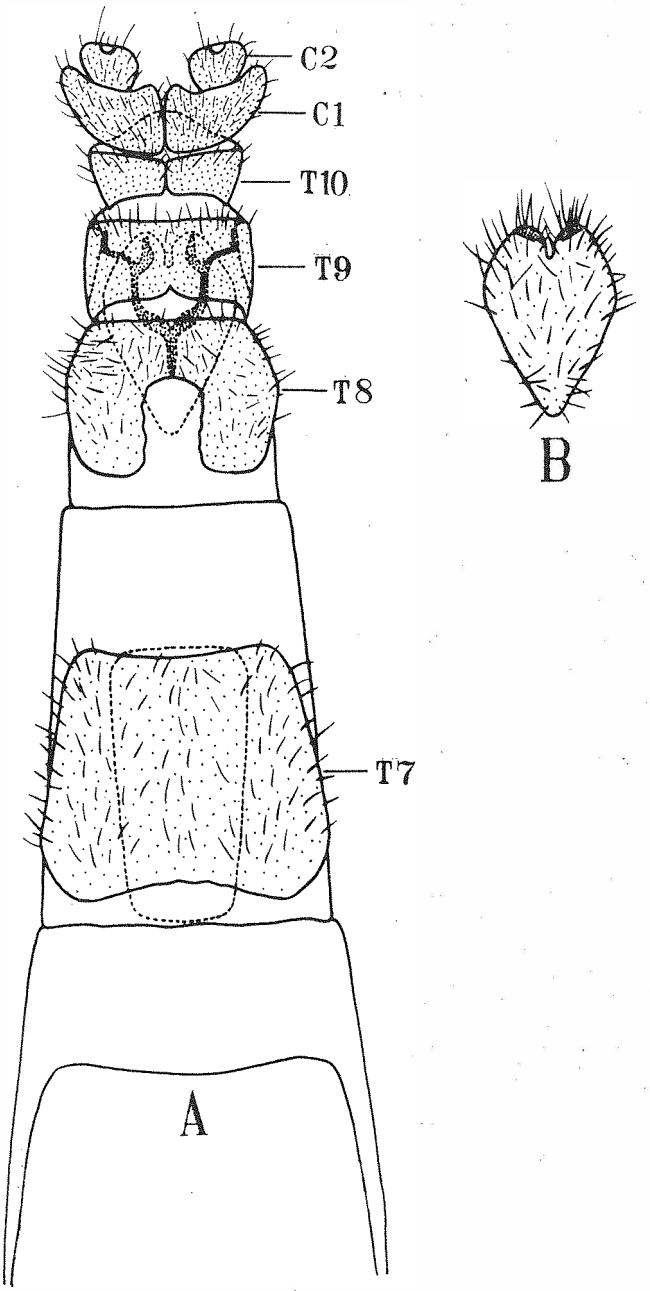

Fig. 15. *Chrysopilus ditissimis* BEZZI, 1912 (Rhagionidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

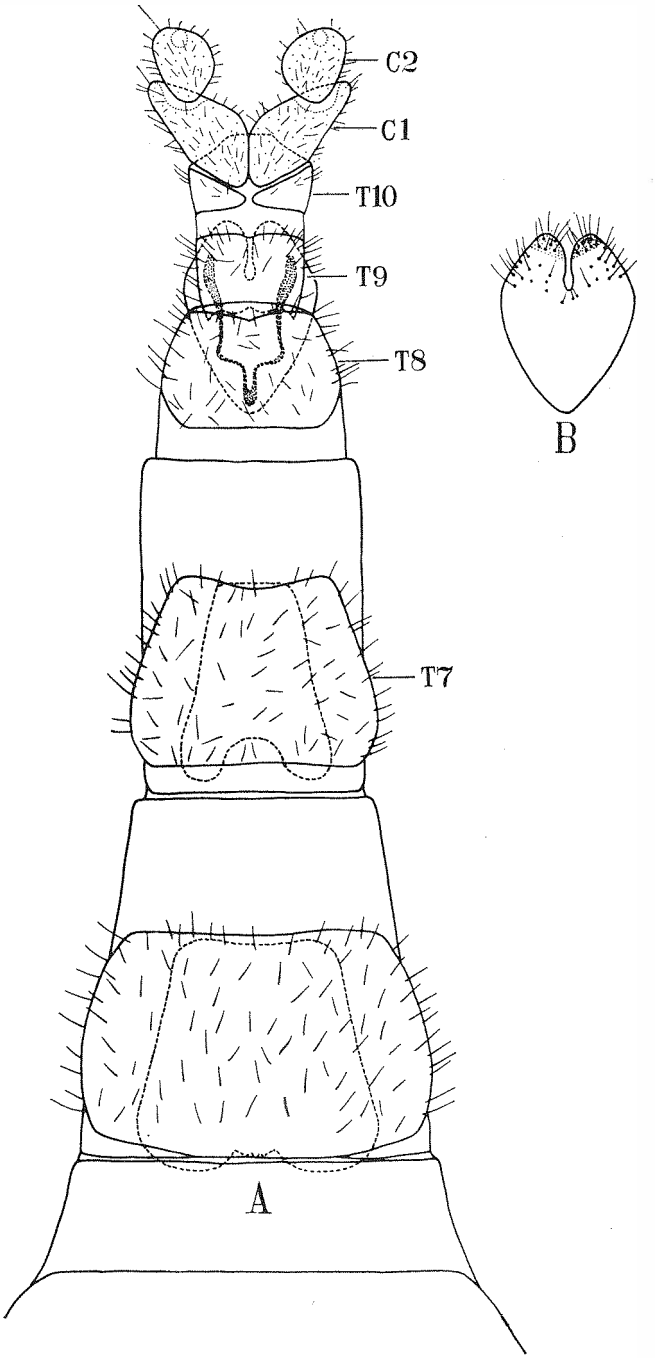

Fig. 16. *Chrysopilus subaquilus* NAGATOMI, 1968 (Rhagionidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

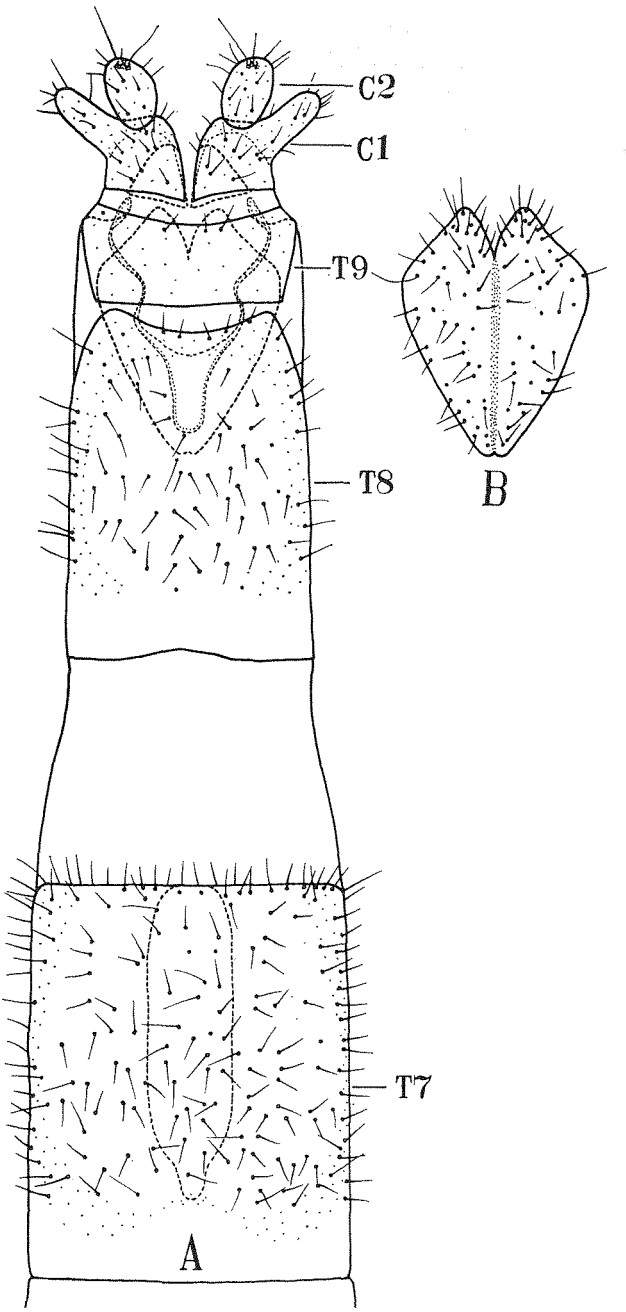

Fig. 17. *Glutops itoi* (NAGATOMI, 1955) (Rhagionidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

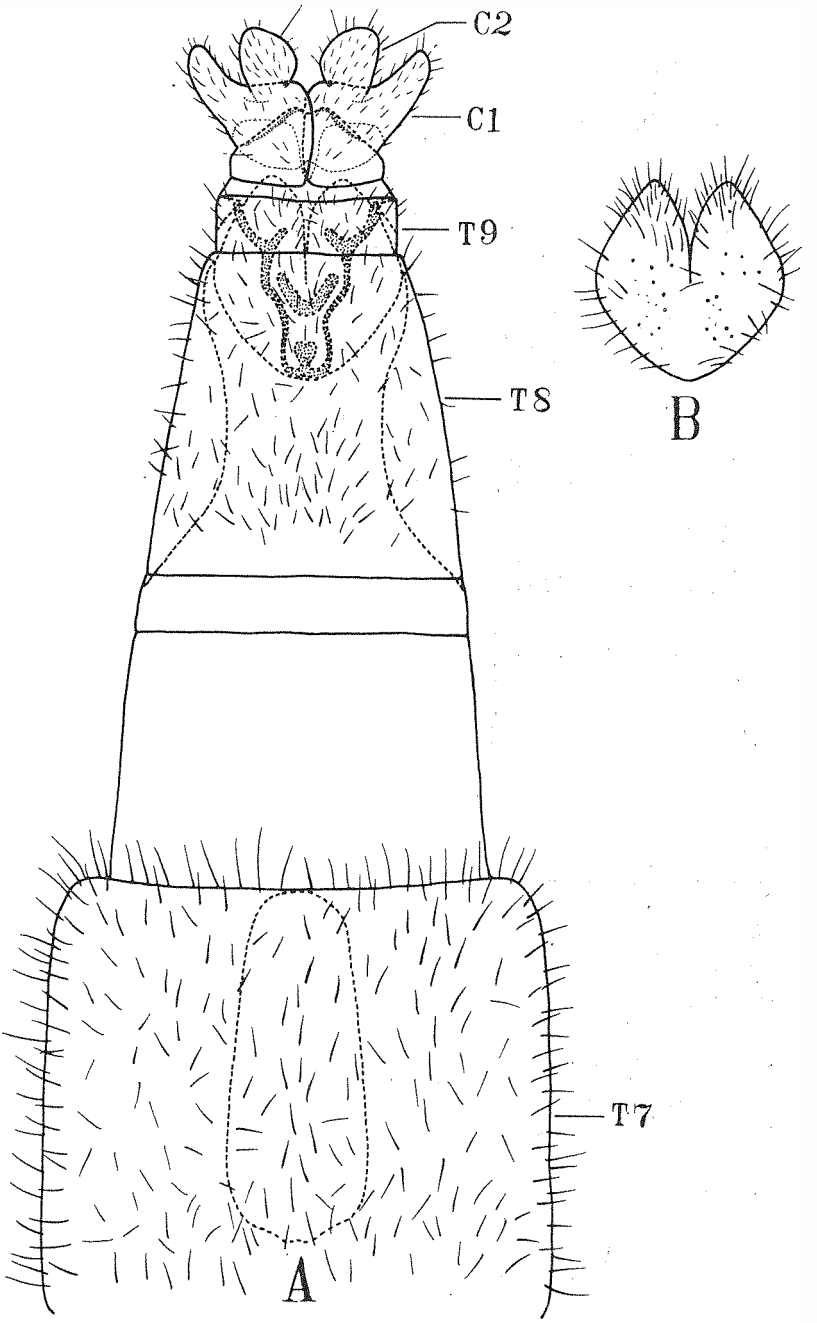

Fig. 18. *Pseudoerinna fuscata* SHIRAKI, 1932 (Rhagionidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

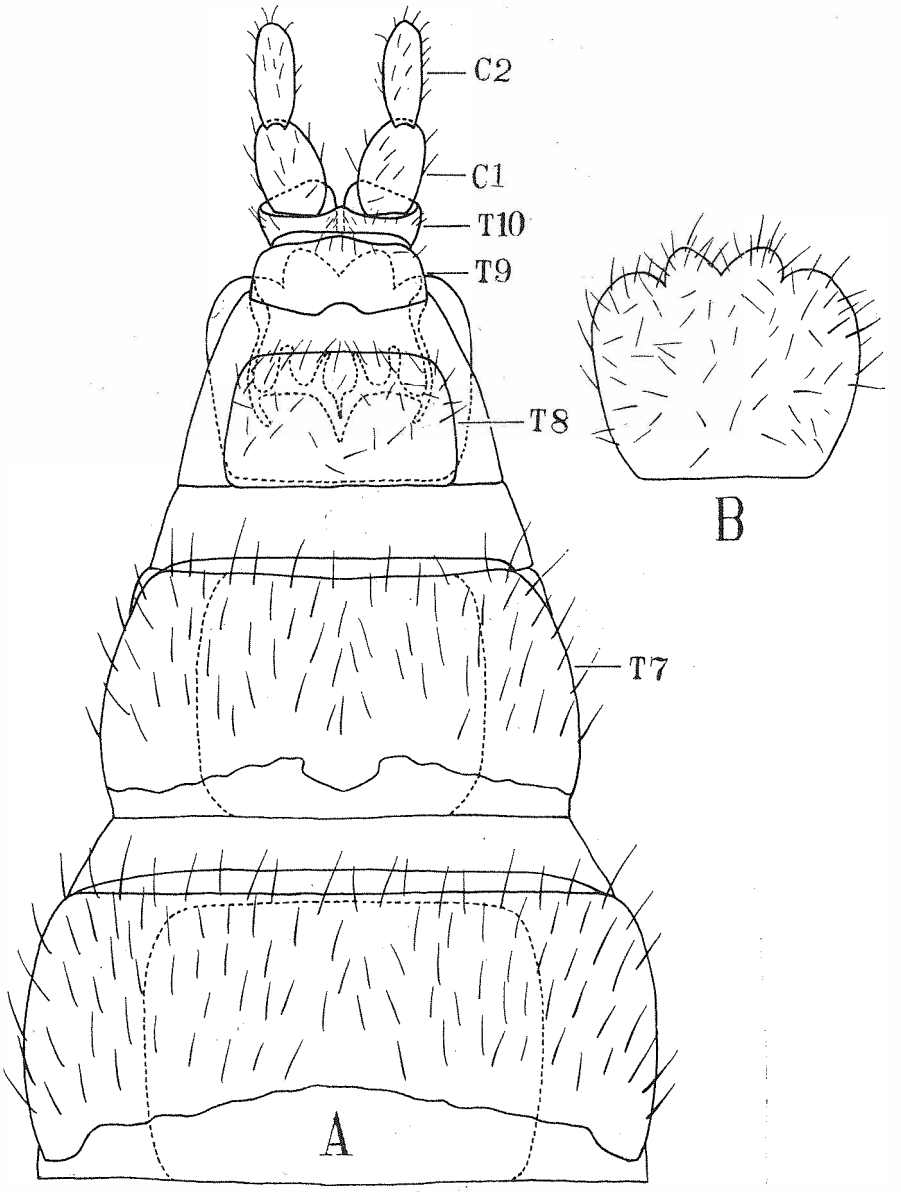

Fig. 19. *Ptiolina* sp. (Rhagionidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

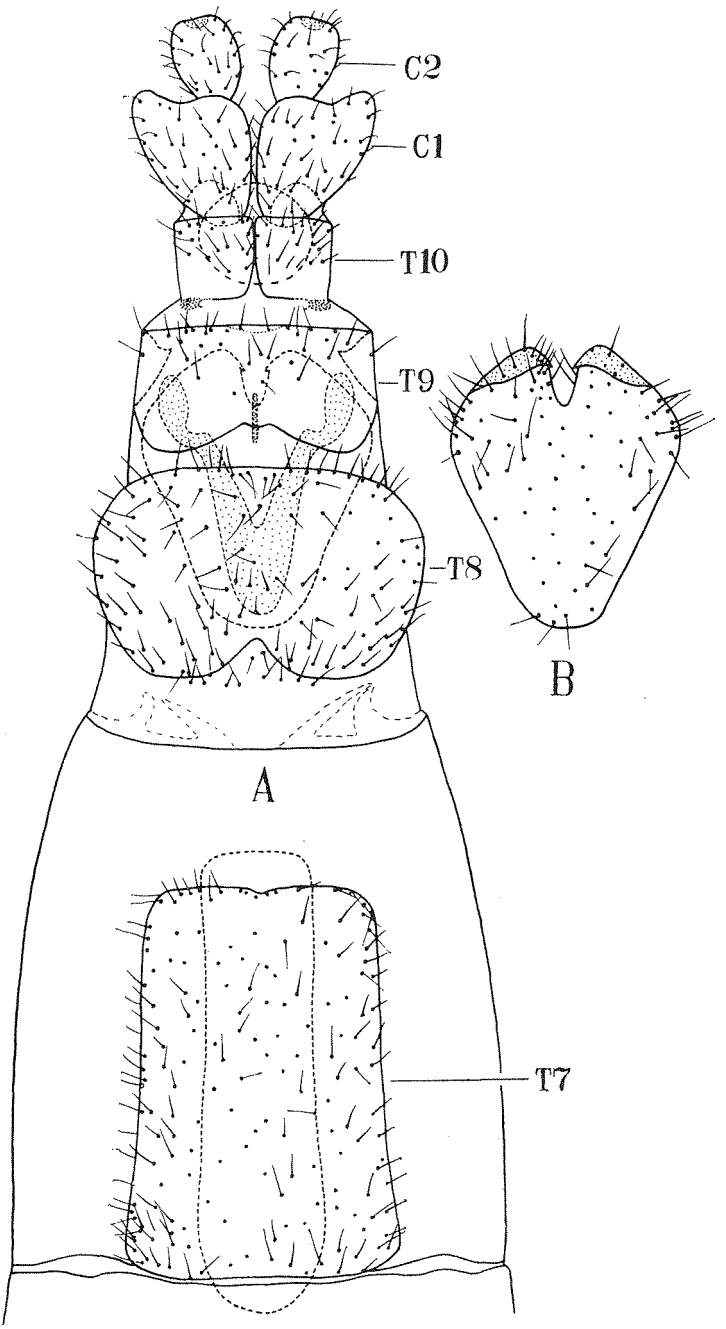

Fig. 20. *Rhagina* sp. (Rhagionidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

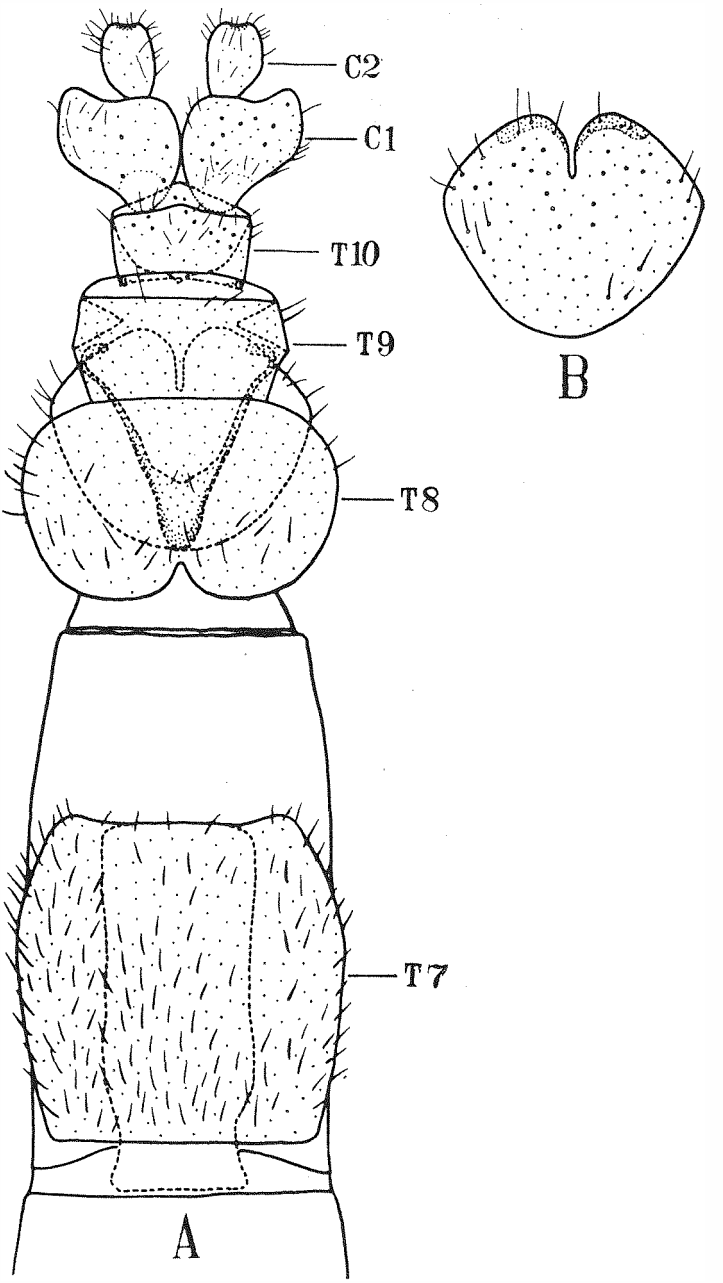

Fig. 21. *Rhagio puellaris* NAGATOMI, 1971 (Rhagionidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

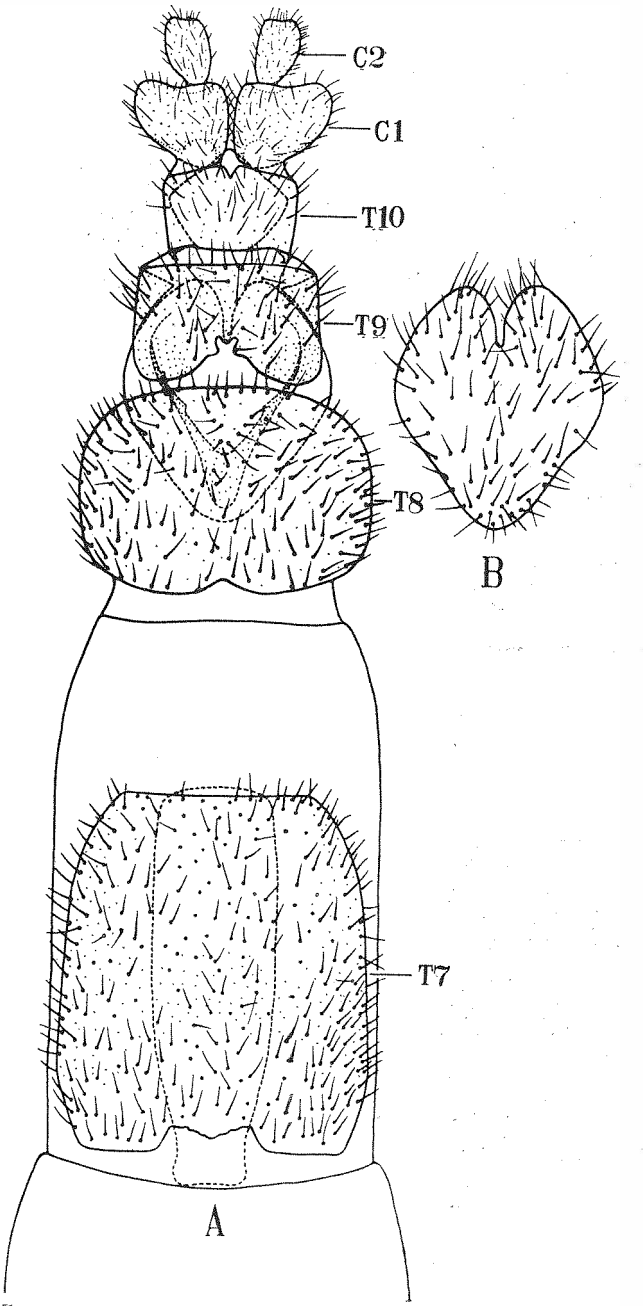

Fig. 22. *Rhagio yasumatsui* NAGATOMI, 1972 (Rhagionidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

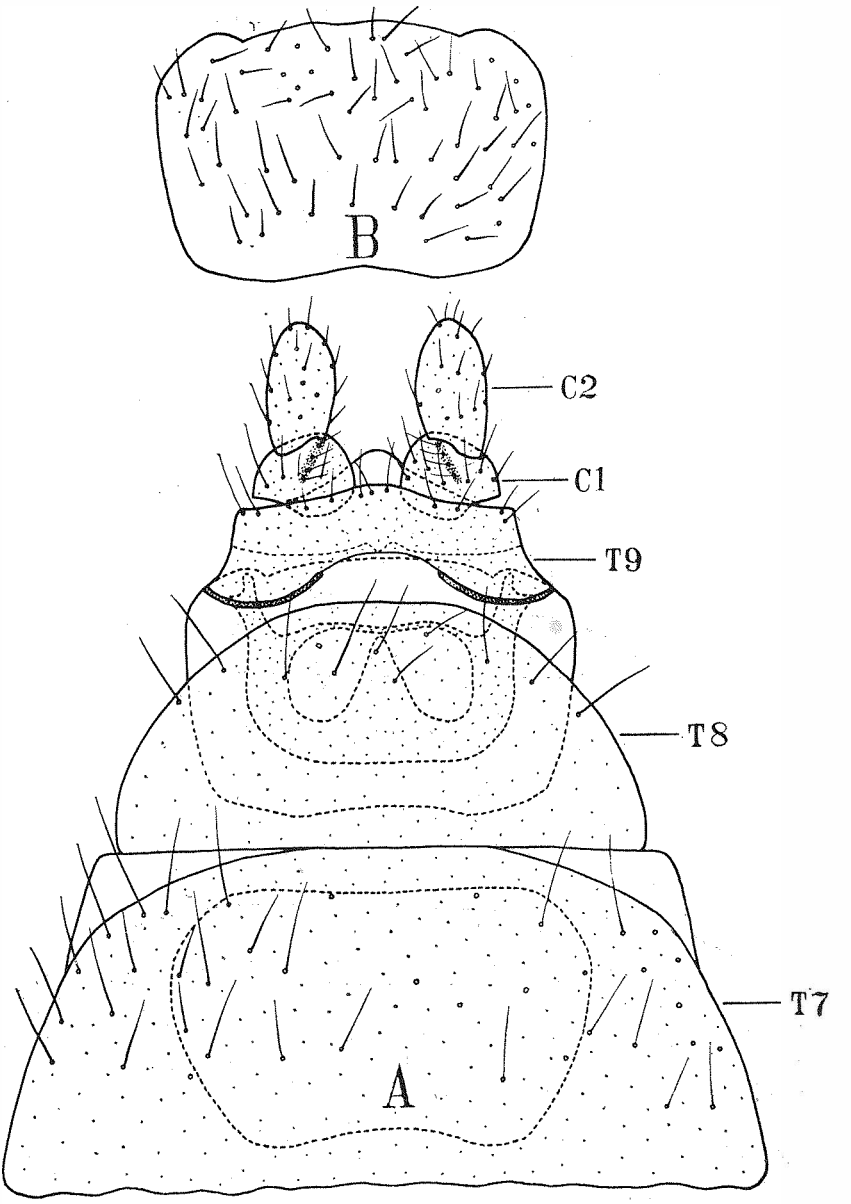

Fig. 23. *Spania* sp. (Rhagionidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

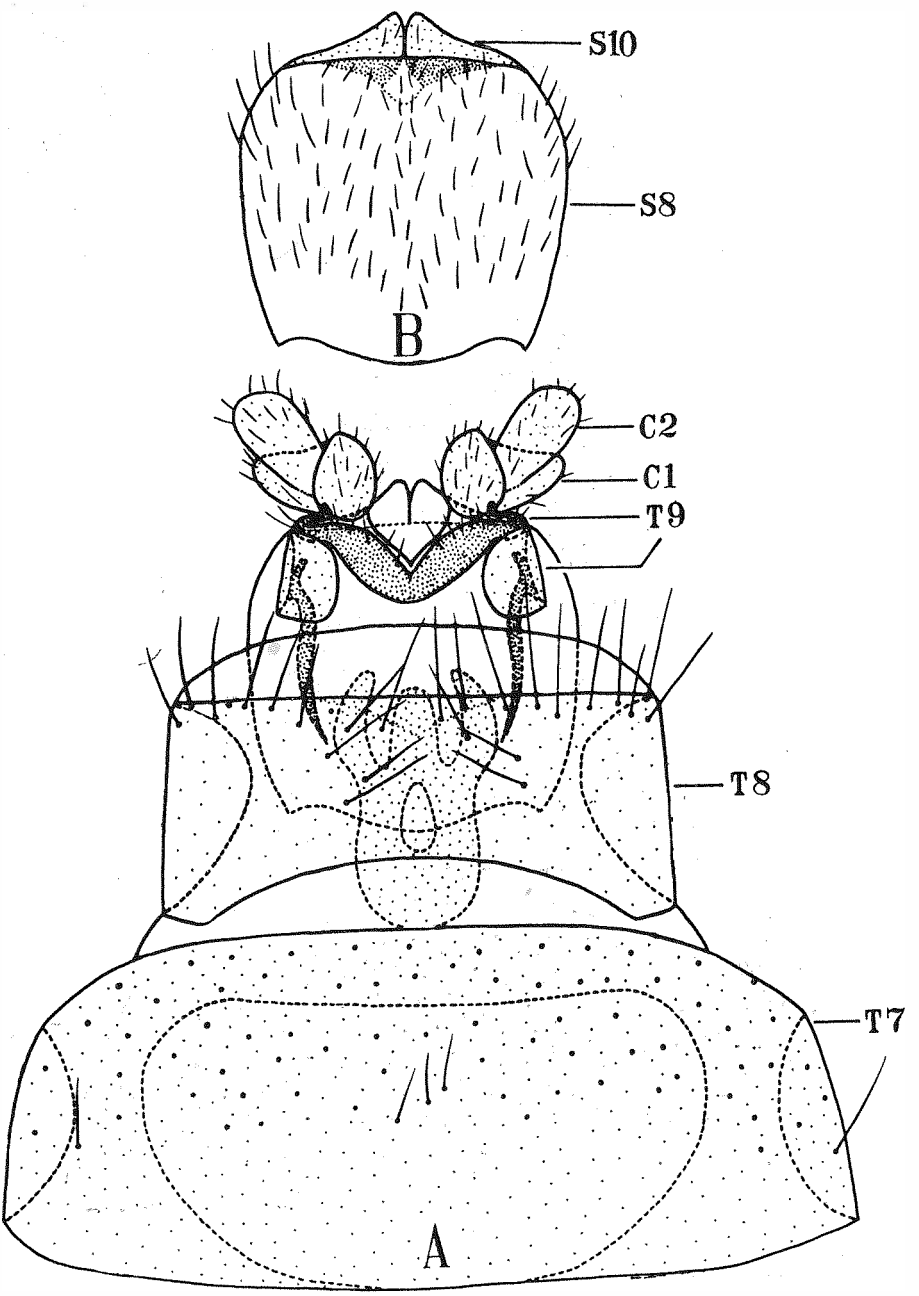

Fig. 24. *Spaniopsis* sp. (Rhagionidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

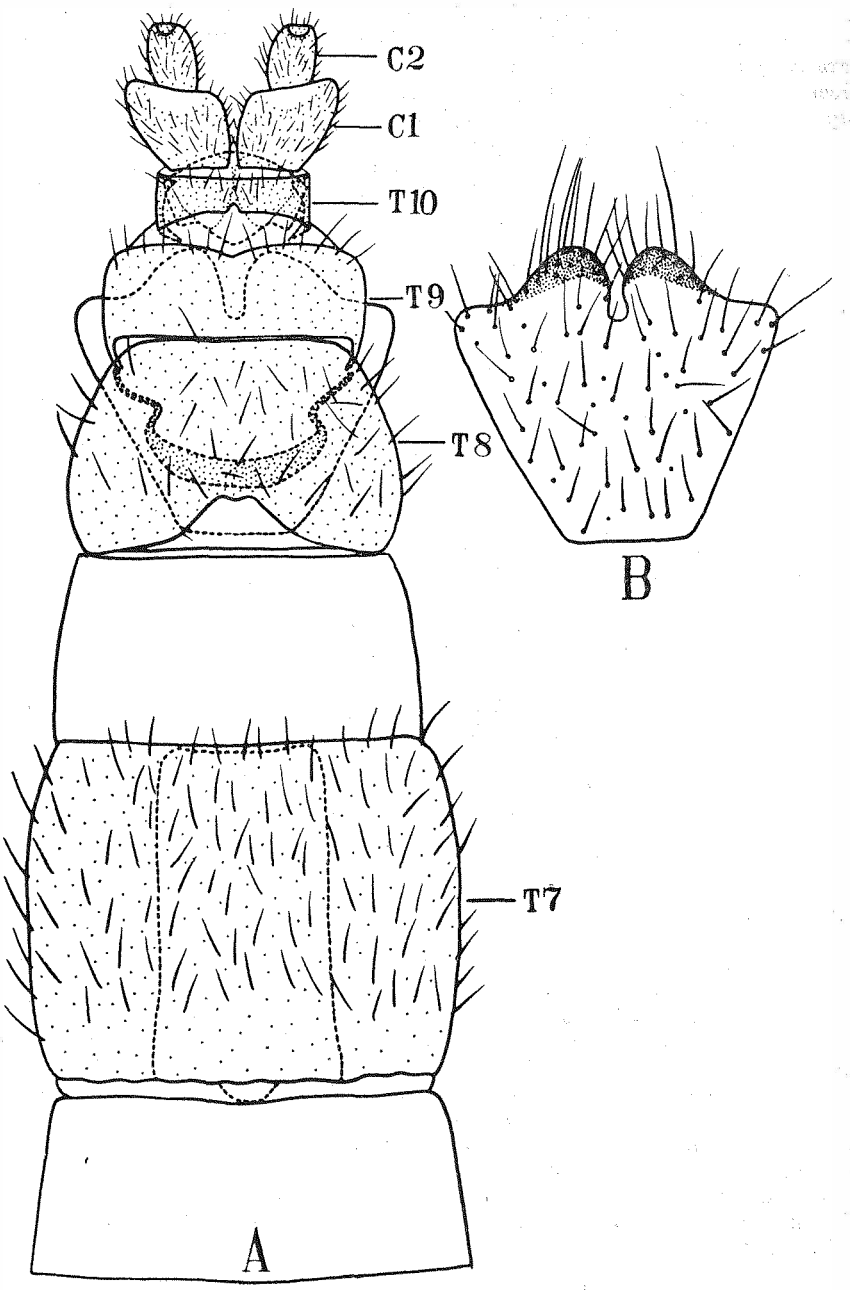

Fig. 25. *Symphoromyia crassicornis* (PANZER, 1806) (Rhagionidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

Specimen dissected: *R.* sp.: 1♀, Sangkarkuri, near Cirebon, Java, 24. xi. 1973, S. SHINONAGA.

Rhagio FABRICIUS, 1775 (Figs. 21—22): Segment 1 of cercus comparatively long and dilated outward long and thickly and its base situated near apex of sternum 10. Tergum 10 comparatively long. Sternum 8 roughly circular or somewhat elongate, with mid-posterior part deeply concave. Tergum 8 about as long as and wider than sternum 8.

Rhagio is most similar to *Arthroteles* but may be distinguished from the latter by having the inner part of segment 1 of cercus without any section. *Rhagio* may be distinguished from *Rhagina* by having tergum 10 undivided and sternum 10 rhombic. *Rhagio* is separated from *Symphoromyia* by having segment 1 of cercus dilated outward long and thickly and lateral margin of sternum 8 rounded.

Specimens dissected: *R. puellaris* NAGATOMI, 1971 (Fig. 21): 1♀, Tsurugiyama, Tokushima Pref., 29. v. 1950, S. ITO; 1♀, Takakuma, Osumi, 6. vi. 1968, A. NAGATOMI. *R. yasumatsui* NAGATOMI, 1972 (Fig. 22): 1♀, Mt. Takachiho (Kyushu), 6. vi. 1965, S. OHGA; 1♀, Kurinodake, Satsuma, 25.—26. v. 1966, K. KUSIGEMATI.

Spania MEIGEN, 1830 (Fig. 23): In cercus, segment 2 elongate and segment 1 not longer than wide but not dilated outward; in segment 1 of cercus a pair are distinctly separated from each other. Sternum 10 convex and rounded at middle of posterior margin. Tergum 10 appears to be absent. Tergum 9 wide and with mid-anterior margin shallowly and widely concave (in tergum 9, posterior half darker in color). Sternum 8 large, nearly rectangular, wider than long, and with mid-posterior margin not so concave. Tergum 8 is semicircular or may be roughly trapezoid and is wider than sternum 8. Intersegmental membrane between terga 7 and 8 hardly visible.

Spania is distinguished from *Ptiolina* by having segment 1 of cercus short, tergum 9 wider, sternum 8 nearly rectangular, tergum 8 wider than sternum 8, and intersegmental membrane between terga 7 and 8 hardly visible. *Spania* is separated from *Spaniopsis* in the following points: segment 1 of cercus not dilated outward and its inner part without any section; in tergum 9, area at base of genital furca not sclerotized; sternum 8 wider than long.

Specimen dissected: *S.* sp.: 1♀, Mt. Kujyu, Bungo, 21. v. 1962, T. SAIGUSA.

Spaniopsis WHITE, 1914 (Fig. 24): Cercus: segment 2 longer than wide and with apex rounded; segment 1 dilated outward and its inner part with an elliptical section. Sternum 10 convex at mid-posterior part and divided into a pair. Tergum 9 elongate transversely, with anterior margin convex and rounded, and with posterior margin concave; a pair of sclerotized parts are present at base of genital furca and they appear to belong in tergum 9. Sternum 8 roughly square. Tergum 8 wider than sternum 8. Intersegmental membrane between terga 7 and 8 hardly visible.

Spaniopsis is distinguished from *Spania* in the following points: segment 1 of cercus dilated outward and its inner part with an elliptical section (if this section is an independent segment, cercus has 3-segments); a pair of sclerotized parts are present at base of genital furca; sternum 8 roughly square.

Specimens dissected: *S.* sp.: 2♀, Australia, HELMS collection.

Symphoromyia FRAUENFELD, 1867 (Fig. 25): Segment 1 of cercus comparatively long and its base situated near apex of sternum 10. It appears that sternum 10 is nearly rhombic and is divided into a pair which are triangular. Tergum 10 roughly rectangular. Sternum 8 large and tapering anteriorly, with lateral margin angular and anterior margin straight. Tergum 8 may be wider than sternum 8. Tergum 7 may be wider than long.

Symphoromyia may be distinguished from *Rhagio* by having segment 1 of cercus less dilated outward and lateral margin of sternum 8 angular.

Specimen dissected: *S. crassicornis* (PANZER, 1806): 1♀, Renge Oike, Shinano, 21. vii. 1955, T. OKUNO.

Key to 12 genera of Rhagionidae (based on ♀ terminalia)

1(2) Segment 1 of cercus roughly as wide as or wider than long 2

— Segment 1 of cercus much narrower than long; segment 2 of cercus also elongate; tergum 8 wide but smaller in width and length than sternum 8; tergum 7 wide; intersegmental membrane between terga 7 and 8 short . . *Ptiolina*

DOI: 10.21248/contrib.entomol.26.1.5-47

2(1) Segment 1 of cercus dilated outward (or downward from a lateral view) . . . 3
— In cercus, segment 1 not dilated outward and segment 2 elongate (as well as in *Ptiolina*); sternum 8 roughly rectangular; terga 7—8 wide; intersegmental membrane between terga 7 and 8 hardly visible . . . . . *Spania*
3(2) Intersegmental membrane between terga 7 and 8 well developed; inner part of segment 1 of cercus has no or indistinct section; tergum 9 roughly rectangular or trapezoid; sternum 8 with lateral margin strongly curved 4
— Intersegmental membrane between terga 7 and 8 hardly visible and terga 7 and 8 wide; inner part of segment 1 of cercus with distinct section (cercus superficially 3-segmented); tergum 9 (or chitinous part of tergum 9) elongate transversely, with anterior margin convex, and with a pair of separated sclerite at base of genital furca; sternum 8 with lateral margin not so strongly curved . . . . . *Spaniopsis*
4(3) Sternum 8 with mid-posterior margin deeply and narrowly concave; tergum 8 longer than in *Bolbomyia* 5
— Sternum 8 with posterior margin widely, shallowly, and gently concave; tergum 8 much shorter than wide and than sternum 8 . . . . . *Bolbomyia*
5(4) Segment 1 of cercus dilated outward as a slender lobe; tergum 10 appears to be absent; sternum 10 divided into a pair 6
— Segment 1 of cercus not so dilated outward as a slender lobe; tergum 10 distinct 7
6(5) Each sclerite of sternum 10 narrower than segment 1 of cercus . . . . . *Glutops*
— Each sclerite of sternum 10 bulged out from base of segment 1 of cercus . . . . . *Pseudoerinna*
7(5) Tergum 10 entirely divided into a pair or at least deeply incised at mid-posterior part 8
— Tergum 10 not divided into a pair; segment 1 of cercus about as wide as long 10
8(7) Segment 1 of cercus distinctly wider than long; sternum 10 appears to be roughly rhombic 9
— Segment 1 of cercus not wider than long; sternum 10 appears to be circular . . . . . *Rhagina*
9(8)* Sternum 8 roughly circular . . . . . *Arthroceras*
— Sternum 8 longer than wide and tapering anteriorly . . . . . *Chrysopilus*
10(8) Tergum 10 comparatively long; segment 1 of cercus with outer margin strongly curved (or dilated outward thickly) 11
— Tergum 10 comparatively short; segment 1 of cercus with outer margin gently curved (or not dilated outward thickly); sternum 8 with lateral margin angular at least in *crassicornis* . . . . . *Symphoromyia*
11(10) Segment 1 of cercus with a rather indistinct section at inner part . . . *Arthroteles*
— Segment 1 of cercus without any section . . . . . *Rhagio*

Family Athericidae (Figs. 26—30)

Characters of family. Ovipositor is not telescoped. Cercus 1-segmented, as wide as long or roughly so, and with posterior margin rounded. Sternum 10 with posterior margin convex and rounded (shape of anterior margin in sternum 10 is not certainly grasped; in *Atherix basilica* anterior margin appears to be widely concave and sternum 10 appears to be strap-like). Tergum 10 is elongate transversely and divided into a pair (which may possibly be connected with each other in *Atherix basilica*). Tergum 9 wide, roughly rectangular, and much larger than tergum 10. Sternum 8 roughly as wide as long or somewhat wider than long, with lateral margin strongly curved, with posterior margin convex but sometimes shallowly concave at middle, and with anterior margin straight but sometimes (in *Dasyomma poecilogaster*) widely concave. Terga 7 and 8 very wide and intersegmental membrane between terga 7 and 8 hardly visible.

Athericidae are very similar in shape of female terminalia to Pangoniinae of Tabanidae and are difficult to distinguish from the latter. But in Athericidae tergum 9 is larger than in usual Pangoniinae, and mid-distal part of genital furca protrude forward (toward base

DOI: 10.21248/contrib.entomol.26.1.5-47

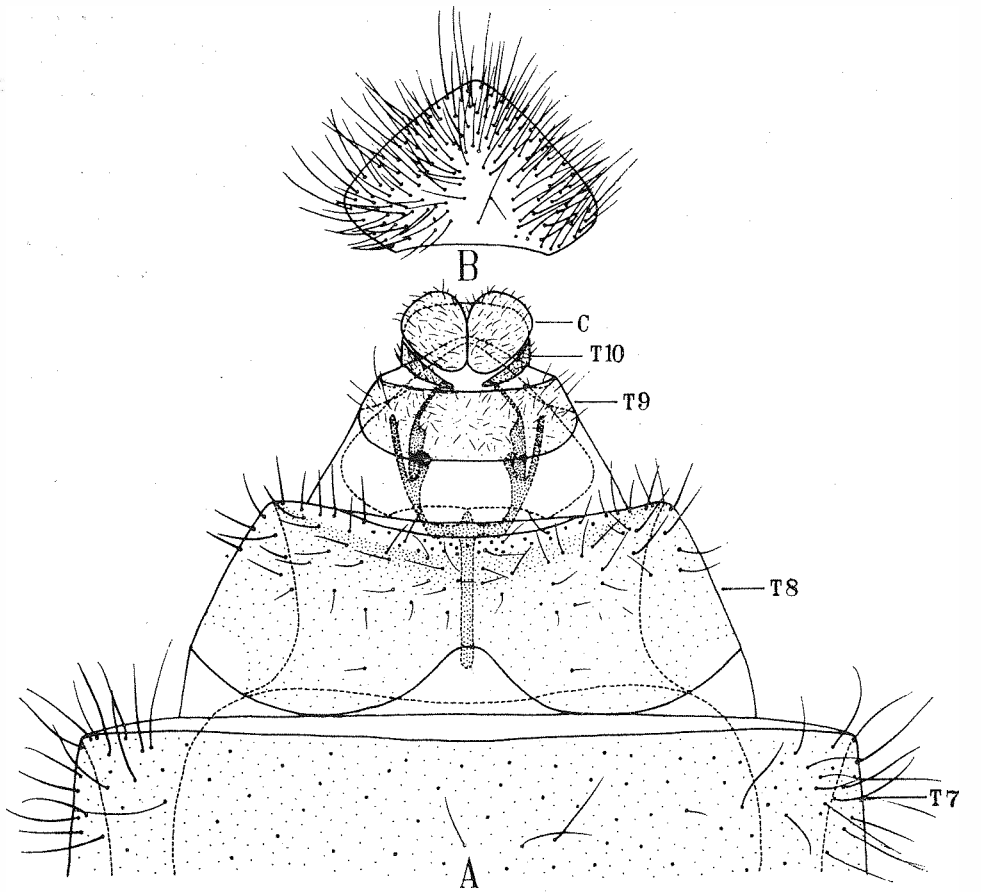

Fig. 26. *Atherix ibis* (FABRICIUS, 1798) (Athericidae)

of abdomen), although in shape of genital furca some Pangoniinae (e. g. *Scaptia* (*Palimmecomyia*) *walkeri* (NEWMAN, 1857) and *S.* (*P.*) *pictipennis* MACKERRAS, 1960) (after MACKERRAS, 1960: 143) resemble somewhat *Atrichops*.

Characters of genus. It appears that the shape of genital furca varies with genus, and the inner part of tergum 10 is rounded in *Atrichops* but pointed or rather so in *Atherix*, *Suragina*, and *Dasyomma*.

Characters of species. The tergum 9 is longer in *Atherix basilica* than in 4 species (belonging to *Atherix*, *Suragina*, *Atrichops*, and *Dasyomma*) discussed in this paper. The shape of sternum 8 may be useful in separating some species.

Specimens dissected. *Atherix* MEIGEN, 1803: *A. ibis* (FABRICIUS, 1798) (Fig. 26): 3♀, Sasayama, Tamba, 4. v. 1955, A. NAGATOMI. *A. basilica* NAGATOMI, 1958 (Fig. 27): 3♀, Senjodake, Kai, 16—17. vii. 1963, A. NAGATOMI.

Suragina WALKER, 1860 (which may be at most a subgenus of *Atherix*): *S. kodamai* (NAGATOMI, 1953) (Fig. 28): 1♀, Sasayama, Tamba, 2. vii. 1953, A. NAGATOMI.

Atrichops VERRALL, 1909: *A. morimotoi* (NAGATOMI, 1953) (Fig. 29): 4♀, Takinoya-mura, Yabu-gun, Tajima (Hyogo Pref.), 7. viii. 1951, A. NAGATOMI.

Dasyomma MACQUART, 1840: *D. poecilogaster* (PHILIPPI, 1865) (det. by L. L. PECHUMAN) (Fig. 30): 1♀, Prov. Valdivia, Chile, xi. 1953, L. E. PENA.

DOI: 10.21248/contrib.entomol.26.1.5-47

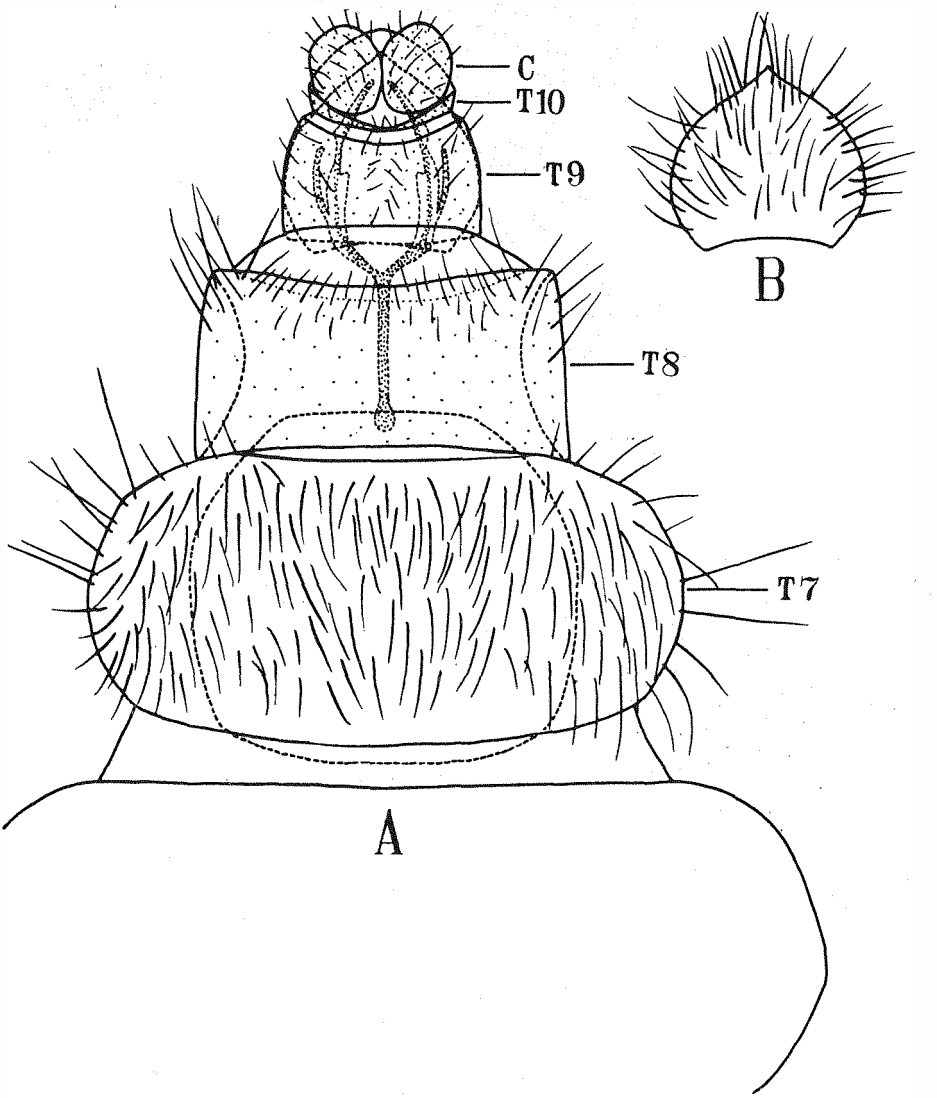

Fig. 27. *Atherix basilica* NAGATOMI, 1958 (Athericidae)

Family Vermileonidae (Figs. 31—33)

Characters of family. Abdomen without telescope ovipositor; intersegmental membrane between terga 7 and 8 short and hardly visible. Cercus is not elongate and probably unsegmented but has some (2 in principle) processes. Sternum 10 undivided or divided into a pair according to genus or species. Tergum 10 appears to be entirely absent. Tergum 9 roughly rectangular or triangular according to genus or species. Sternum 8 elliptical in shape and wider than long. Tergum 8 wider than long and wider than sternum 8.

Vermileonidae are characterized by having the cercus with some (2 in principle) processes and probably unsegmented, tergum 10 absent, and intersegmental membrane

DOI: 10.21248/contrib.entomol.26.1.5-47

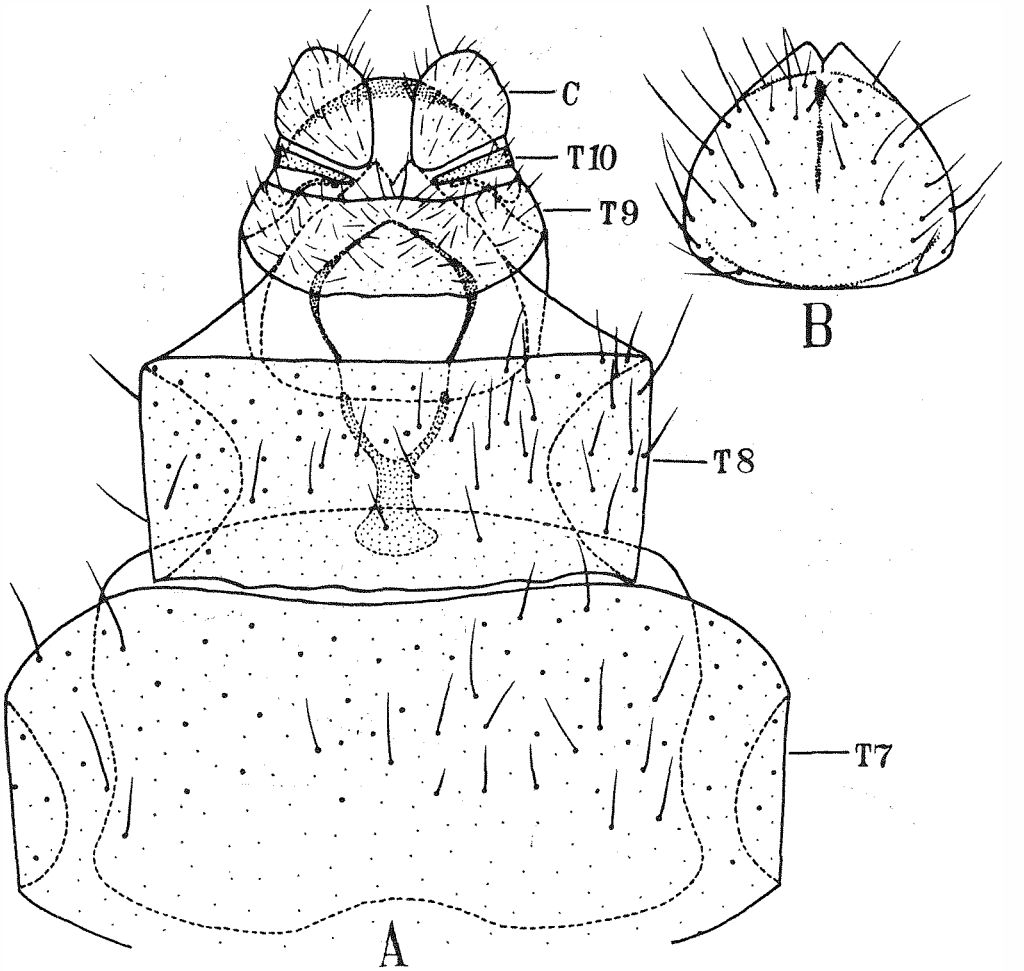

Fig. 28. *Suragina kodamai* (NAGATOMI, 1953) (Athericidae)

between terga 7 and 8 hardly visible. Vermileonidae may be most similar to the genus *Spaniopsis* of Rhagionidae but is distinguished from the latter by having the cercus peculiar in shape and tergum 9 much larger.

Characters of genus and species. *Lampromyia* MACQUART, 1835 (Figs. 31 and 33): *L. intermedia* STUCKENBERG, 1955 (det. by B. R. STUCKENBERG): Cercus entirely hidden under tergum 9, and with 2 processes which are elongate and run transversely (the outer is wider than the inner); sternum 10 divided into a pair which are roughly an acute-angled triangular; tergum 9 roughly triangular; sternum 8 rather circular. Specimen dissected: 1♀, Grahamstown, South Africa, x. 1958, B. R. STUCKENBERG.

Vermileo MACQUART, 1834 (Figs. 32 and 33): *V. comstocki* WHEELER, 1918 (det. by E. I. SCHLINGER): Cercus with 2 processes which are not longer than wide (the outer process is larger than the inner); sternum 10 undivided and roughly fan-like in shape; tergum 9 rectangular; sternum 8 distinctly wider than long. Specimen dissected: 1♀, Donner Pass, Nevada Co., California, 4. vii. 1962, J. POWELL.

DOI: 10.21248/contrib.entomol.26.1.5-47

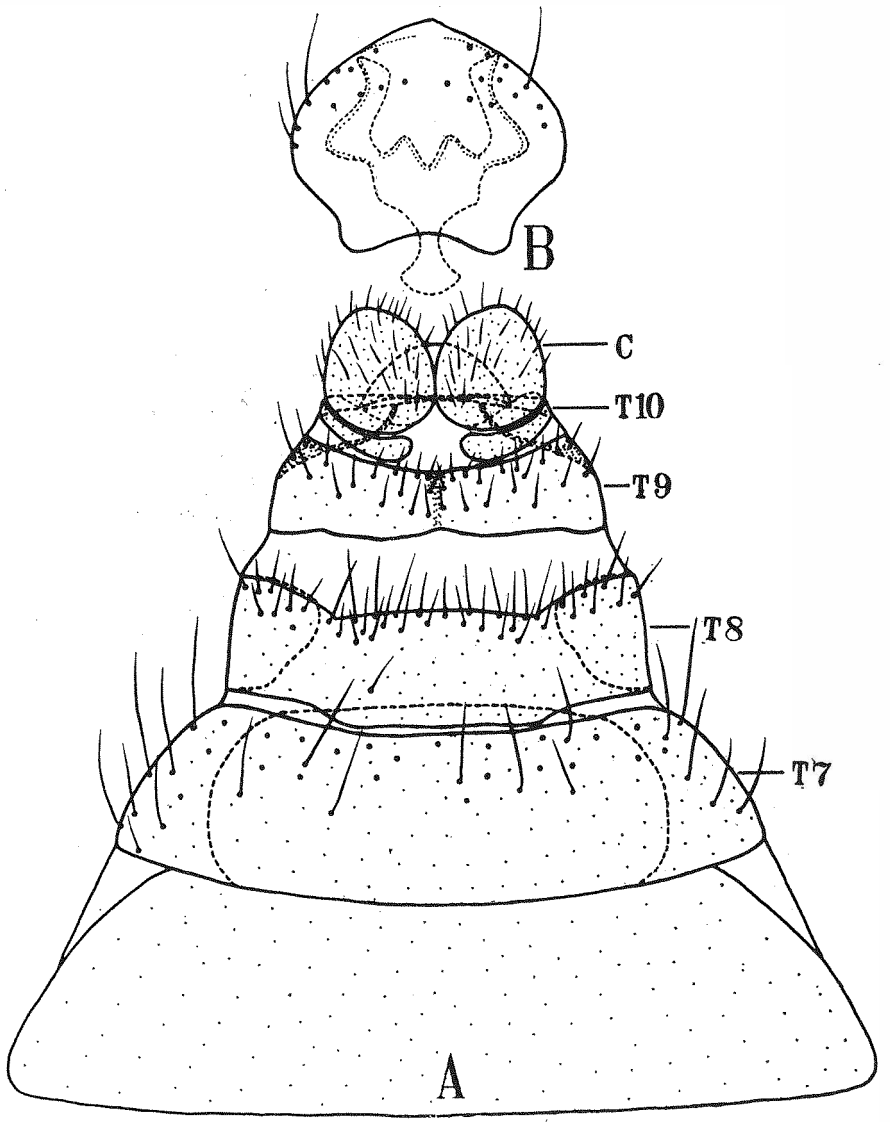

Fig. 29. *Atrichops morimotoi* (NAGATOMI, 1953) (Athericidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

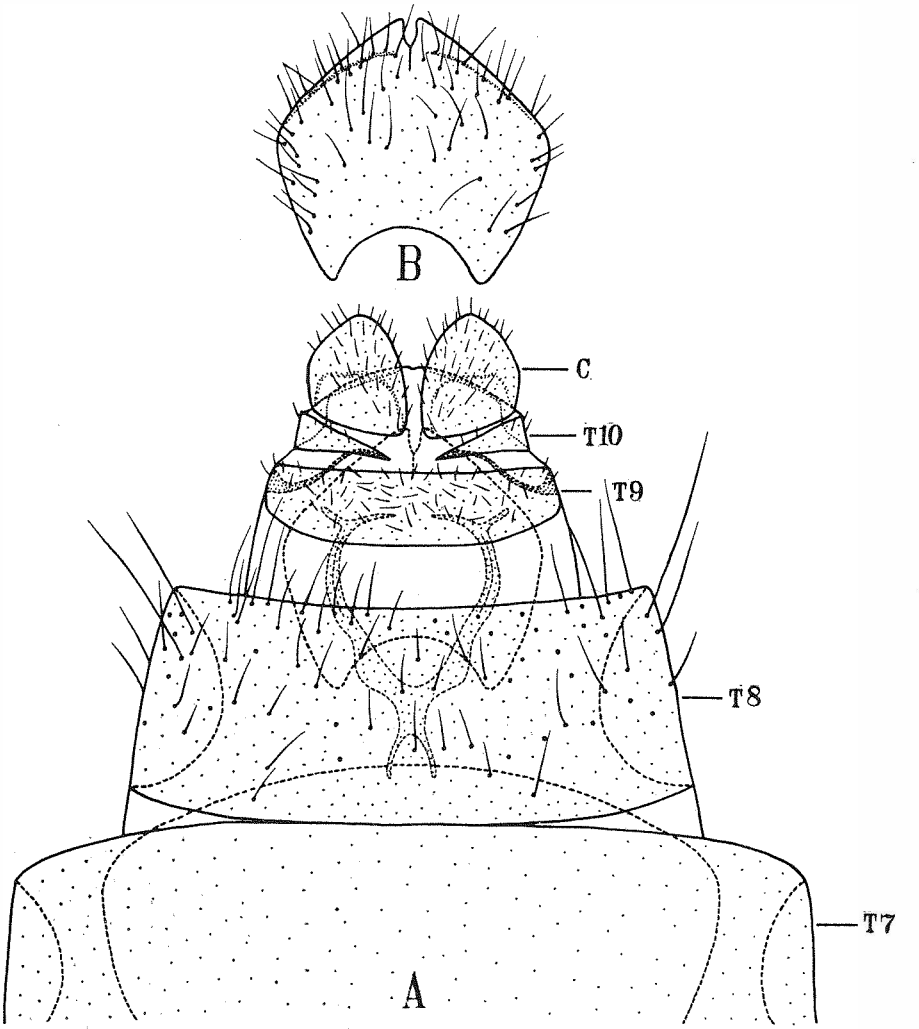

Fig. 30. *Dasyomma poecilogaster* (PHILIPPI, 1805) (Athericidae)

Genus ***Austroleptis*** HARDY, 1920 (probably Rhagionidae) (Fig. 34)

Characters of genus. Ovipositor appears to be composed of abdominal segments 5—8. Cercus 1-segmented and with posterior margin rounded. Sternum 10 with posterior margin convex and rounded. Tergum 10 divided into a pair and small. Sternum 9 is present, roughly as wide as long, much narrower than tergum 9, and at least in *collessi* its anterior margin is rounded and posterior margin may be rather straight. Tergum 9 rather rectangular and wider than long. Sternum 8 longer than wide, tapering anteriorly, and much narrower than tergum 8. Terga 7 and 8 not so wide as in Athericidae, and intersegmental membrane between terga 7 and 8 well developed.

DOI: 10.21248/contrib.entomol.26.1.5-47

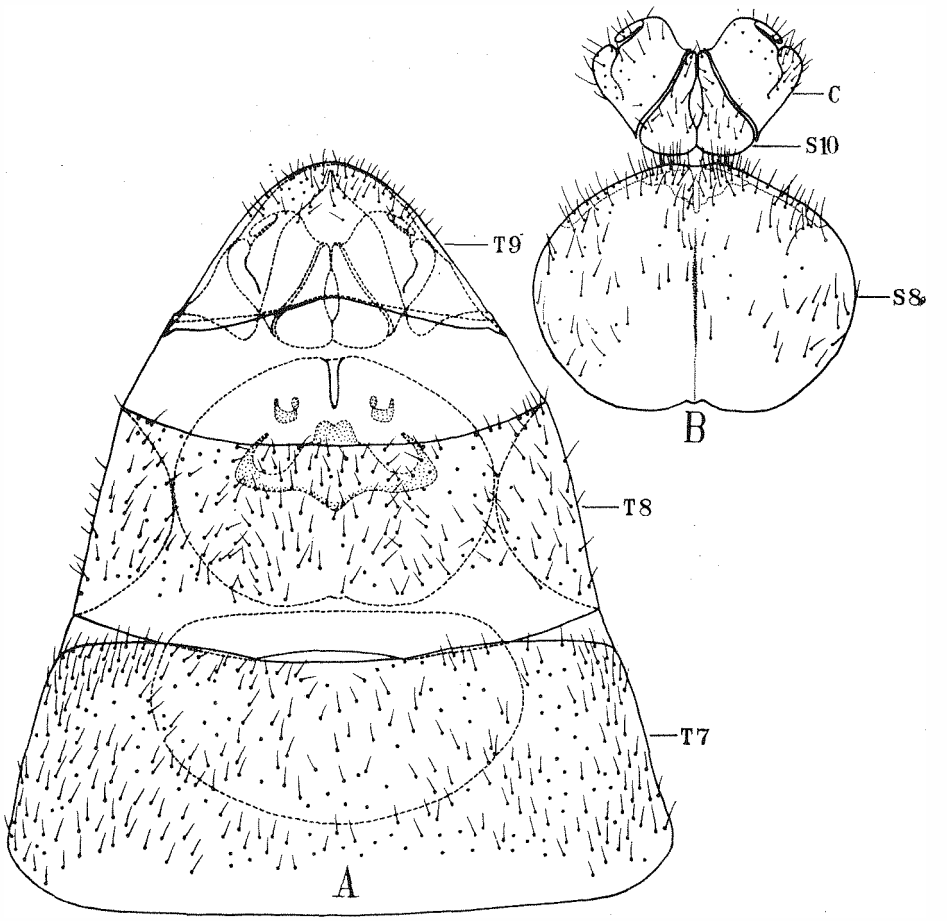

Fig. 31. *Lampromyia intermedia* STUCKENBERG, 1955 (Vermileonidae)

Austroleptis has a striking peculiarity, that is, the sternum 9 is present, and in addition to this character, it is at once distinguished from the genera of Athericidae by having tergum 10 much smaller, sternum 8 longer than wide and thinner anteriorly, terga 7 and 8 narrower, and intersegmental membrane between terga 7 and 8 well developed, and it is also easily separated from the genera of Rhagionidae by having cercus 1-segmented.

Austroleptis is intermediate between the Rhagionidae and Athericidae in the structure of ♀ genitalia, but seems to belong (or be more closely related) to the Rhagionidae rather than to Athericidae judging from the structure of ♂ genitalia in which aedeagus appears to have no "endophallic tines".

Specimen dissected. *A. collessi* PARAMONOV, 1962 (det. by D. H. COLLESS): 1♀, 7 miles W. of Maydena, Tasmania, 26. ii. 1967, E. F. RIEK.

Summary

This paper describes and illustrates the female terminalia of the following families: Solvidae (= Xylomyidae), Xylophagidae s. lat. (Rachiceridae, Xylophagidae, Coenomyiidae and Exeretoneuridae), Rhagionidae s. lat. (Pefecorhynchidae and Rhagionidae), Athericidae and Vermileonidae. It deals with a total of 33 species belonging to 27 genera. It is hoped that the present study gives some bases in the classification of the lower Brachycera.

DOI: 10.21248/contrib.entomol.26.1.5-47

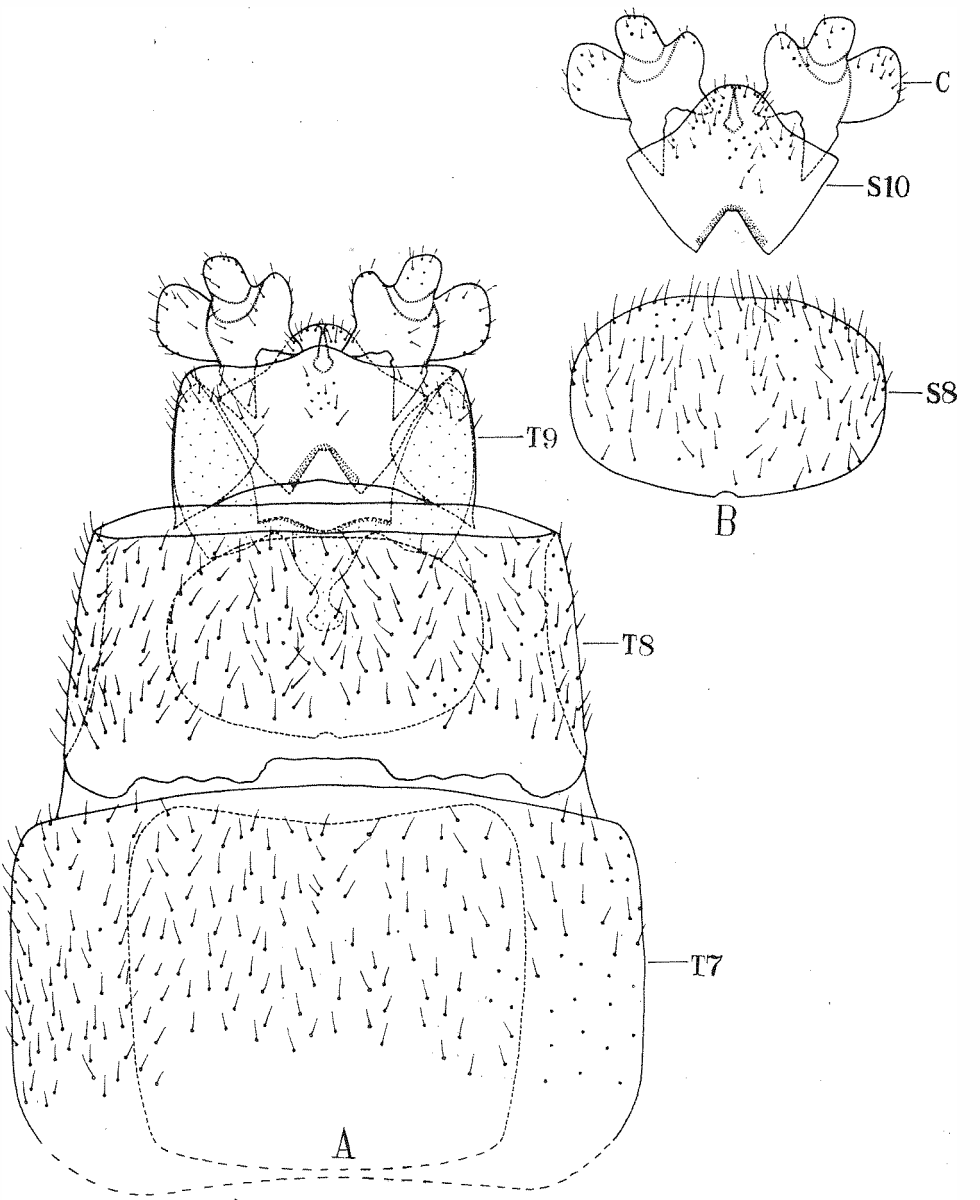

Fig. 32. *Vermileo comstocki* WHEELER, 1918 (Vermileonidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

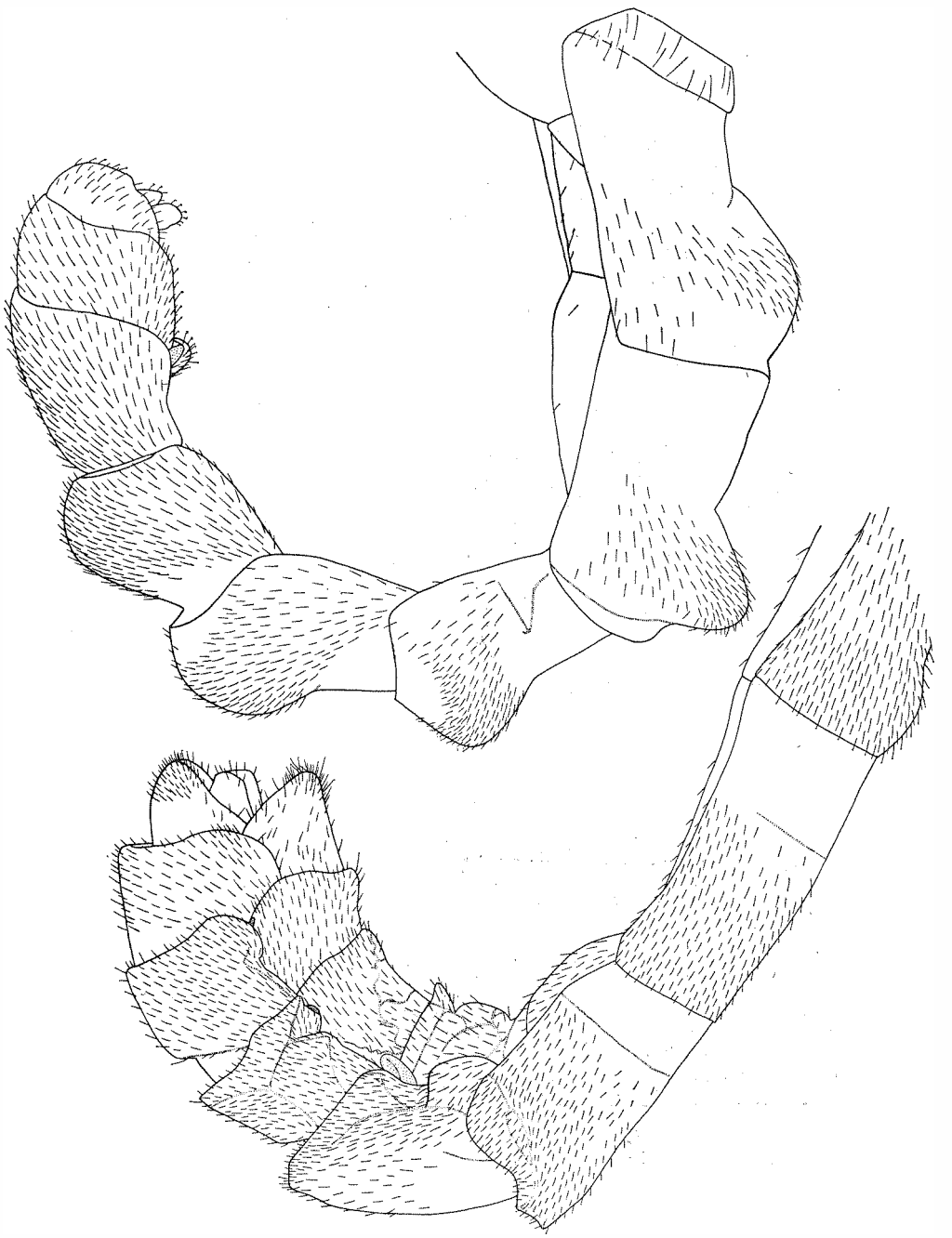

Fig. 33. *Lampromyia intermedia* (below) and *Vermileo comstocki* (above) (abdomen, lateral view)

DOI: 10.21248/contrib.entomol.26.1.5-47

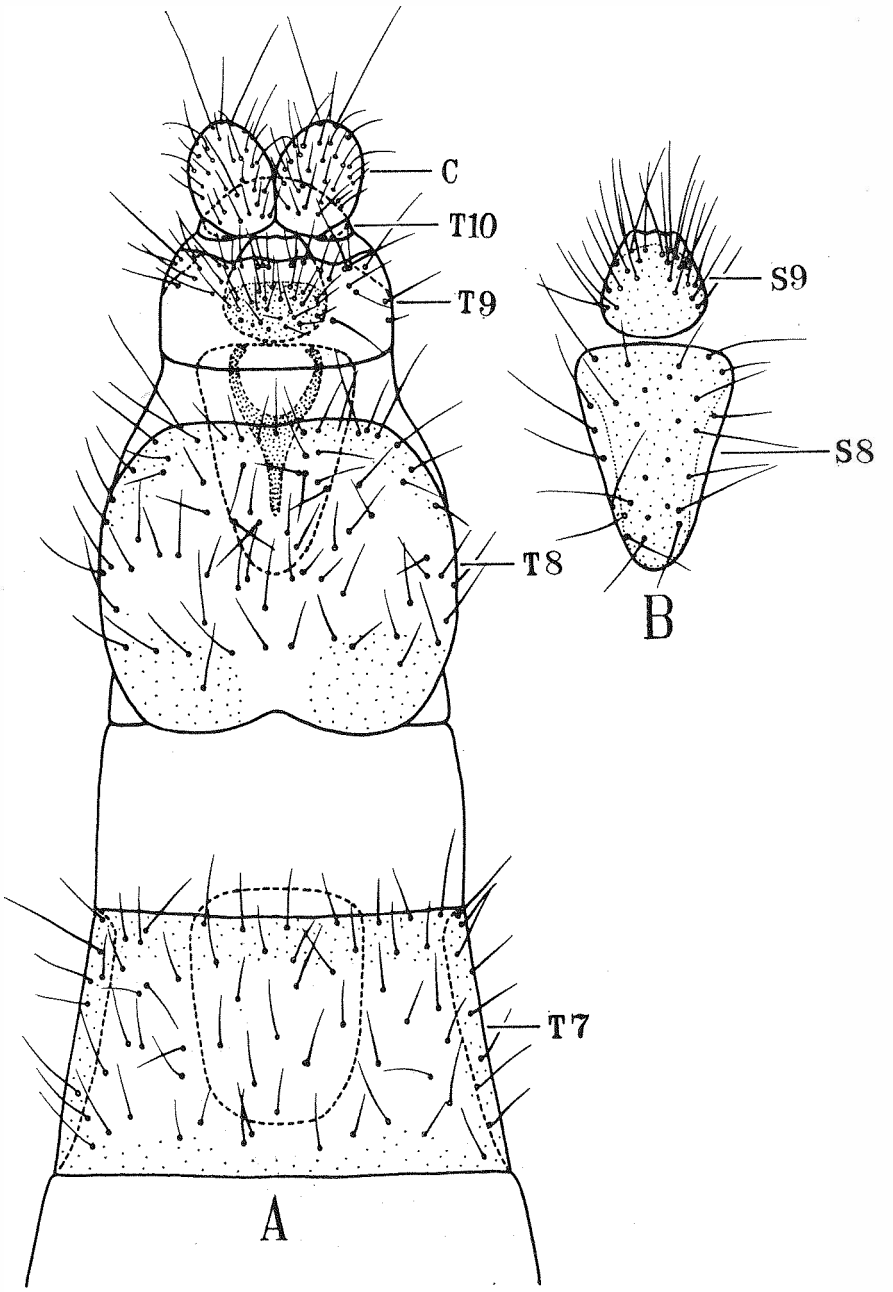

Fig. 34. *Austroleptis collessi* PARAMONOV, 1962 (probably Rhagionidae)

DOI: 10.21248/contrib.entomol.26.1.5-47

Zusammenfassung

Die weiblichen Terminalien von 33 Arten aus 27 Gattungen folgender Familien werden als Beitrag zur Klassifizierung der niederen Brachyceren beschrieben: Solvidae (= Xylomyidae), Xylophagidae s. lat. (Rachiceridae, Xylophagidae, Coenomyiidae and Exeretoneuridae), Rhagionidae s. lat. (Pelecorhynchidae and Rhagionidae), Athericidae und Vermileonidae.

Резюме

Статья описивает и илегюстрирует женские терминали следующих семеиств: Solvidae (= Xylomyidae), Xylophagidae s. lat. (Rachiceridae, Xylophagidae, Coenomyiidae и Exeretoneuridae), Rhagionidae s. lat. (Pelecorhynchidae and Rhagionidae), Athericidae и Vermileonidae. Всего обхвативаюся 33 видов в 27 родов. Статья служит классификации низших Brachycera.

References

Brauer, F. Systematische Studien auf Grundlage der Dipterenlarven nebst einer Zusammenstellung von Beispielen aus der Literatur über dieselben und Beschreibung neuer Formen. Denkschr. Math.-Naturwiss. Classe Kaiserl. Akad. Wiss. Wien **47**, 1–100; 1883.

Hennig, W. Die sogenannten „niederen Brachycera" im Baltischen Bernstein (Diptera: Fam. Xylophagidae, Xylomyidae, Rhagionidae, Tabanidae). Stuttg. Beitr. Naturk. **174**, 1–51; 1967.

Iwata, K. & Nagatomi, A. Female terminalia of Tabanidae (Diptera) from Japan. Jap. Journ. Sanit. Zool. [In press].

Mackerras, I. M. The Tabanidae (Diptera) of Australia. III. Subfamily Pangoniinae, Tribe Scionini and supplement to Pangoniini. Aust. Journ. Zool. 8, 1–152; 1960.

Mackerras, I. M. & Fuller, M. E. The genus *Pelecorhynchus* (Diptera, Tabanoidea). Proc. Linn. Soc. N.S.W. **67**, 9–76; 1942.

Malloch, J. R. A preliminary classification of Diptera exclusive of Pupipara, based on larval and pupal characters, with keys to imagines in certain families, Part I. Bull. Ill. Lab. Nat. Hist. **12**, 161–409; 1917.

Nagatomi, A. Definition of Coenomyiidae (Diptera). Proc. Japan Acad. **51**, 452–466; 1975.

– Classification of lower Brachycera (Diptera). Journ. nat. Hist. [In press].

Stuckenberg, B. R. The Athericidae, a new family in the lower Brachycera (Diptera). Ann. Natal Mus. **21**, 649–673; 1973.

DOI: 10.21248/contrib.entomol.26.1.5-47