

Article

A revision of the Japanese species of the subgenus *Metatrichocera* Dahl, 1966 of the genus *Trichocera* Meigen, 1803 (Diptera; Trichoceridae)¹⁾

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Abstract

Japanese species of the subgenus *Metatrichocera* Dahl, 1966 of the genus *Trichocera* Meigen, 1803 are revised. Six new species, *T. (M.) bifurcata*, *T. (M.) truncata*, *T. (M.) monstrosa*, *T. (M.) cordata*, *T. (M.) hypandrialis*, and *T. (M.) corallifera*, are described. A redescription of *T. (M.) mirabilis* Alexander, 1934 is given. Some comments on *T. (M.) crassicauda* Nakamura et Saigusa, 1996 and *T. (M.) chaetopyga* Nakamura et Saigusa, 1996, are mentioned. Illustrations of these species and keys to the Japanese species of this subgenus are given. The probable polyphyly of *Metatrichocera* and phylogenetic relationships of some species are discussed.

Key words : Trichoceridae, *Trichocera*, *Metatrichocera*, taxonomy, new species, Japan.

Introduction

The genus *Trichocera* Meigen, 1803, is a large taxon comprising approximately 80 species of medium-sized slender flies, and is divided into 3 subgenera, *Trichocera* Meigen, 1803, *Oligotrichocera* Dahl, 1971, and *Metatrichocera* Dahl, 1966 (Dahl & Alexander, 1976).

The subgenus *Metatrichocera* was established by Dahl (1966) as a genus, and soon after that, Alexander & Alexander (1967) treated it as a subgenus of *Trichocera*. Until now, 19 species of this subgenus are known from the Holarctic Region. These species vary remarkably in the structure of the male genitalia. Although many diagnostic characters, such as inflated gonocoxites and complicated gonostyli of the male genitalia, were indicated for this subgenus, none seem able to define the subgenus *Metatrichocera* exactly, as many exceptions exist. For example, *T. (M.) mirabilis* Alexander has slender gonocoxites, *T. (M.) candida* Dahl and *T. (M.) latilobata* Alexander possess rather simple gonostyli. For this reason, we doubt the monophyly of this subgenus as stated in the discussion.

Although the validity of this subgenus is doubtful, we consider it preferable to include provisionally the species having complicated gonostyli in the subgenus *Metatrichocera*, until a reconstruction

of the phylogenetic relationships of the genus *Trichocera* is established for the world species.

A faunal survey made by the first author in northern Japan from October to November, 1996, revealed that Japanese fauna of Trichoceridae is quite rich. Although 3 *Metatrichocera* species, *T. (M.) mirabilis* Alexander, 1934, *T. (M.) chaetopyga* Nakamura et Saigusa, 1996 and *T. (M.) crassicauda* Nakamura et Saigusa, 1996, are known from Japan so far (Nakamura, 1995, Nakamura & Saigusa, 1996), 6 unfamiliar species of this subgenus were collected during the survey, and interestingly, all of these species appear to be new to science.

In the present paper, we describe and illustrate these species in detail together with *T. (M.) mirabilis* which has not been precisely described since its original description, mention some notes on *T. (M.) crassicauda* and *T. (M.) chaetopyga*, give keys to Japanese species of *Metatrichocera*, and discuss the polyphyly of *Metatrichocera* and phylogenetic relationships of some species. Most of the first draft of the descriptions of the species and the illustrations of the genitalia were prepared by the first author.

The holotypes and some paratypes of the new species described in this paper are deposited in the collection of the Biosystematics Laboratory, Graduate School of Social and Cultural Studies, Kyushu University. Other paratypes are preserved in the collection

1) Contribution from Biosystematics Laboratory, Graduate School of Social and Cultural Studies, Kyushu University, Fukuoka (No. 18).

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of the Museum of Nature and Human Activities, Hyogo, and our private collections.

The first author is especially grateful to Prof. H. Shima and Assoc. Prof. O. Yata (Biosystematics Laboratory, Graduate School of Social and Cultural Studies, Kyushu University) for their guidance and encouragement. We would like to express our thanks to Dr. H. Watabe (Biological Laboratory, Hokkaido University of Education) for his kind advise in many ways in the faunal survey in Hokkaido, and to Miss Mika Sugimoto (Biosystematics Laboratory, Graduate School of Social and Cultural Studies, Kyushu University) for donating specimens.

Key to the Japanese species of the subgenus *Metatrichocera* based on adult males

- 1 Wing membrane without macrotrichia; pterostigma not obvious; halter of ordinary length, 0.9–1.1 times as long as thorax; 9th abdominal tergum without a slender dorsomedian process 2
- Wing membrane with macrotrichia on distal portion of wing; pterostigma obvious; halter unusually long, 1.5 times as long as thorax; posterior margin of 9th tergum produced into a slender process. Gonostylus with 3 branches *T. (M.) mirabilis* Alexander, 1934
- 2 Ninth or/and 10th abdominal terga complicated in structure, projecting posteriorly into a median or paired lobes; posterior margin of ventral gonocoxal bridge with median incision 3
- Ninth and 10th abdominal terga simple in structure, 9th tergum of a simple transverse sclerite with posterior margin straight or emarginate and 10th tergum represented by a pair of subdorsal sclerites on anal tube; posterior margin of ventral gonocoxal bridge without median incision 7
- 3 Ninth abdominal tergum fused with 10th tergum at posterior margin, not produced posteriorly into a dorsomedian process; 10th tergum strikingly modified, projecting posteriorly into a pair of glabrous lobes 4
- Ninth abdominal tergum produced posteriorly into a complicated dorsomedian projection; 10th tergum consisting of a tongue-like median lobe and a pair of sclerites situated on sides of the dorsomedian projection of 9th tergum *T. (M.) chaetopyga* Nakamura et Saigusa, 1996
- 4 Crossvein m lacking (or weakened); 9th tergum clothed densely with erect hairs on subdorsal portions; dorsal side of ventral gonocoxal bridge simple, widely membranous; gonostylus bilobate, each lobe simple in structure 5
- Crossvein m always present; 9th tergum bearing a pair of subdorsal projections clothed with setae; ventral gonocoxal bridge with tongue shaped elongation on dorsal side between parameres; gonostylus complicated in structure, bearing a conspicuous projection on mesial surface at the middle or on basal 1/3, a glabrous process, a membranous tubercle and a hairy process at distal 1/3, and a comb of strong setae near apex 6
- 5 Ventral gonocoxal bridge narrow, tapering posteriorly; parameres unusually short and broad *T. (M.) bifurcata* sp. nov.
- Ventral gonocoxal bridge wide, not tapering posteriorly with a long posterior margin; parameres slender and curved dorsally *T. (M.) truncata* sp. nov.
- 6 Eighth tergum with a dorsomedian projection; anterior margin of 9th tergum without any projection; gonostylus with a mesial projection at the middle *T. (M.) crassicauda* Nakamura et Saigusa, 1996
- Eighth tergum with a pair of posterior expansions covered with dense long hairs; anterior margin of 9th tergum with a pair of small lobules; gonostylus with a mesial projection at basal 1/3 *T. (M.) monstrosa* sp. nov.
- 7 Posterior margin of 9th sternum simple, concave at the middle 8
- Posterior margin of 9th sternum projecting posteriorly; gonocoxite swollen; gonostylus with a beak-like projection on mesial portion near apex *T. (M.) hypandrialis* sp. nov.
- 8 Long axis of gonocoxite horizontal; gonocoxite long, not swollen; gonostylus with 2 branches *T. (M.) cordata* sp. nov.
- Long axis of gonocoxite vertical; gonocoxite swollen, ventral gonocoxal bridge elongate into a curved sword-like lobe; gonostylus with 2 spiny lobes on mesial side at base *T. (M.) corallifera* sp. nov.

Key to the Japanese species of the subgenus *Metatrichocera* (except for *T. truncata* and *T. hypandrialis* whose females are unknown so far) based on adult females

- 1 Wing membrane without macrotrichia, pterostigma not obvious; halter of ordinary length, subequal to or shorter than thorax; cercus of moderate length, 2.5–3.0 times as long as wide 2

- Wing membrane with macrotrichia on distal portion of wing; pterostigma obvious; halter long, 5/4 as long as thorax. Cercus long, about 5 times as long as its maximum width
..... *T. (M.) mirabilis* Alexander, 1934
- 2 Discal cell closed, crossvein m always present ... 3
- Discal cell open as crossvein m lacking
..... *T. (M.) bifurcata* sp. nov.
(The unknown female of *T. truncata* sp. nov. will be included here, because the male *truncata* has open discal cell.)
- 3 Cercus with a group of fine setae restricted to the ventroproximal area bordered dorsally by a weak or distinct lateral ridge 4
- Cercus sparsely clothed with fine setae distributed on its entire area
..... *T. (M.) corallifera* sp. nov.
- 4 Tenth tergum much longer than 9th tergum 5
- Dorsomedian portion of 10th tergum much shorter than that of 9th tergum; 10th tergum bearing a row of long erect setae; ventral surface of 8th sternum flat; cercus triangular in lateral aspect
... *T. (M.) chaetopyga* Nakamura et Saigusa, 1996
- 5 Abdomen stout; terga and sterna concolorous; 10th sternum with 2 or more setae on both sides 6
- Abdomen slender; terga dark brown, darkened to blackish brown on 2-3 posterior segments; 2nd to 8th sterna yellowish brown, darkened posteriorly on posterior 1/2; 10th sternum with a pair of single setae on posterior margin
..... *T. (M.) cordata* sp. nov.
- 6 Wing with R_{2+3} as long as R_{2+3+4} . Ninth sternum as broad as long; 10th sternum with 2-3 rather short setae on both sides
.. *T. (M.) crassicauda* Nakamura et Saigusa, 1996
- Wing with R_{2+3} often half as long as R_{2+3+4} . Ninth sternum broader than long; 10th sternum with 4 or more rather long curved setae on both sides ...
..... *T. (M.) monstrosa* sp. nov.

Trichocera (Metatrachocera) bifurcata sp. nov.

[Japanese name: hasami-gaganbodamashi]

(Figs. 1, 9-21)

Description.

Male. Body length 3.5-4.9 mm; wing length 5.2-6.0 mm (in dried specimens).

Head: Cranium, mouthparts and antenna blackish brown, grayish brown pollinose, occiput and face with brown setae, more yellowish on face; eye black. Antenna 2.3-2.5 times as long as thorax, consisting of 16 segments; extreme base of 1st flagellomere pale brown; flagellum rather stout; 1st to 8th or 9th flagellomeres densely covered with pale curved hairs;

Table 1. Relative lengths* of leg segments of *Trichocera (Metatrachocera) bifurcata* sp. nov., a paratype male.

	Femur	Tibia	Tarsomere					Claw
			1	2	3	4	5	
Fore leg	344	355	167	87	47	25	23	12
Mid leg	340	313	123	71	41	21	20	11
Hind leg	365	373	151	89	53	27	21	11

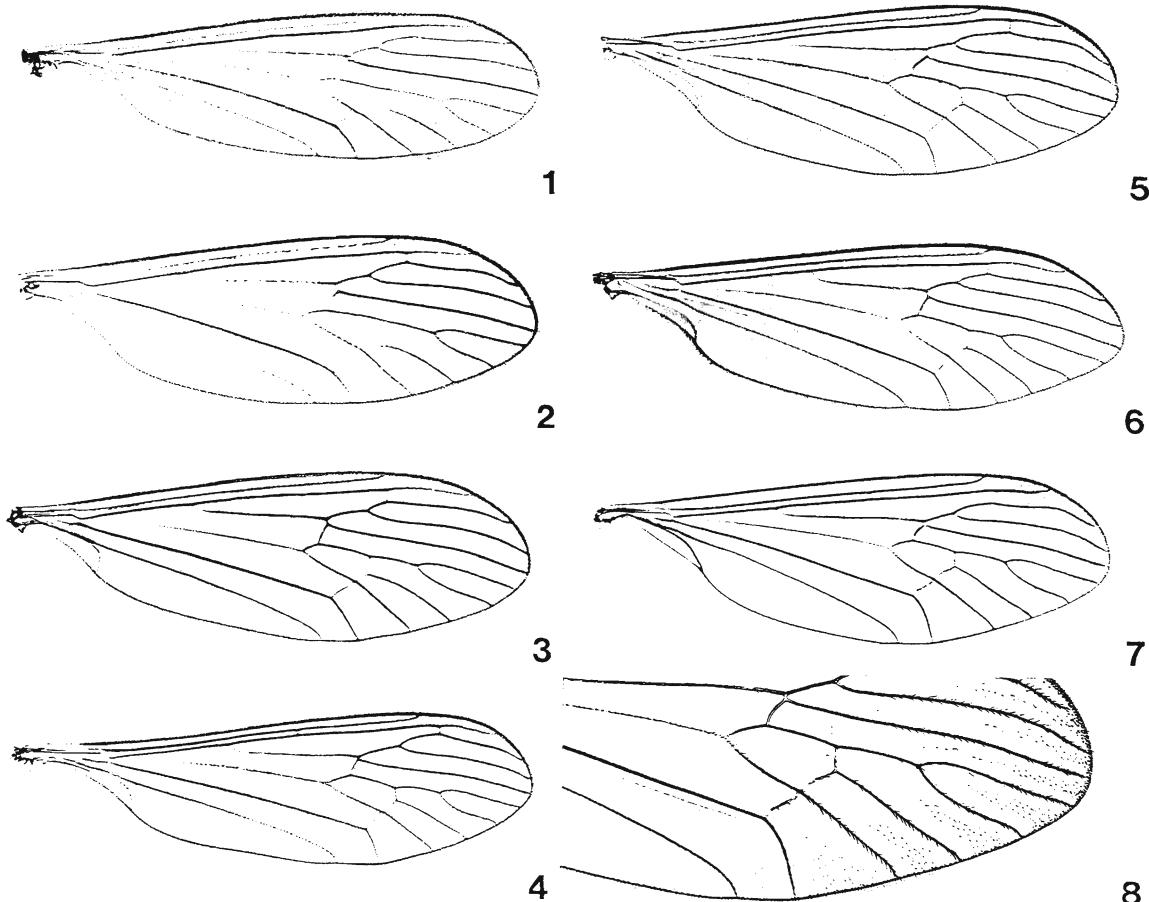
*the length of thorax as 100

remainder of flagellomeres with long straight hairs; 1st flagellomere bearing scattered long darker setae; 2nd to 6th flagellomeres with scattered long darker setae on subapical portion; 1st flagellomere 1.8-2.1 times as long as 2nd. Specimens having relatively longer 1st flagellomere bearing a joint like membranous break at basal 3/5 on ventral surface of 1st flagellomere.

Thorax: General coloration dark brown, pale brown pollinose; paratergite, lateral portion of scutum, scutellum and mediotergite paler; pronotum, prescutum, scutum and scutellum clothed with yellow to pale brown setae. Legs stout; coxae and trochanters yellowish brown with longish yellow hairs; femora and tibiae yellowish brown, faintly darkened distally, covered with brown hairs; tibial spurs blackish brown; tarsi dark brown, a little shorter than tibiae; 1st to 4th tarsomeres cylindrical and straight; 5th tarsomere curved downward, thickened apically. Claws about half as long as 5th tarsomere, pale brown. Relative lengths of leg segments as in Table 1.

Wing slender, 3.5 times as long as broad. Membrane subhyaline with a yellowish tinge, without any markings; pterostigma concolorous to ground; veins yellowish brown, paled to yellow basally. Venation: Crossvein sc-r situated at the level of basal 1/3 of Rs; R_{1+2} slightly weakened at distal end; R_{2+3} a little longer than R_{2+3+4} ; crossvein r-m connected with R_5 just beyond the fork of Rs or short distance beyond it; discal cell open as crossvein m lacking in most specimens (approximately 10% of specimens having completely or incompletely closed discal cell); basal oblique part of M_3 glabrous and weakened. Halter as long as thorax, yellow.

Abdomen: First to 8th segments dark blackish brown, pale brown pollinose; 1st tergum with a row of long setae on posterior margin; 2nd to 7th segments with scattered pale setae; 7th tergum 0.7 times as long as wide, with anterior margin rounded and more or less produced medially, posterior margin slightly emarginate; 8th tergum of a transversely narrow sclerite, 1/6 as long as 7th tergum along dorsomedian line, only slightly dilated laterally, clothed with a row of longish setae along posterior margin and a few shorter setae at sides; 8th sternum twice as long as its

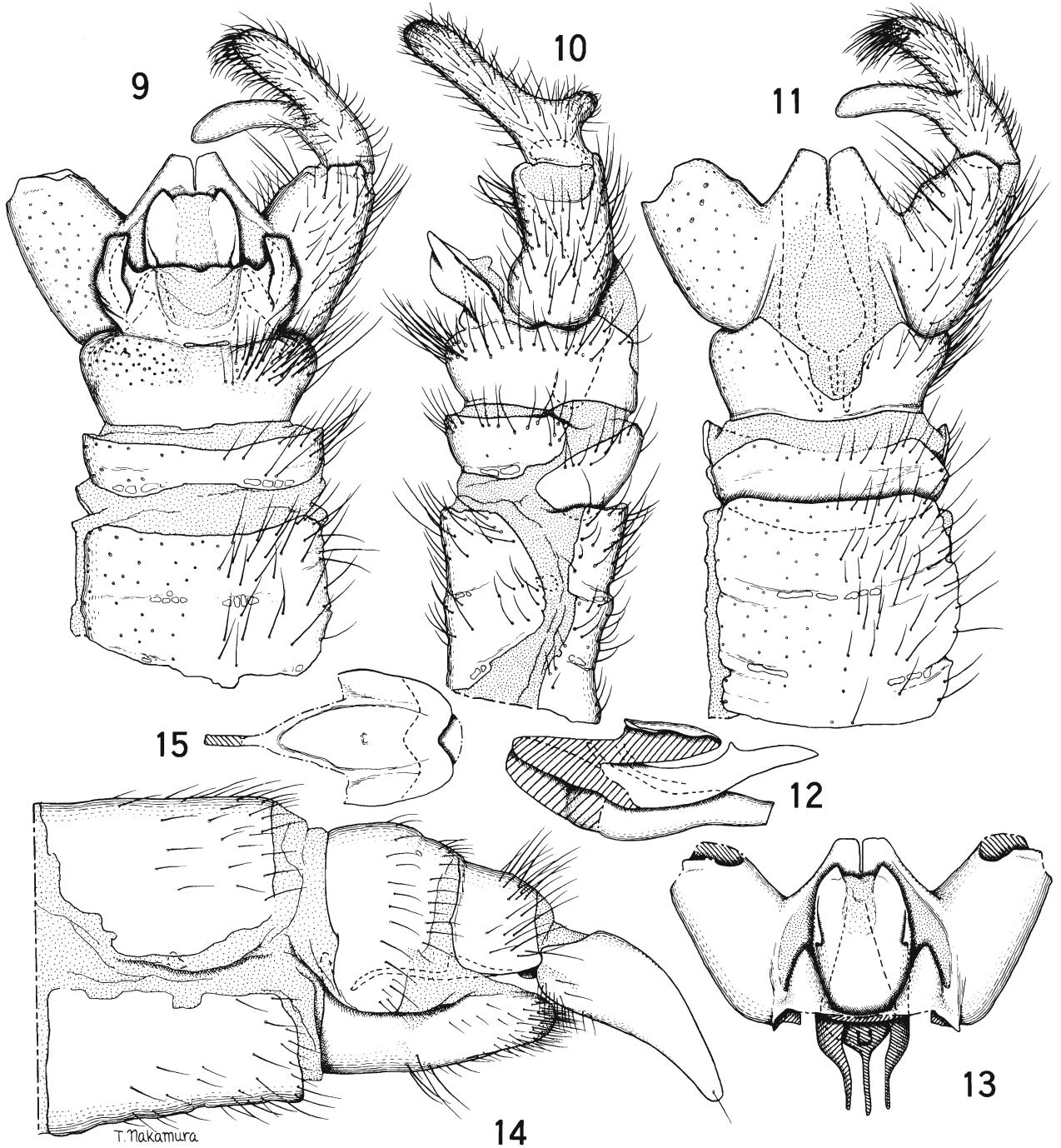


Figs. 1-8. Wings of *Trichocera (Metatrichocera)* spp., ♂. — Fig. 1. *T. (M.) bifurcata* sp. nov. Fig. 2. *T. (M.) truncata* sp. nov. Fig. 3. *T. (M.) monstrosa* sp. nov. Fig. 4. *T. (M.) cordata* sp. nov. Fig. 5. *T. (M.) hypandrialis* sp. nov. Fig. 6. *T. (M.) corallifera* sp. nov. Fig. 7. *T. (M.) mirabilis* Alexander. Fig. 8. ditto, distal portion of wing, showing macrotrichia on membrane.

tergum, with a row of setae along posterior and lateral submargins.

Genitalia brown to dark brown, maximum width (distance between tips of gonocoxites) slightly more than 1.5 times width of 8th segment; 9th segment being a complete sclerotized ring, slightly narrower than 8th sternum, somewhat widening posteriorly; tergal area of 9th segment along dorsomedian line almost as long as lateral margin, and with median portion glabrous, subdorsal portion swollen dorsally with a minute point and densely clothed with long erect setae; posterolateral portion of 9th segment weakly projecting posteriorly in blunt tubercle for articulation with gonocoxite; sternal area of 9th segment with posterior margin deeply emarginate medially, median portion glabrous and 1/3 as long as sublateral portion, which is clothed with scattered setae. Tenth tergum fused with 9th segment; border of 9th and 10th segments indicated by a transverse membranous spot; 10th tergum produced posterodorsally into a pair of large glabrous lobes; the lobe 1.2 times as long as lateral margin of 9th segment, evenly wide for basal 2/3, then tapered to bluntly ended outer process, outer margin of lobe gently rounded, inner margin of

lobe with a small subbasal projection; distance between outer margins of these lobes 4/5 as wide as 9th segment; area between basal 2/3 of these lobes widely membranous except for anterior margin. Gonocoxite 2.0 times as long as its thickness or lateral margin of 9th segment, clothed with pale setae, bearing 3 or more distinct long fine setae on distal 1/3 of mesial surface; ventral gonocoaxal bridge complete, strongly protruded posteriorly to the level of distal end of gonocoxite, distinctly narrowed posteriorly, with a narrow minute median notch on posterior margin, ventral surface of the bridge with a narrow longitudinal furrow continuous to the median notch of posterior margin. Gonostylus 1.2 times as long as gonocoxite, with a large mesial lobe on subbasal portion; this lobe half as long as gonostylus, almost perpendicular to gonostylus proper, weakly curved inward, widest at the middle and tapered apically, clothed sparsely with short hairs; gonostylus proper curved inward, narrowest at the middle, gently thickened toward subapical portion, densely clothed with fine hairs, and bearing a group of strong setae on mesial surface at apical portion. Process of dorsal gonocoaxal bridge wide, triangularly produced,



Figs. 9–15. Male and female genitalia of *Trichocera (Metatrichocera) bifurcata* sp. nov. — Fig.9. Male genitalia without right gonostylus, dorsal aspect. Fig.10. Ditto, lateral aspect. Fig.11. Ditto without left gonostylus, ventral aspect. Fig.12. Phallobase and phallus, lateral aspect. Fig.13. Phallobase, phallus and gonocoxites, dorsal aspect. Fig.14. Female terminalia, lateral aspect. Fig.15. Ninth and 10th sterna of female in ventral aspect.

rounded at tip. Parameres lamellate, broad and unusually short, bearing a small pointed dorsal projection on dorsolateral margin at the level of apex of process of dorsal gonocoxal bridge. Phallus large, not or slightly protruding posteriorly from membrane between parameres.

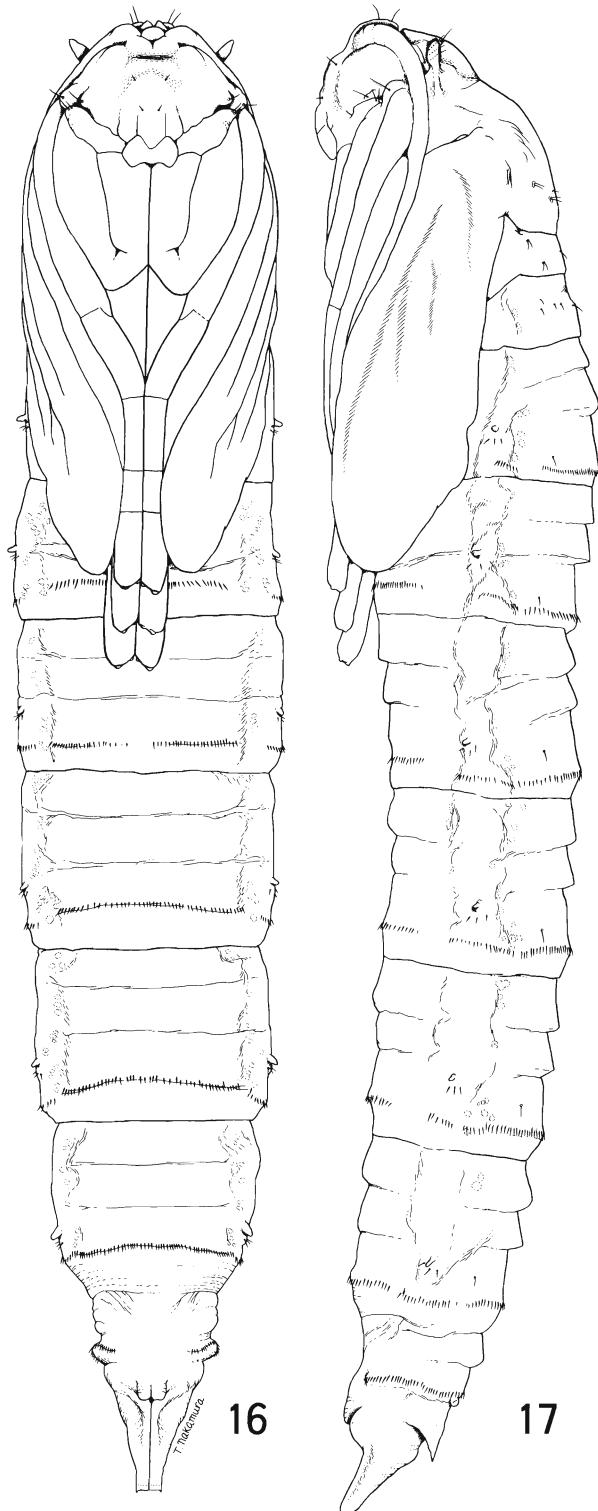
Female. Body length 3.8–5.1 mm, wing length 5.7–6.1 mm (in dried specimens).

General coloration as in male. Antenna shorter than in male, 2.0 times as long as thorax, consisting of 16 segments. Fifth tarsomeres thickened toward

distal end.

Terminalia: Eighth and 9th terga dark brown, 10th tergum and cerci pale brown, 8th sternum dark brown at distal and lateral portions, pale brown at the middle and anteroventral portion. Eighth tergum bearing a row of pale brown hairs which are more or less scattered laterally; 9th tergum fused with 8th tergum, 0.4 times as long as 8th and much narrower than it, bearing a row of setae which are denser and scattered on dorsal portion; 10th tergum a little shorter than 8th and 9th terga together, as broad as 9th,

clothed with long scattered setae on posterior half. Eighth sternum a little shorter than 7th, bearing erect long setae at the middle, clothed with fine hairs on posterior portion; 9th sternum with anterior portion tapered toward the apodeme, which is short and curved ventrally; 10th sternum small, without



Figs. 16-17. Female pupa of *Trichocera (Metatrichocera) bifurcata* sp. nov. — Fig. 16. Ventral aspect. Fig. 17. Lateral aspect.

marginal setae. Cercus as long as 8th sternum, 2.7 times as long as broad, broadest at basal 1/5, curved downward. Spermatheca with short neck region, half as long as diameter of spherical body.

Pupa. Male: Body length 6.3 mm; width at thorax 1.2 mm. Head with 2 pairs of short setae on frons, 4 longer ones on vertex, 2 short ones on palpal sheath of both sides and 2 independent setae on small swellings at posterior margin of each compound eye. Pronotum with 4 longer setae on lateral portion. Mesonotal and metanotal parts with 2 paired short setae dorsolaterally and a short seta near the middle on each side. Wing sheath exceeding midlength of 3rd abdominal segment and sheaths of hindlegs reaching basal 1/3 of 4th abdominal segment. Abdomen; 1st segment bearing 5 independent setae on both sides; 2nd to 7th segments with spiracles accompanied with 3 short setae posteriorly, fringed posteriorly by a row of small spines, tergal area with a short seta laterally near posterior margin on each segment; 8th segment 2/3 as wide as 7th, fringed with a row of small spines posteriorly. Terminal segments with a pair of small tubercles at anterior margin of 9th segment, a pair of large conical tubercles on posterior border of 9th segment and a pair of minute conical tubercles between gonocoxal sheaths.

Female: Body length 5.7-6.8 mm; width at thorax 1.1-1.2 mm.

General structure as in male. Eighth abdominal segment 0.6 times as wide as 7th. Dorsal surface of terminal segments with a pair of small tubercles anteriorly and a pair of large conical tubercles at base of cercal sheath; cercal sheath with a pair of minute conical tubercles at apex.

Types.

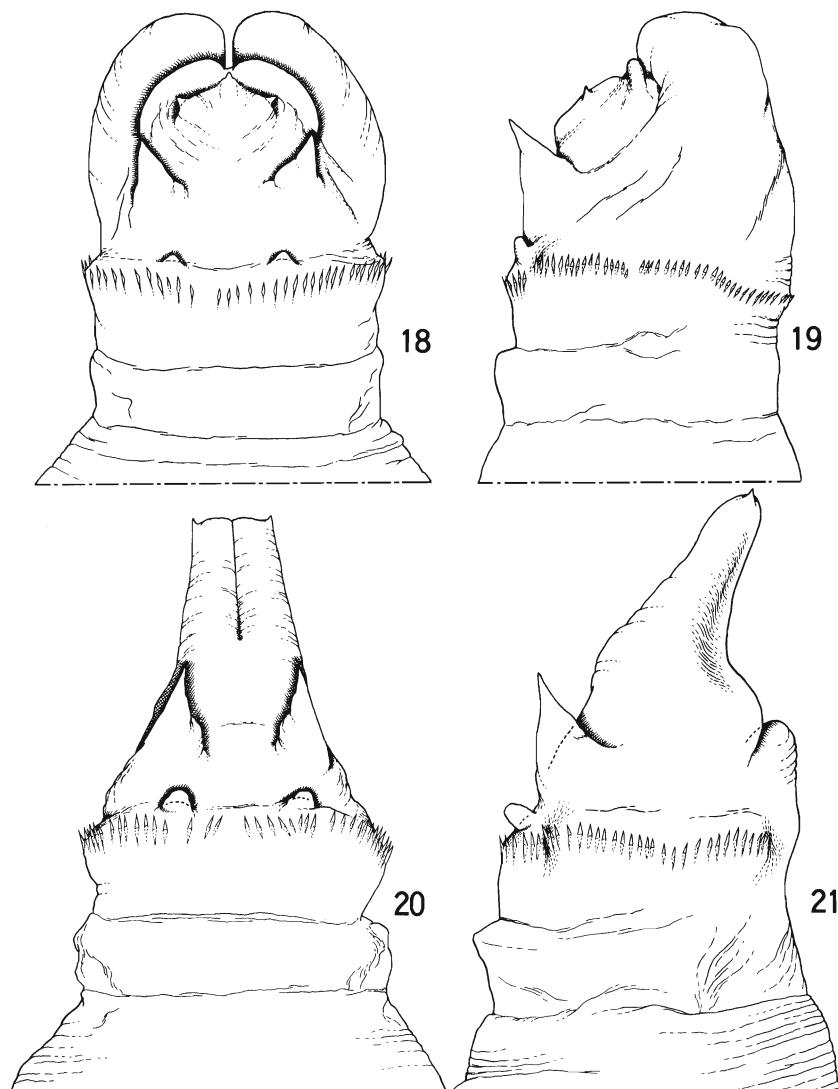
Holotype. ♂, Ikutora Pass, Minamifurano Town, Hokkaido, 12. x. 1996, T. Nakamura leg.

Paratypes. [Hokkaido] 377 ♂ 78 ♀ (including 1 male and 3 female pupae), same data as holotype; 240 ♂ 62 ♀ (including 3 female pupae), same locality, 13. x. 1996, T. Nakamura leg.; 65 ♂ 5 ♀, Karikachi Pass, Minamifurano Town, 13. x. 1996, T. Nakamura leg.

Distribution. Japan (Hokkaido).

Etymology. The specific name is based on the bifurcate gonostylus.

Remarks. This new species is readily distinguished from the known species of the genus *Trichocera* by the absence of the discal cell. The new species is somewhat similar to *T. (M.) garretti* Alexander, 1927, from North America and *T. (M.) forcipula* Nielsen, 1920, from Europe in the structure of the gonostylus which has a subbasal process. But the subbasal process of gonostylus of *T. (M.) garretti* is much shorter than that of the new species, and



Figs. 18–21. Terminal segments of pupae of *Trichocera (Metatrichocera) bifurcata* sp. nov. — Fig. 18. Male, dorsal aspect. Fig. 19. Male, lateral aspect. Fig. 20. Female, dorsal aspect. Fig. 21. Female, lateral aspect.

judging from the illustration of Nielsen (1920) and Dahl (1966), that of *T. (M.) forcipula* seems to bear 2 small additional spines. This new species is closely related to the next new species, *T. (M.) truncata* sp. nov., but easily distinguishable by the shape of ventral gonocoxal bridge and unusually short parameres in the male.

Most of the specimens of the type series were collected in the colony of *Pertasites japonicus giganteus* (Compositae) along a woodland path. In this location, many newly emerged adults and copulating pairs were observed.

***Trichocera (Metatrichocera) truncata* sp. nov.**
[Japanese name: futamata-gaganbodamashi]
(Figs. 2, 22–26)

Description.

Male. Body length 3.5 mm; wing length 5.0 mm

(holotype in dried condition).

Head: Cranium, mouthparts and antenna dark brown to blackish brown, grayish brown pollinose, with black setae on occiput and face; eye black. Antenna 2.8 times as long as thorax, consisting of 16 segments; 1st to 7th flagellomeres densely covered with short curved pale hairs, remainder of flagellomeres with straight darker hairs; 1st flagellomere 2.6 times as long as the 2nd, yellowish on extreme base, with a membranous spot on ventral surface at distal 2/5, bearing scattered long setae mostly on basal 1/2 and near tip; 2nd to 5th flagellomeres with a few scattered long setae on subapical portion.

Thorax: General coloration dark brown, pale brown pollinose; postpronotum, lateral postalar portions of scutum, sides of scutellum and mediotergite, laterotergite and anapleural area along pleural suture paler; pronotum, prescutum, scutum and scutellum clothed with pale brown setae. Legs stout and pale

yellowish, femora darker, tibiae darkened at apex, tarsi dark brown; coxae with longish brown hairs; femora and tibiae covered with brown hairs; tibial

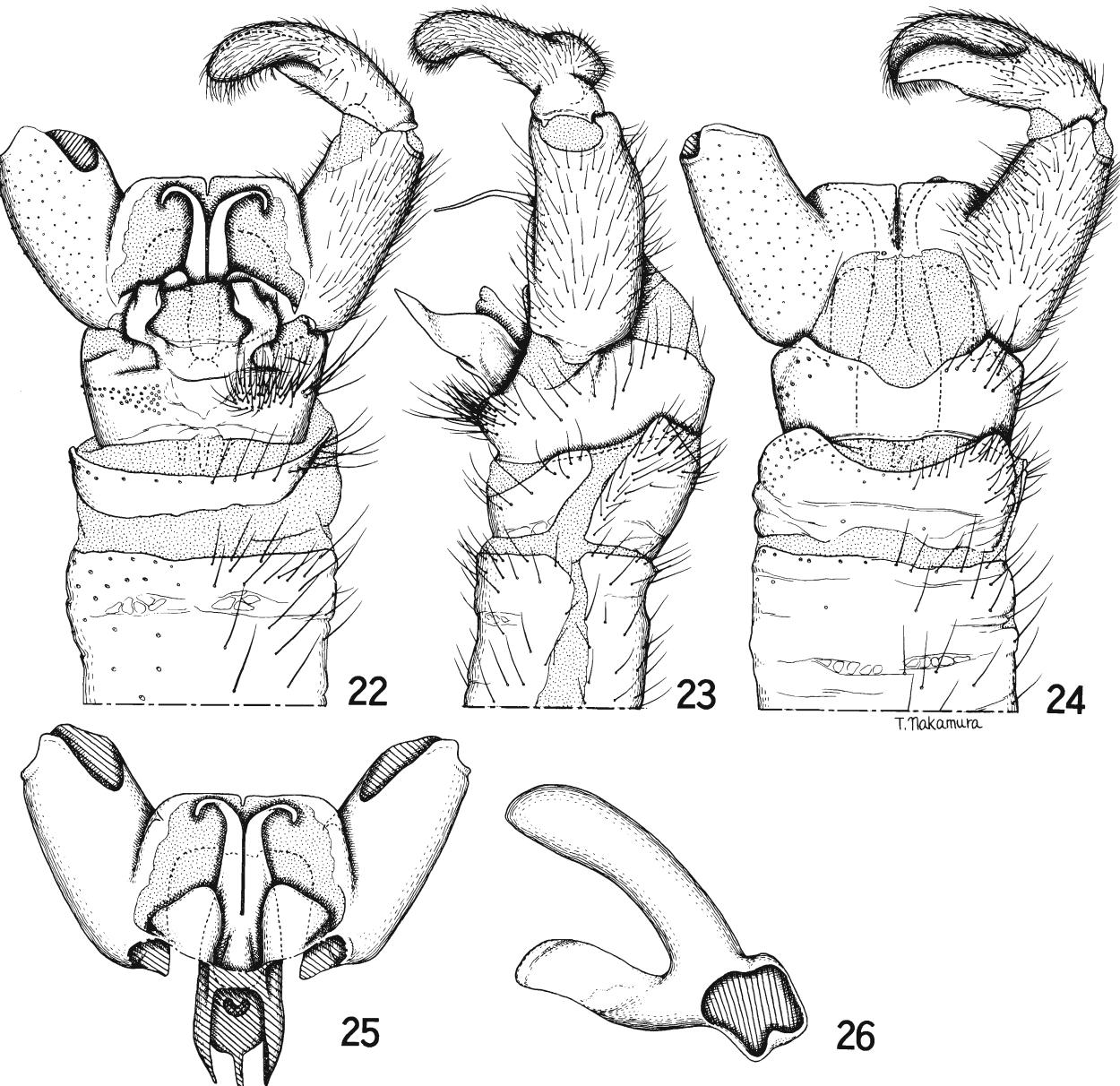
Table 2. Relative lengths^{**} of leg segments of *Trichocera* (*Metatrachocera*) *truncata* sp. nov., holotype, male.

	Femur		Tarsomere					Claw
		Tibia	1	2	3	4	5	
Fore leg	291	363	162	82	47	26	16	5
Mid leg	287	311	129	72	39	22	16	5
Hind leg	303	375	151	80	43	24	16	5

**the length of thorax as 100

spurs blackish brown; tarsi a little shorter than tibiae; 1st to 4th tarsomeres cylindrical and straight; 5th tarsomere short, curved downward, tapered medially and thickest at distal end. Claws pale brown, long, about half as long as 5th tarsomere. Relative lengths of leg segments as in Table 2.

Wing 3.1 times as long as broad, somewhat pointed distally. Membrane subhyaline with a yellowish tinge, without any markings; pterostigma concolorous to ground; veins yellowish brown, paling basally. Venation: Crossvein sc-r opposite to the basal 1/3 of Rs; R_{1+2} weakened at distal end; R_{2+3} as long as R_{2+3+4} ; crossvein r-m connecting with R_5 a short distance beyond the fork of Rs; discal cell open as cross-



Figs. 22-26. Male genitalia of *Trichocera* (*Metatrachocera*) *truncata* sp. nov., holotype — Fig. 22. Dorsal aspect without right gonostylus. Fig. 23. Lateral aspect. Fig. 24. Ventral aspect without left gonostylus. Fig. 25. Phallobase, phallus and gonocoxites, dorsal aspect. Fig. 26. Left gonostylus, mesial aspect.

vein m lacking. Halter yellow, as long as thorax.

Abdomen dark brown, pale brown pollinose; 2nd to 7th segments with scattered fine setae; 8th tergum of a transversely narrow sclerite, nearly 1/2 as long as 9th tergum at the dorsomedian portion, and with a posterior marginal row of setae which are scattered laterally; 8th sternum twice as long as its tergum, widely emarginate posteriorly, clothed with scattered setae near posterior margin and posterior half of lateral margin.

Genitalia dark brown and similar to those of *T. (M.) bifurcata*; 9th segment being a complete sclerotized ring, slightly narrower than 8th sternum; tergal area of 9th segment along dorsomedian portion 2/3 as long as its lateral margin, median portion paled, glabrous and weakly concaved, subdorsal portion more or less raised widely, densely clothed with erect long setae; posterolateral portion of the segment weakly projecting posteriorly in blunt tubercle for condyle of gonocoxite; sternal area of 9th segment with posterior margin more widely concave than in *T. (M.) bifurcata*, median portion glabrous and 1/2 as long as lateral portion, ventrolateral portion clothed with scattered long setae on posterior half, the setae continuing to a row of posterior marginal setae on subventral portion. Tenth tergum fused with 9th segment and produced posterodorsally into a pair of large glabrous lobes which are 1.2 times as long as lateral margin of 9th segment; the lobe broad basally, tapered medially, with a weak subbasal projection and rather truncate apex; in lateral aspect the lobe evenly tapered toward tip on apical 1/2, distance between outer margins of these lobes 3/5 as wide as that of 9th segment; area between these lobes widely membranous and extending to the level of dorsal gonocoxal bridge. Gonocoxite 2.4 times as long as its width or lateral margin of 9th segment; ventral gonocoxal bridge complete, protruded posteriorly to the level of 3/4 of gonocoxite, posterior margin wide, truncate and straight, ventral surface with a narrow longitudinal furrow continuous to a small median notch of posterior margin. Gonostylus 1.2 times as long as gonocoxite, with a large ventromesial lobe on subbasal portion; this lobe 2/5 as long as gonostylus, weakly divergent from gonostylus proper, curved inward, glabrous and compressed on distal half; gonostylus proper curved inward, gently dilated subapically, clothed with fine hairs and bearing dense, longish, stiff setae on mesial surface at apex. Process of dorsal gonocoxal bridge wide, rounded distally. Parameres slender, parallel to each other at basal half, then curved dorsally and divergent from each other. Phallus large, not protruding posteriorly from phallotheca.

Female. Unknown.

Type.

Holotype. ♂, Ebeotsu, Takikawa City, Hokkaido, 16. x. 1996, T. Nakamura leg.

Distribution. Japan (Hokkaido).

Etymology. The specific name is based on the truncate posterior margin of the ventral gonocoxal bridge of the male genitalia.

Remarks. This species is undoubtedly most closely related to the preceding species, *T. (M.) bifurcata*, judging from many synapomorphies, such as opened discal cell of wing (or lack of crossvein m), structure of 10th tergum, the longitudinal furrow of ventral gonocoxal bridge, and the bilobate gonostylus. The present new species is easily distinguished from *T. (M.) bifurcata* by the slender parameres and the broad truncate ventral gonocoxal bridge.

The holotype was collected by sweeping the grass of pasture land.

Trichocera (Metatrichocera) monstrosa sp. nov.

[Japanese name: ezofutoo-gaganbodamashi]

(Figs. 3, 27-37)

Description.

Male. Body length 5.0-6.2 mm; wing length 7.1-8.5 mm (in dried specimens).

Head: Cranium, mouthparts, antenna brown to blackish brown, grayish brown pollinose; occiput often paled along eye margin; face with dark to pale brown setae; occiput dark brown setose; eye black; antenna 2.4 times as long as thorax, with 18 segments; 1st to 9th flagellomeres densely clothed with curved white short hairs; remainder of flagellomeres with darker straight hairs; 1st flagellomere a little longer than 2nd and 3rd flagellomeres together, whitish at extreme base, and bearing 1-3 strong setae on subbasal, middle and distal portions; succeeding flagellomeres each with an anteroventral, a posteroventral and a dorsal setae subapically; number and arrangement of setae being irregular on apical 3-4 flagellomeres.

Thorax: General coloration ochreous brown to brown, grayish brown pollinose; prescutum, scutellum and ventral portions of katepisternum and meron darker, postpronotum yellow; pronotum, prescutum, scutum and scutellum with yellow to yellowish brown setae. Legs rather stout; coxae and trochanters yellow with longish pale yellow setae; femora and tibiae yellowish brown to ochreous brown, apical portion of femora and tibiae, and extreme base of tibiae infuscated to brown, femora and tibiae clothed with brownish hairs throughout; tibial spurs black; tarsi dark brown to blackish brown, shorter than tibiae; 1st to 4th tarsomeres cylindrical and straight; 5th tarsomere slightly curved downward.

Table 3. Relative lengths^{**} of leg segments of *Trichocera* (*Metatrachocera*) *monstrosa* sp. nov., a paratype, male.

	Femur		Tarsomere					Claw
		Tibia	1	2	3	4	5	
Fore leg	276	345	133	52	28	15	14	7
Mid leg	260	281	89	37	21	12	12	7
Hind leg	306	333	108	51	36	18	13	7

*the length of thorax as 100

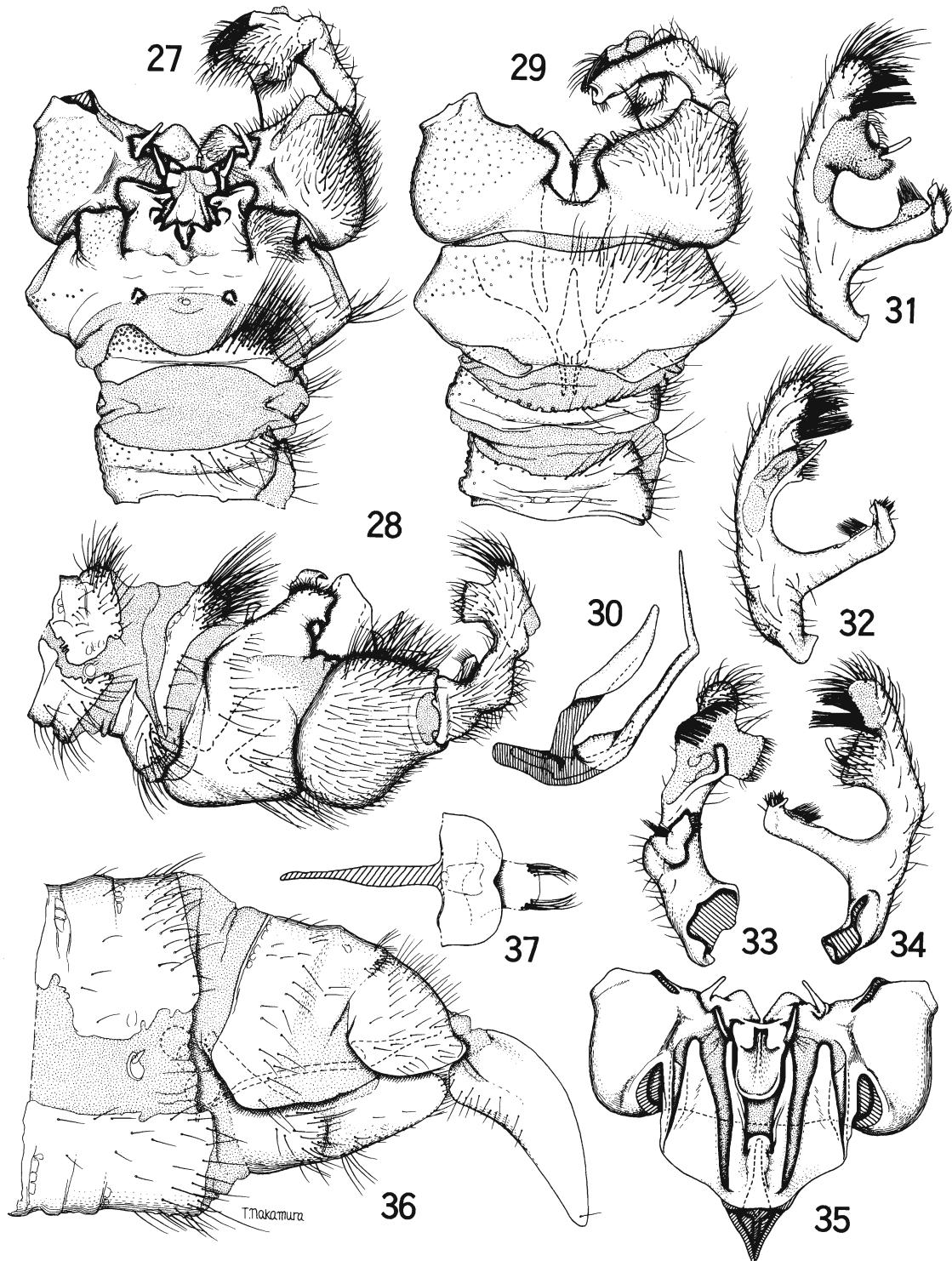
narrowest at the middle and thickest at distal end, clothed with erect or suberect fine hairs on ventral side; claws brown, long, about half as long as 5th tarsomere. Relative lengths of leg segments as in Table 3.

Wing 3.0 times as long as broad. Membrane subhyaline with a yellowish tinge, without any markings; pterostigma almost concolorous with membrane; veins ochreous, paler near base. Venation, R_{1+2} weakened and tapered on distal 1/2, recognizable by presence of macrotrichia; R_{2+3} half as long as R_{2+3+4} ; crossvein r-m connecting with R_5 at a short distance beyond the fork of Rs; cell m1 much longer than its petiole. Halter pale yellow, a little shorter than thorax.

Abdomen stout, ochreous to dark brown, grayish brown pollinose, sterna paler on anterior segments, 5th to 8th segments darker; 1st to 7th segments with scattered pale brownish setae; 6th and 7th terga with a prominent transverse furrow near the middle; 7th tergum 1/4 as long as wide, weakly emarginate posteriorly, denser and longer setae on posterior portion than on preceding terga; 8th tergum of a very narrow transverse sclerite, very short and almost 1/4 as long as 7th tergum at the dorsomedian portion, with sublateral portions expanding posteriorly into paired flat rounded lobes; each lobe weakly sclerotized and densely covered with long stiff golden yellow setae.

Genitalia extraordinarily large; 9th segment dark brown, 1.5 times as wide as 8th sternum; 9th tergum and sternum fused with each other, widest at the middle in dorsal aspect, distinctly tapered toward anterior and posterior margins; a deep membranous notch expanding from posterior margin between sternal and tergal areas; sternal area large, 0.4 times as long as wide, mostly glabrous, and bearing yellow setae near posterior margin; tergal area complicated in structure, completely divided into lateral areas by a broad dorsal desclerotization, 1/3 as wide as 9th segment; each lateral area with a small lobule subdorsally near anterior margin; the lobule oval, short-petiolate, with a short slender dorsal projection;

the lateral area of 9th tergum also with a sublateral flat, square, whitish, though sclerotized projection near posterior margin, the projection covered with hairs directing outward on apical 1/2, directing anteriorly on basal 1/2, 10th segment complicated, its main part divided into a pair of large glabrous expansions, which are 1.6 times as long as dorsomedian length of 9th tergum, almost as thick as long in lateral aspect, having 5 small dentations along mesial margin, and falcate ventrally; a pair of small weakly sclerotized lobes and a ventral pair of longitudinal dark stripes between the main lateral expansions; the stripes supported ventrally by a w-shaped sclerite, which is supported at each side by the ventral portions of main lateral expansions of the 10th segment. Gonocoxites large and swollen, almost square in dorsal aspect, bearing a pair of 2 to 4 conspicuous long setae arising from large sockets on posteromesial sides of ventral surface; bearing many strong grayish yellow setae posterolaterally on dorsal surface around base of gonostylus, ventromedian area of gonocoxites forming a complete bridge; ventral surface of ventral bridge of gonocoxites depressed at its posterior 1/2 and bearing a pair of longitudinal furrows running convergently to each other at its basal 1/3 where a short transverse line connecting the furrows, an apodeme invaginated from the furrows and the transverse line and supporting dorsomedian portion of the ventral gonocoxal bridge from inside of the body; posterior margin of ventral bridge triangularly incised medially, developing a pair of blunt short pilose triangular lobes, each of which continues to a conspicuous bird-head shaped compressed projection dorsal to the lobe; dorsomedian area between gonocoxites with a tongue shaped lobe which has a median longitudinal keel, and covers the apodeme projected from the ventral bridge of gonocoxites; dorsal gonocoxal bridge much deeply invaginated, consisting of a pair of long and triangular sclerites fused medially with each other; process of dorsal gonocoxal bridge short and triangular with finger-like apical projection. Gonostylus longer than gonocoxite, strongly curved inward, projecting into a conspicuous process at basal 1/3 of mesial surface; this projection bearing a dorsally directing apical sclerite which is indistinctly separated by some bordering structures and bears a group of short, stiff, bluntly tipped setae; a patch of dense, proximally directing, decumbent, pale setae on subapical portion of dorsal surface of the projection close to the apical sclerite; apical portion of gonostylus broadly expanded, short bilobed apically into inner and outer lobes, and provided with a long slender ventromesial process arising from a strongly sclerotized black stripe on ventral surface of gonostylus, and with a eversible



Figs. 27-37. Male and female genitalia of *Trichocera (Metatrichocera) monstrosa* sp. nov. — Fig. 27. Male genitalia without right gonostyli, dorsal aspect. Fig. 28. Ditto in lateral aspect. Fig. 29. Ditto without left gonostyli, ventral aspect. Fig. 30. Phallobase and phallus, lateral aspect. Fig. 31. Left gonostyli with expanded membranous lobes, ventral aspect. Fig. 32. Ditto, with shrunked membranous lobes. Fig. 33. Ditto, mesial aspect. Fig. 34. Ditto, dorsal aspect. Fig. 35. Phallobase, phallus and gonocoxites, dorsal aspect. Fig. 36. Female terminalia, lateral aspect. Fig. 37. Ninth and 10th sterna of female, ventral aspect.

membranous tubercle ventroproximal to the slender process; the inner lobe of apex of gonostylus short, truncate apically, and clothed with short dense yellowish hairs; the outer lobe short, rounded apically, clothed with longish curved yellow setae apically and bearing a dense comb of long curved black setae seeming to be glued to each other along ventral margin of its subapical portion. Phallic organ small, deeply invaginated between gonocoxites; parameres long, very weakly divergent from each other, curved dorsally beyond the middle; phallus short, not protruding posteriorly from phallotheca.

Female. Body length 4.0–6.1 mm, wing length 7.0–8.0 mm (in dried specimens).

General coloration as in male. Antenna shorter than in male, 2.0 times as long as thorax, with 18 segments. Fifth tarsomeres straight, thickened toward distal end.

Terminalia: Eighth and 9th terga dark brown, completely fused with each other, with scattered setae on 8th and rather dense setae on posterior margin of 9th tergum; 10th tergum ochreous brown, as long as 8th and 9th terga together; 8th sternum with some erect or suberect setae at basal 1/2, covered with dense fine setae at posterior end; 9th sternum broader than long, with a stout apodeme; 10th sternum with several long setae on both sides; cercus pale brown, a little shorter than 8th to 10th terga together, 2.5 times as long as broad, broadest at basal 1/6, dorsal side and basal 1/2 of ventral side curved. Spermatheca with a long neck region a little shorter than the diameter of spherical body.

Types.

Holotype. ♂, Tonashibetsu, Minamifurano Town, Hokkaido, 11. x. 1996, T. Nakamura leg.

Paratypes. [Hokkaido] 10 ♂ 44 ♀, Nisso Pass (alt. 1,100m), Hidaka Town, 9. x. 1996, T. Nakamura leg.; 89 ♂ 17 ♀, same data as holotype; 1 ♂, Ikutora Pass, Minamifurano Town, 12. x. 1996, T. Nakamura leg.; 3 ♂, Karikachi Pass, Minamifurano Town, 13. x. 1996, T. Nakamura leg.; 124 ♂ 106 ♀, Shimotawaramappu, Biei Town, 14. x. 1996, T. Nakamura leg.; 14 ♀, Asahidake spa, Higashikawa Town, 15. x. 1996, T. Nakamura leg.; 8 ♂, Butokama-rindo, Horokanai Town, 20. x. 1996, T. Nakamura leg.; 8 ♂ 4 ♀, Sekitanbetsu, Sarufutsu Town, 39 ♂ 16 ♀, Toyotomi spa, Toyotomi Town, 21. x. 1996, T. Nakamura leg.; 4 ♂ Osatsunai, Hamatonbetsu Town, 18 ♂ 5 ♀, Sakkuru Pass, Otoineppu Town, 22. x. 1996, T. Nakamura leg.; 18 ♀, Aizankei, Kamikawa Town, 1 ♀, Asahidake spa, Higashikawa Town, 23. x. 1996, T. Nakamura leg.

Distribution. Japan (Hokkaido).

Etymology. The specific name is based on the enormously specialized male pregenital and genital

segments.

Remarks. This species is most closely related to the next species, *T. (M.) crassicauda* Nakamura et Saigusa, 1996, described from Honshu, Japan. The two species share many apomorphic character states found in the male genitalia; i.e. a pair of setose subdorsal tubercles of the 9th tergum, the bulged 9th sternum, the specialized structure of apical portion of mesial process of the gonostylus, shape of vestiture of apical lobes of gonostylus, the modifications of ventral and dorsal areas of ventral bridge of the gonocoxites. The present new species seems to be more advanced than *T. (M.) crassicauda*. In addition, the two species are different in the male 8th abdominal tergum; *T. (M.) crassicauda* has a dorsomedian projection, while the new species has a pair of subdorsal setose lobes. These character states do not represent the different stages of a transformation series of the modification. The number of flagellomeres is also different between the two species; *T. (M.) crassicauda* has 18 segments and the new species has 16.

The two species are allopatric in distribution, *T. (M.) crassicauda* is distributed in the northern half of Honshu, while the new species occurs in Hokkaido. It is a common species of *Trichocera* in central to northern Hokkaido, and is often found in the bamboo grass floor of deciduous forests.

Trichocera (Metatrachocera) crassicauda Nakamura et Saigusa, 1996

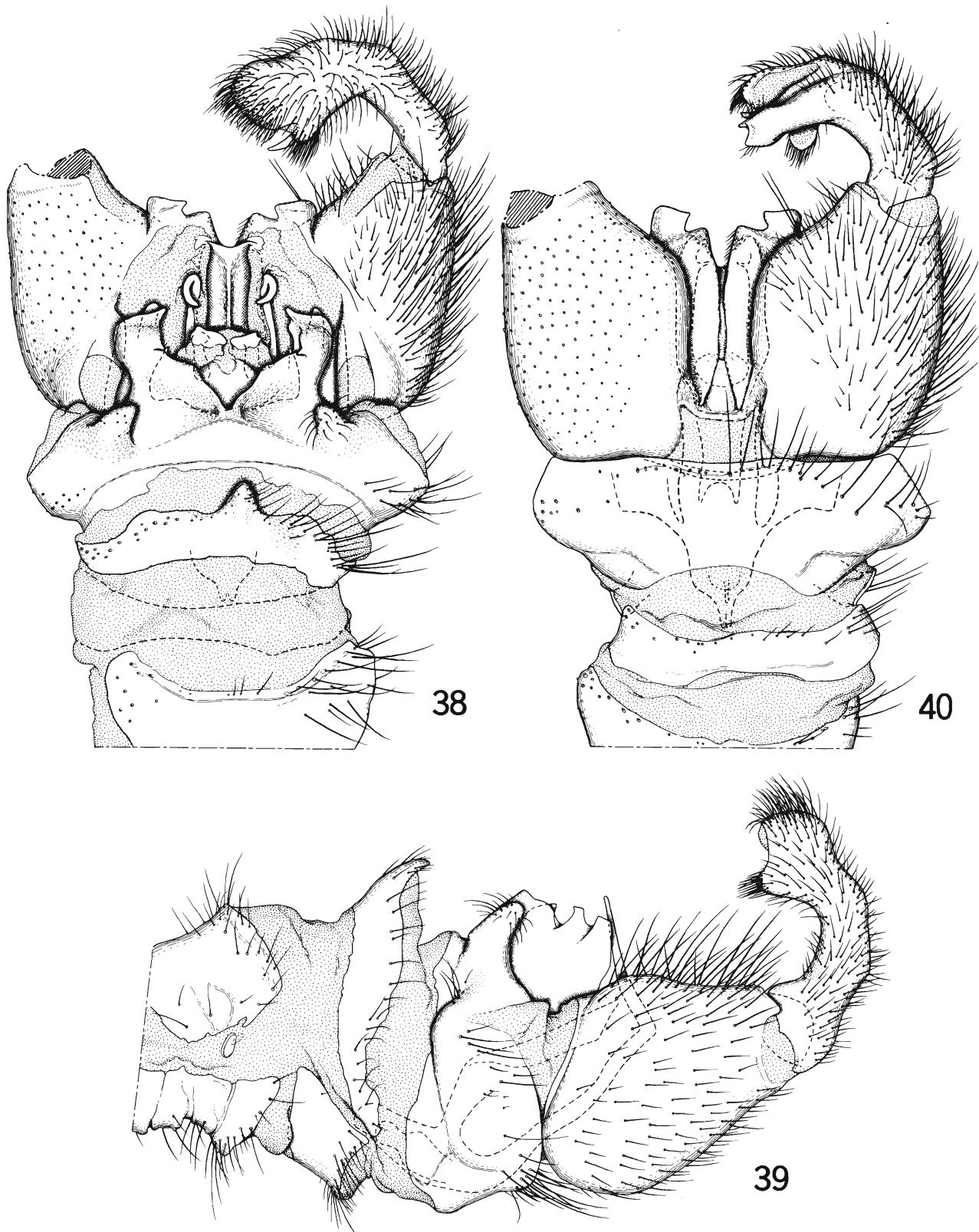
[Japanese name: Futoo-gaganbodamashi]

(Figs. 38–46, 58–59)

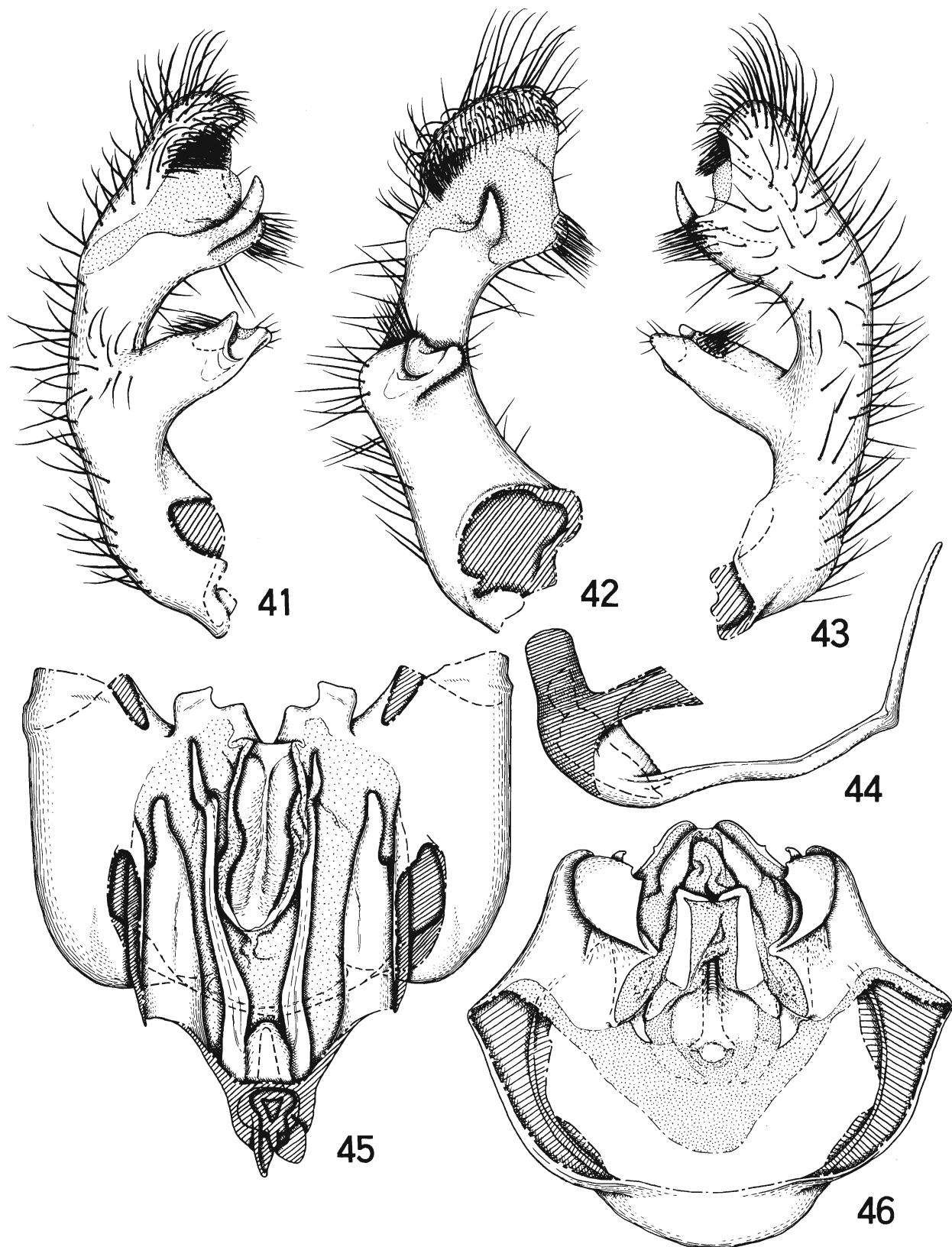
Trichocera (Metatrachocera) crassicauda Nakamura et Saigusa, 1996, *Jpn. J. Ent.*, 64: 799–803. [Type-locality: Itamuro spa, Kuroiso City, Tochigi Pref., Honshu (Japan)]

This species was described based on specimens from Northern Honshu. As the illustrations of its genitalia were not clearly printed in the original description, here we provide the illustrations for comparison with those of *monstrosa*. We also give the relative lengths of leg segments in Table 4.

Specimens examined. [Honshu] 1 ♂, Akaishi-gawa, Ajigasawa Town, Aomori Pref., 27. x. 1996, T. Nakamura leg.; 10 ♂ 11 ♀, Ichinowatari-rindo, Hirosaki City, Aomori Pref., 28. x. 1996, T. Nakamura leg.; 22 ♂ 9 ♀, Nurukawa, Hiraka Town, Aomori Pref., 29. x. 1996, T. Nakamura leg.; 5 ♂ 3 ♀, Matsukusa, Kawai Village, Iwate Pref., 31. x. 1996, T. Nakamura leg.; 40 ♂ 23 ♀, Shinyu spa, Ichinoseki City, Iwate Pref., 2. xi. 1996, T. Nakamura leg.; 41 ♂ 32 ♀ (holotype and paratypes), Itamuro spa, Kuroiso City, Tochigi



Figs. 38-40. Male genitalia of *Trichocera (Metatrichocera) crassicauda* Nakamura et Saigusa —ig. 38. Male genitalia without right gonostylus, dorsal aspect. Fig. 39. Ditto, lateral aspect. Fig. 40. Ditto without left gonostylus, ventral aspect. (from Nakamura and Saigusa, 1996)



Figs. 41-46. Male genitalia of *Trichocera (Metatrichocera) crassicauda* Nakamura et Saigusa — Fig. 41. Left gonostylius, ventral aspect. Fig. 42. Ditto, mesial aspect. Fig. 43. Ditto, dorsal aspect. Fig. 44. Phallobase and phallus, lateral aspect. Fig. 45. Phallobase, phallus and gonocoxites, dorsal aspect. Fig. 46. Ninth segment and 10th tergum, posterior aspect. (from Nakamura and Saigusa, 1996)

Pref., 12. xi. 1995, T. Nakamura leg.

Distribution. Japan (Honshu).

Remarks. As stated in the remarks of the preceding species, *T. (M.) crassicauda* is undoubtedly its sister species. After investigation of northern Honshu, it became clear that this species is widely distributed in this area.

Table 4. Relative lengths* of leg segments of *Trichocera (Metatrichocera) crassicauda* Nakamura et Saigusa, holotype, male.

	Femur	Tibia	Tarsomere					Claw
			1	2	3	4	5	
Fore leg	289	332	139	65	31	15	15	7
Mid leg	264	287	99	48	25	14	14	8
Hind leg	301	350	126	65	32	15	14	8

*the length of thorax as 100

Trichocera (Metatrichocera) chaetopyga Nakamura et Saigusa, 1996

[Japanese name: Fusage-gaganbodamashi]
(Figs. 47-57)

Trichocera (Metatrichocera) chaetopyga Nakamura et Saigusa, 1996, *Jpn. J. Ent.*, 64: 796-799. [Type-locality: Mt. Ontakesan, Gifu Pref., Honshu (Japan)]

This species was described from Central Honshu. Since then, no additional material was obtained. Here we reproduce the illustrations of genitalia from the original description, and give the relative length of leg segments in Table 5.

Specimens examined. [Honshu] 5♂5♀ (holotype and paratypes), Mt. Ontakesan, Gifu Pref., 31. x. 1995, K. Nakatsuka leg.

Distribution. Japan (Honshu).

Remarks. This species is somewhat similar to the two preceding species in the overall structure of the male genitalia, but seems to have no close relationship to them, judging from the modification of the male 9th and 10th abdominal terga.

Table 5. Relative lengths* of leg segments of *Trichocera (Metatrichocera) chaetopyga* Nakamura et Saigusa, a paratype male.

	Femur	Tibia	Tarsomere					Claw
			1	2	3	4	5	
Fore leg	312	358	147	74	36	20	17	7
Mid leg	308	311	114	58	34	19	19	8
Hind leg	339	383	133	78	37	20	17	8

*the length of thorax as 100

Trichocera (Metatrichocera) cordata sp. nov.

[Japanese name: Hahto-gaganbodamashi]

(Figs. 4, 60-65)

Description.

Male. Body length 5.1-6.1 mm; wing length 6.0-6.3 mm (in dried specimens).

Head: Cranium, mouthparts and antenna dark brown, grayish brown pollinose, occiput, gena and face often brown, occiput with dark brown setae, face with pale brown setae; eye black. Antenna 2.3 times as long as thorax, consisting of 16 segments, scape, pedicel and extreme base of 1st flagellomere yellow; flagellum slender; 1st to 5th flagellomeres more or less densely clothed with curved pale hairs; remainder of flagellomeres sparsely with long straight darker hairs; basal 7-8 flagellomeres with some scattering long dark setae, 1st flagellomere 1.3 times as long as 2nd.

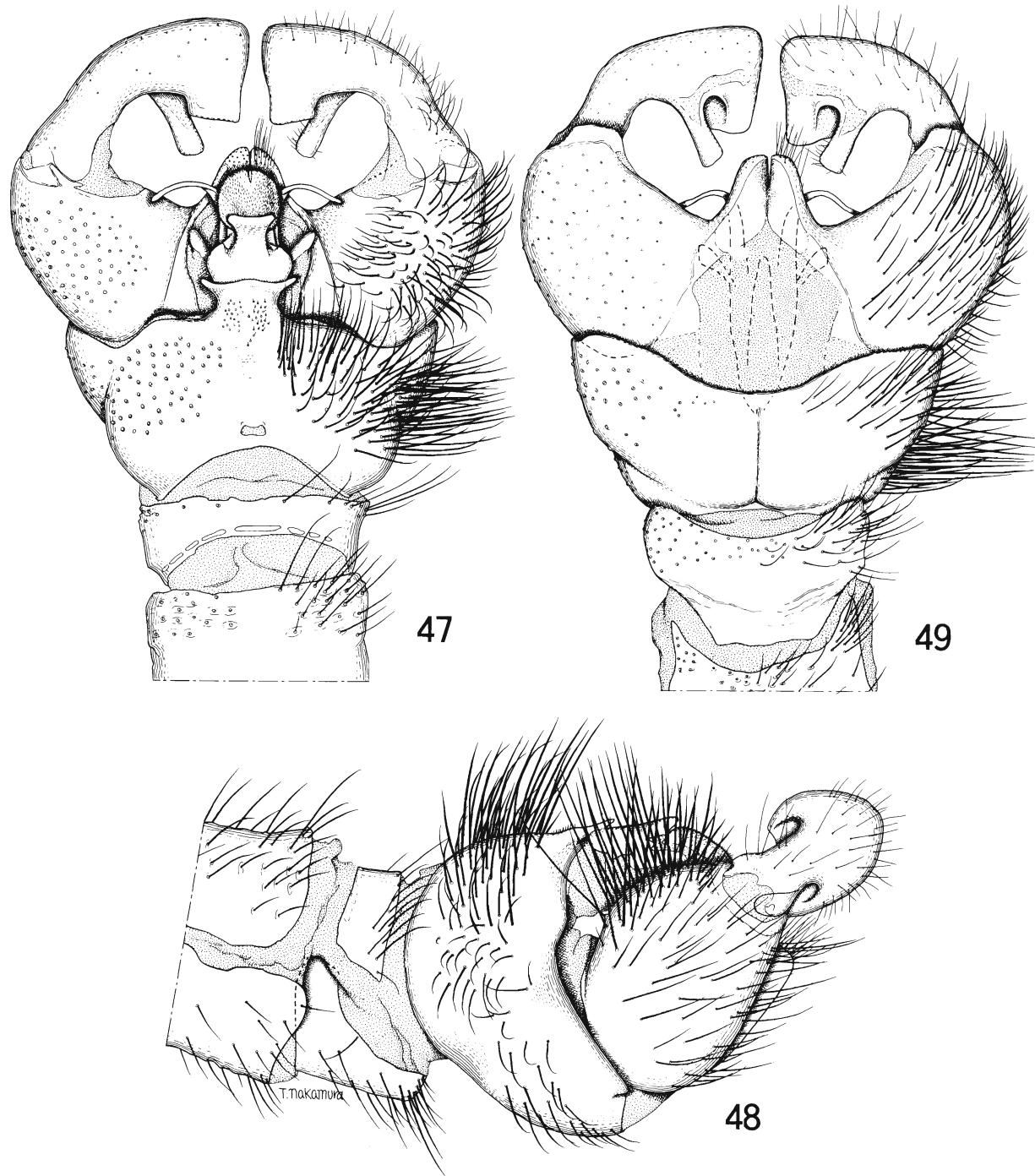
Thorax: General coloration brown, pale brown pollinose; postpronotum, sides of mesonotum including laterotergite brownish yellow; pleura pale brown, mesepimeron and metapleuron extensively yellow; pronotum, prescutum, scutum and scutellum clothed with pale brown to yellowish brown setae. Legs slender; coxae and trochanters yellow with longish yellow hairs; femora and tibiae uniformly yellowish brown, covered with dark brown hairs; tibial spurs blackish brown; tarsi gradually darkened, a little shorter than tibiae; 1st to 4th tarsomeres cylindrical and straight; 5th tarsomere weakly curved ventrally; claws short, shorter than 1/2 length of 5th tarsomere, pale brown. Relative lengths of leg segments as in Table 6.

Wing rather slender, 3.4 times as long as broad. Membrane subhyaline with a faint gray tinge, without any markings; pterostigma concolorous to ground; veins dark brown, paling basally to yellowish brown. Venation: Crossvein sc-r various in position, situated from opposite the basal 1/3 to 1/2 of Rs; R₁₊₂ slightly weakened at distal end; R₂₊₃ subequal to R₂₊₃₊₄ in length; crossvein r-m connecting with R₅ at the fork of Rs or slightly beyond it; cell m₁ much longer than petiole of M₁₊₂ fork. Halter as long as thorax, yellow,

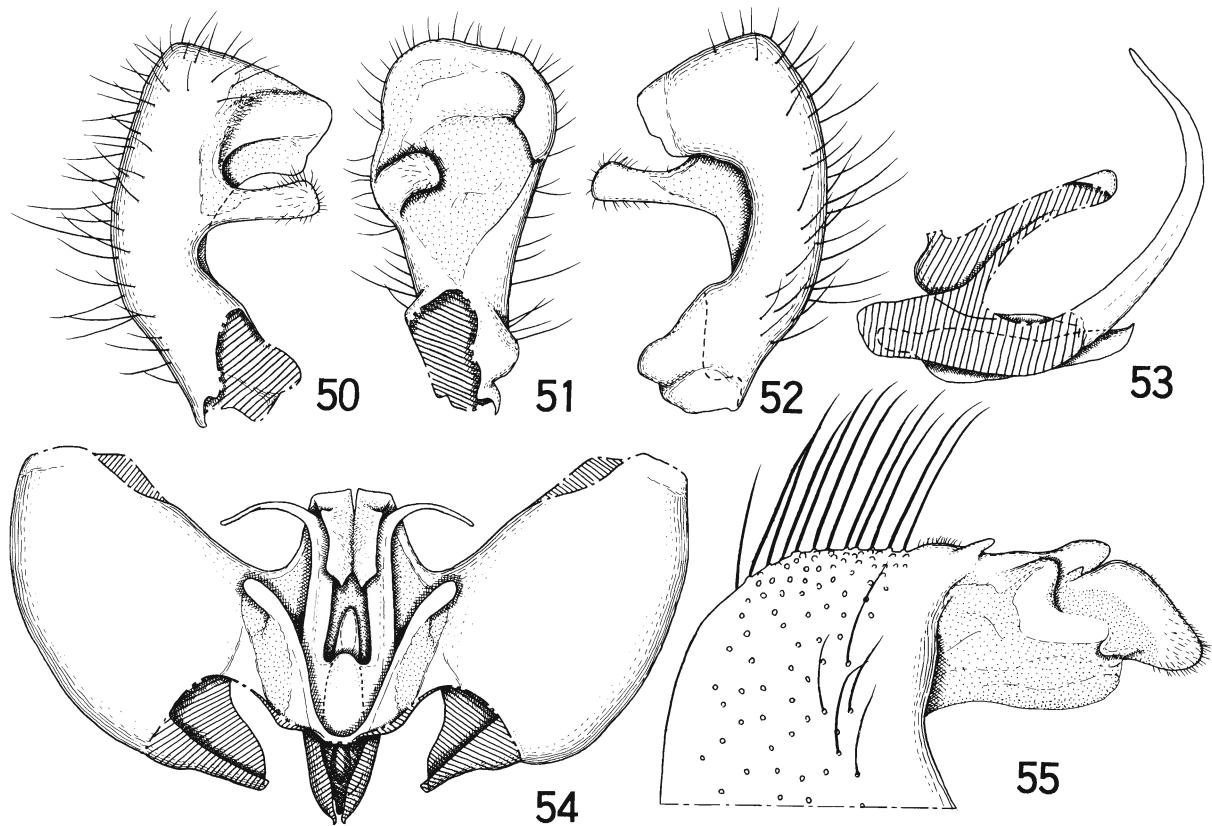
Table 6. Relative lengths* of leg segments of *Trichocera (Metatrichocera) cordata* sp. nov., a paratype male.

	Femur	Tibia	Tarsomere					Claw
			1	2	3	4	5	
Fore leg	291	363	162	82	47	26	16	5
Mid leg	297	311	129	72	39	22	16	5
Hind leg	303	375	151	80	43	24	16	5

*the length of thorax as 100



Figs. 47-49. Male genitalia of *Trichocera (Metatrichocera) chaetopyga* Nakamura et Saigusa — Fig.47. Dorsal aspect. Fig.48. Lateral aspect. Fig.49. Ventral aspect. (from Nakamura and Saigusa, 1996)



Figs. 50–55. Male genitalia of *Trichocera (Metatrichocera) chatopyga* Nakamura et Saigusa — Fig. 50. Left gonostylus, ventral aspect. Fig. 51. Ditto, mesial aspect. Fig. 52. Ditto, dorsal aspect. Fig. 53. Phallobase and phallus, lateral aspect. Fig. 54. Phallobase, phallus and gonocoxites, dorsal aspect. Fig. 55. Dorsomedian projection of 9th tergum and 10th tergum, lateral aspect. (from Nakamura and Saigusa, 1996)

and with brown knob.

Abdomen: Terga dark brown, darkened to blackish brown on 2–3 posterior segments; 2nd to 8th sterna yellowish brown, each of these sterna darkened on posterior 1/2; 2nd to 7th segments with scattered fine yellowish setae; 8th tergum with a row of setae along posterior submargin, which are more or less scattered laterally; 8th sternum bearing scattered short setae on posterior half.

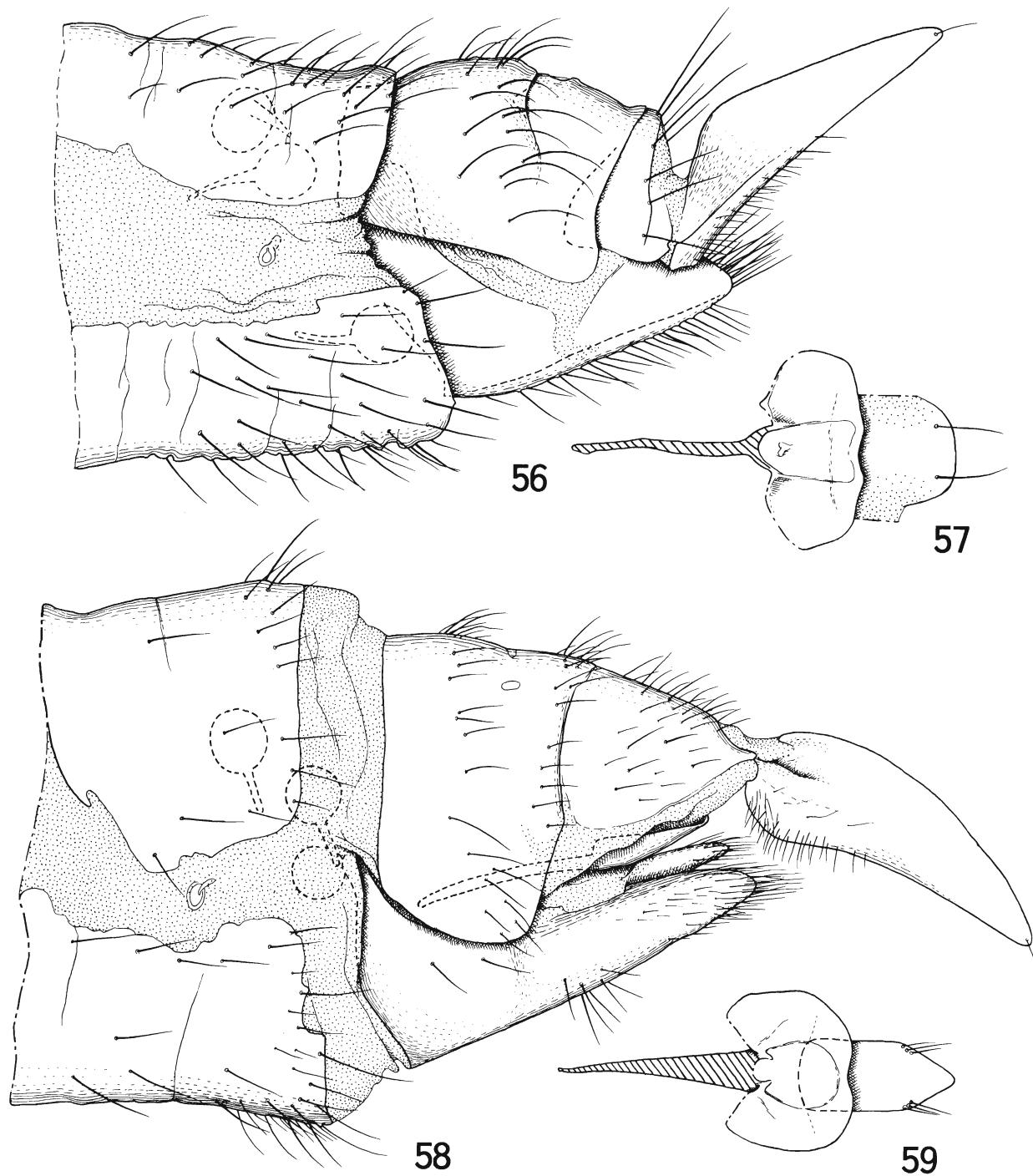
Genitalia large, dark brown; maximum width (distance between tips of gonocoxites) slightly more than twice width of 8th segment; 9th segment being a complete sclerotized ring, as wide as 8th sternum; tergal area of 9th segment more or less raised posterodorsally, with a row of minute setae on posterodorsal portion and scattered longish setae on posterolateral portion demarcated by a transverse suture running from anterior margin of sternal area; sternal area of 9th segment produced into a pair of short posterolateral blunt protuberances bearing a few long setae. Tenth tergum represented by a pair of weakly sclerotized oval lobes indistinctly separated from each other. Gonopod extraordinarily large, gonocoxite long, 1.3 times as long as 9th sternum width, 2.5 times as long as wide, not swollen;

gonocoxites widely divergent from each other, with outer lateral margin evenly curved inwardly in dorsal aspect; ventral bridge complete, protruded posteriorly to the level of 3/4 of gonocoxite, weakly projecting ventrally at the middle, bearing fine hairs on dorsoproximal margin. Gonostylus large, almost as long as gonocoxite, 1/2 as wide as gonocoxite at the middle, strongly curved inward, prominently bilobed distally into branches widely divergent from each other; dorsal branch smaller, 1/2 as long as ventral one; ventral one as long as main part of gonostylus and much stouter than it; outer surface of gonostylus including apical processes densely clothed with strong dark brown spiny setae. Process of dorsal gonocoxal bridge wide, triangularly produced, rounded at tip. Parameres broad at base, evenly curved dorsally, and curved outwardly toward tip. Phallus not or slightly protruding posteriorly from phallotheca.

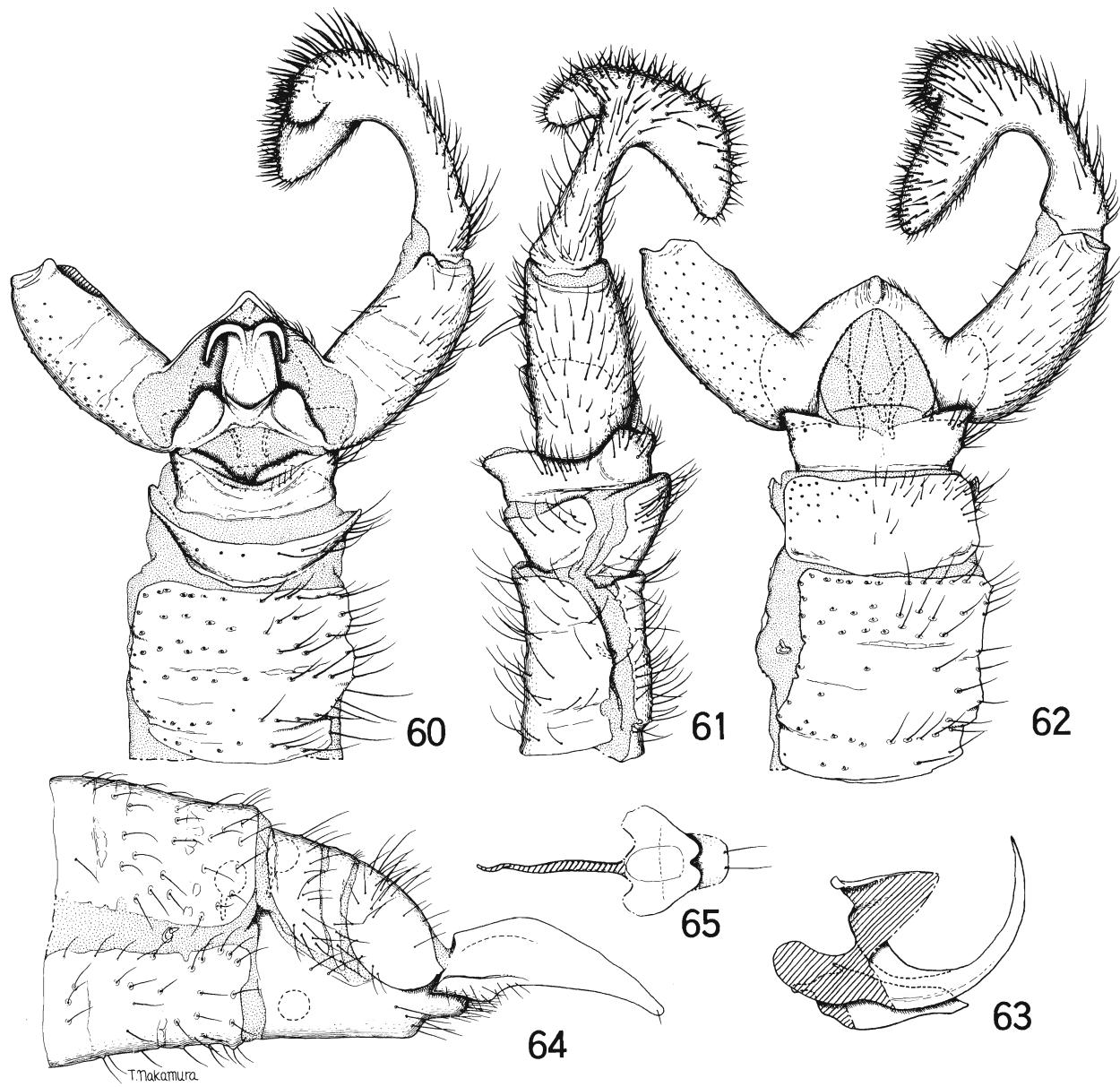
Female. Body length 4.7–5.8 mm, wing length 6.0–6.9 mm (in dried specimens).

General coloration and structures as in male. Antenna shorter than in male, 2.1 times as long as thorax, consisting of 16 segments.

Terminalia: Eighth tergum with a row of setae dorsally and with scattered setae laterally; 9th tergum



Figs. 56–59. Female terminalia of *Trichocera (Metatrichocera)* spp. — Fig. 56. *T. (M.) chaetopyga*, lateral aspect. Fig. 57. Ditto, 9th and 10th sterna, ventral aspect. Fig. 58. *T. (M.) crassicauda*, lateral aspect. Fig. 59. Ditto, 9th and 10th sterna, ventral aspect. (from Nakamura and Saigusa, 1996)



Figs. 60–65. Male and female genitalia of *Trichocera (Metatrichocera) cordata* sp. nov. — Fig. 60. Male genitalia without right gonostylus, dorsal aspect. Fig. 61. Ditto, lateral aspect. Fig. 62. Ditto without left gonostylus, ventral aspect. Fig. 63. Phallobase and phallus, lateral aspect. Fig. 64. Female terminalia, lateral aspect. Fig. 65. Ninth and 10th sterna of female in ventral aspect;

bearing short setae near posterior margin dorsally and a row of longer setae laterally; 10th tergum pale brown, as long as 8th and 9th terga together, clothed with scattered long erect setae; 8th sternum widely glabrous except for a few long setae on lateral margin and posterior 1/3; 9th sternum broader than long, with a slender apodeme; 10th sternum weakly sclerotized, with a pair of setae at posterior margin; cercus yellow, as long as 8th to 10th terga together, 2.7 times as long as broad, dorsal margin strongly curved at basal 1/3, ventral portion clothed with fine hairs at basal 1/3. Spermatheca with long neck

region, almost as long as diameter of spherical body.

Types.

Holotype. ♂, Toikanbetsu, Horonobe Town, Hokkaido, 20. x. 1996, T. Nakamura leg.

Paratypes. [Hokkaido] 70 ♂ 145 ♀, same data as holotype; 1 ♂ 3 ♀, Sekitanbetsu-gawa, Sarufutsu Town, 8 ♂ 60 ♀, Kabutonuma, Toyotomi Town, 21. x. 1996, T. Nakamura leg.; 4 ♂ 19 ♀, Osatsunai, Hamatonbetsu Town, 2 ♂ 17 ♀, Sakkuru Pass, Otoineppu Town, 22. x. 1996, T. Nakamura leg.

Distribution. Japan (Hokkaido).

Etymology. The specific name is based on the heart-shaped outline formed by the gonopods.

Remarks. This species is similar to *T. (M.) mirabilis* in the overall pattern of gonostylus of the male genitalia; i.e. elongate mesially curved gonopod, distally bilobed gonostylus, etc. The new species is easily distinguished from *T. (M.) mirabilis* by the absence of subbasal lobe of male gonostylus and absence of a posteromedian process of the 9th tergum of the male.

***Trichocera (Metatrachocera) hypandrialis* sp. nov.**
[Japanese name: onaga-gaganbodamashi]
(Figs. 5, 66–69)

Description.

Male. Body length 4.0–4.3 mm, wing length 4.8–5.5 mm (in dried specimens).

Head: Cranium, mouthparts and antenna dark brown, grayish brown pollinose, occiput and face with dark brown setae; eye black. Antenna long, 3.6 times as long as thorax, consisting of 15 segments, extreme base of 1st flagellomere pale; flagellum rather stout; 1st to 8th flagellomeres densely clothed with short whitish curved hairs; remainder of flagellomeres with longer straight darker hairs; basal 3–4 flagellomeres with a few scattered straight dark setae distributed irregularly, other flagellomeres without any darker setae; 1st flagellomere 2.2 times as long as 2nd.

Thorax: General coloration yellowish brown to dark brown, pale brown pollinose; pronotum, prescutum and episternum darker; scutum, scutellum, mediotergite, laterotergite, anepimeron, meron and metapleuron dark brown (in holotype) or yellowish brown (in paratype); pronotum, prescutum, scutum and scutellum clothed with yellowish brown to pale brown setae. Legs slender; coxae and trochanters yellowish brown, the former with longish yellow hairs; femora, tibiae and tarsi uniformly dark brown (in holotype) or yellowish brown (in paratype), covered with brown hairs; tibial spurs blackish brown; tarsi dark, faintly darkened distally, as long as tibiae; each tarsomeres cylindrical and straight; claws short, 1/4 as long as 5th tarsomere, pale brown. Relative lengths of leg segments as in Table 7.

Wing 3.0 times as long as broad. Membrane subhyaline with a faint yellowish tinge, without any markings; pterostigma concolorous to ground; veins pale brown, paled to yellowish brown basally. Venation: Crossvein sc-r situated opposite the basal 1/3 of Rs; R₁₊₂ weakened at distal end; R₂₊₃ 1.2–1.7 times as long as R₂₊₃₊₄; R₃ curved posteriorly at distal 1/3; crossvein r-m connecting with R₅ at a short distance beyond the fork of Rs; cell m₁ much longer

Table 7. Relative lengths* of leg segments of *Trichocera (Metatrachocera) hypandrialis* sp. nov., a paratype male.

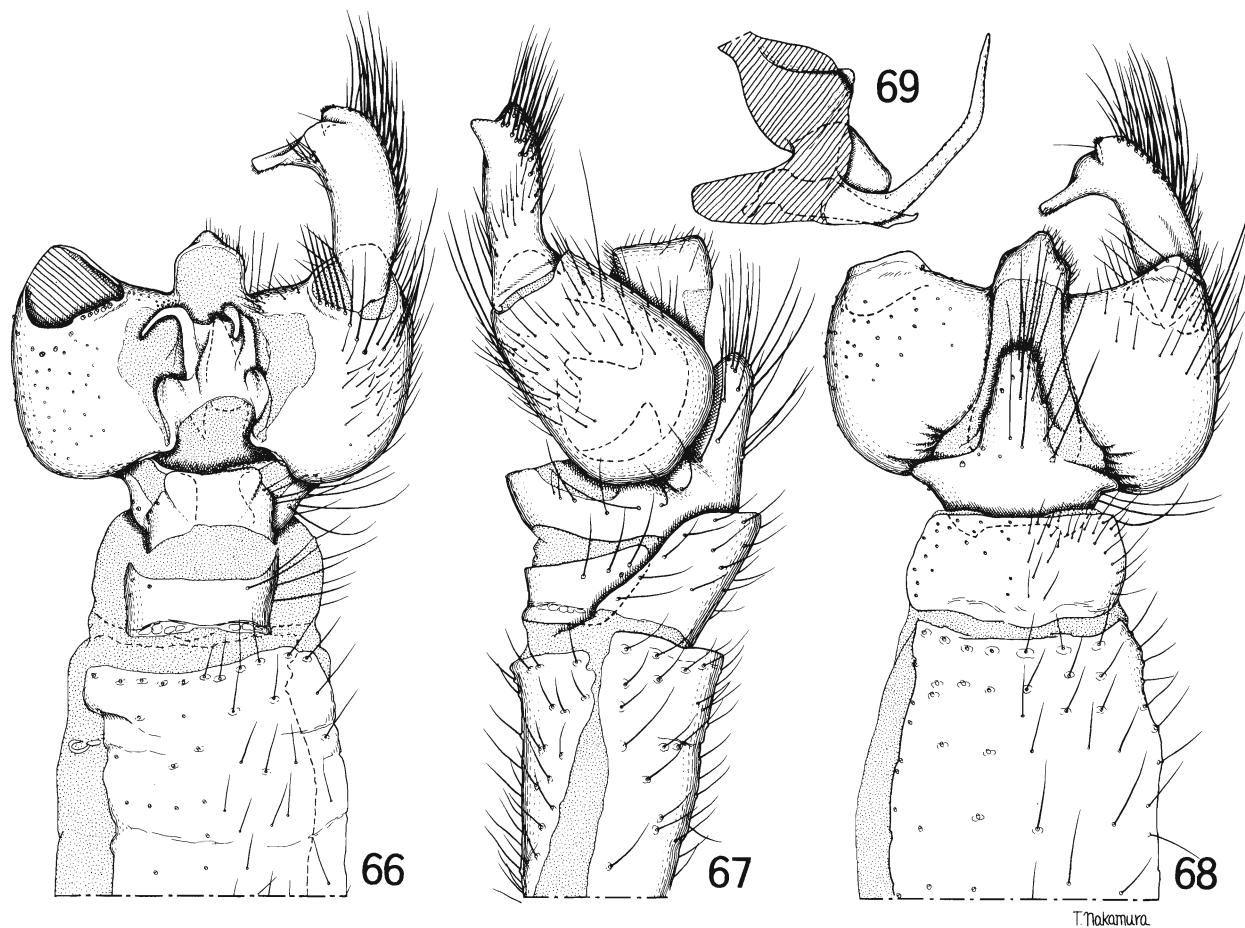
	Femur	Tibia	Tarsomere					Claw
			1	2	3	4	5	
Fore leg	276	346	161	86	57	30	15	5
Mid leg	275	307	135	76	47	26	14	4
Hind leg	310	366	154	84	55	29	15	4

*the length of thorax as 100

than petiole of M₁₊₂ fork. Halter long, 1.3 times as long as thorax, pale yellow, and with brown knob.

Abdomen: First to 8th segments dark brown; 1st tergum with a row of fine short pale brown setae; 2nd to 7th segments with scattered fine pale brown short setae; 8th tergum 1/8 as long as 7th tergum, being a rather narrow transverse sclerite, more or less extending posterolaterally, clothed with a few long erect setae on lateral portions; 8th sternum 2/3 as long as wide, wider than its tergum, almost straight posteriorly, clothed with scattered setae on posterior and lateral submargin and central portion.

Genitalia large, 1.7 times as wide as 8th segment, dark brown. Ninth segment being a complete sclerotized ring, as wide as 8th sternum; tergal area as long as 8th tergum, with straight posterior margin, twice as long as dorsomedian length of the tergum, oblique posterolateral margins and strongly emarginate anterior margin; posterolateral portion with 2–3 strong setae at posterior margin, tergal area demarcated by a large, oval sublateral projections which bear 3 or 4 strongly curved long setae, and articulate with gonocoxites; posterior margin of sternal area projecting posteriorly; this projection 1/3 as wide as the segment, elongate and tapered beyond the mid length of gonocoxites, clothed with straight long setae; posterior 1/2 of elongate projection tapered into a bluntly ended free process. Tenth tergum represented by a pair of triangular sclerites, of which anterior margin is associated with posterior margin of 9th tergum, the lateral margin associated with anteromesial angle of gonocoxite, the mesial margins of the triangular sclerites surrounding dark pigmented anal papilla. Gonocoxite swollen, roughly oval in shape, 1.6 times as long as wide, or as long as 7th tergum, rounded on anterior portion; gonocoxite short setose, and bearing a row of long setae running from subapical portion of dorsal surface to dorsomesial portion of distal margin of gonocoxite; ventrolateral portion of gonocoxite also with a few long and strong setae, of which more apical one is strongest; ventral gonocoxal bridge complete, 1/5 as wide as genitalia, protruded posteriorly to the level of apical portion of gonocoxites, much projecting



Figs. 66–69. Male genitalia of *Trichocera (Metatrichocera) hypandrialis* sp. nov. holotype. — Fig. 66. Male genitalia without right gonostylus, dorsal aspect. Fig. 67. Ditto, lateral aspect. Fig. 68. Ditto without left gonostylus, ventral aspect. Fig. 69. Phallobase and phallus, lateral aspect.

ventrally, square in shape in lateral aspect, clothed with fine hairs. Gonostylus a little shorter than gonocoxite, weakly curved inwardly, and with a beak-like projection with short setulose tip on mesial side near apex; dorsodistal surface of gonostylus membranous and with minute, black, apical patch of densely short setulose and bearing a few setae; outer surface of gonostylus densely clothed with long setae. Dorsal gonocoxal bridge wide, with its posterolateral corner weakly produced into a rounded process. Parameres slender, almost straight at basal 3/5 then curved dorsally. Phallotheca strongly convex dorsally. Phallus slightly protruding posteriorly from phallotheca.

Female. Unknown.

Types.

Holotype. ♂, Karikachi Pass, Minamifurano Town, Hokkaido, 13. x. 1996, T. Nakamura leg.

Paratype. [Honshu] 1 ♂, Sugadaira, Sanada Town,

Nagano Pref., 10. x. 1995, T. Nakamura leg.

Distribution. Japan (Hokkaido, Honshu).

Etymology. The specific name is based on the hypandrium (9th abdominal sternum) which is characteristically produced into an elongate process.

Remarks. This species is quite peculiar in having the male 9th sternum projecting posteriorly into a slender, free process. Such modification of 9th sternum is observed in *T. (M.) mackenzie* Dahl, 1967 from Arctic Canada and Europe, and *T. (M.) gigantea* (Dahl, 1967) from Europe. But the present new species is easily distinguishable by its smaller size (body lengths of the present new species, *mackenzie* and *gigantea* are 4 mm, 7–8 mm and 12 mm respectively) and the shape of gonostylus (present new species has a beak-like projection on mesial face of gonostylus near apex, whereas the other two species have a large mesial projection at base).

***Trichocera (Metatrichocera) corallifera* sp. nov.**
 [Japanese name: Sango-gaganbodamashi]
 (Figs. 6, 70-79)

Description.

Male. Body length 3.8-4.8 mm, wing length 5.2-6.4 mm (in dried specimens).

Head: Cranium, mouthparts and antenna dark brown to blackish brown, grayish brown pollinose, occiput, gena and face with dark brown setae; eye black. Antenna 2.3 - 2.6 times as long as thorax, consisting of 16 segments, extreme base of 1st flagellomere somewhat paler; 1st to 7th flagellomeres densely covered with pale short hairs; remainder of flagellomeres covered with short straight hairs; 1st flagellomere clothed sparsely with conspicuous long dark setae distributed irregularly, 2nd to 4th or 5th flagellomeres with some similar setae on subapical portion; 1st flagellomere 1.8 - 2.3 times as long as 2nd.

Thorax: General coloration yellowish brown to brown, pale brown pollinose; dorsal surface of prescutum and scutum dark brown, scutellum and meron darker; pronotum, lateral margin of prescutum and scutum, laterotergite and pleuron paler; pronotum, prescutum, scutum and scutellum clothed with pale brown setae. Legs rather stout; coxae and trochanters yellow with longish yellow hairs; femora and tibiae yellowish brown, slightly darkened at apex, covered with dark brown hairs; tibial spurs blackish brown; tarsi gradually darkened distally to dark brown, a little shorter than tibiae; 1st to 4th tarsomeres cylindrical and straight, 5th tarsomere thickest at distal end; claws short, 1/3 as long as 5th tarsomere, pale brown. Relative lengths of leg segments as in Table 8.

Table 8. Relative lengths^{**} of leg segments of *Trichocera (Metatrichocera) corallifera* sp. nov., a paratype male.

	Femur		Tibia		Tarsomere			Claw
			1	2	3	4	5	
Fore leg	304	354	142	71	38	21	18	7
Mid leg	281	298	104	58	34	19	19	6
Hind leg	315	353	133	74	45	25	18	7

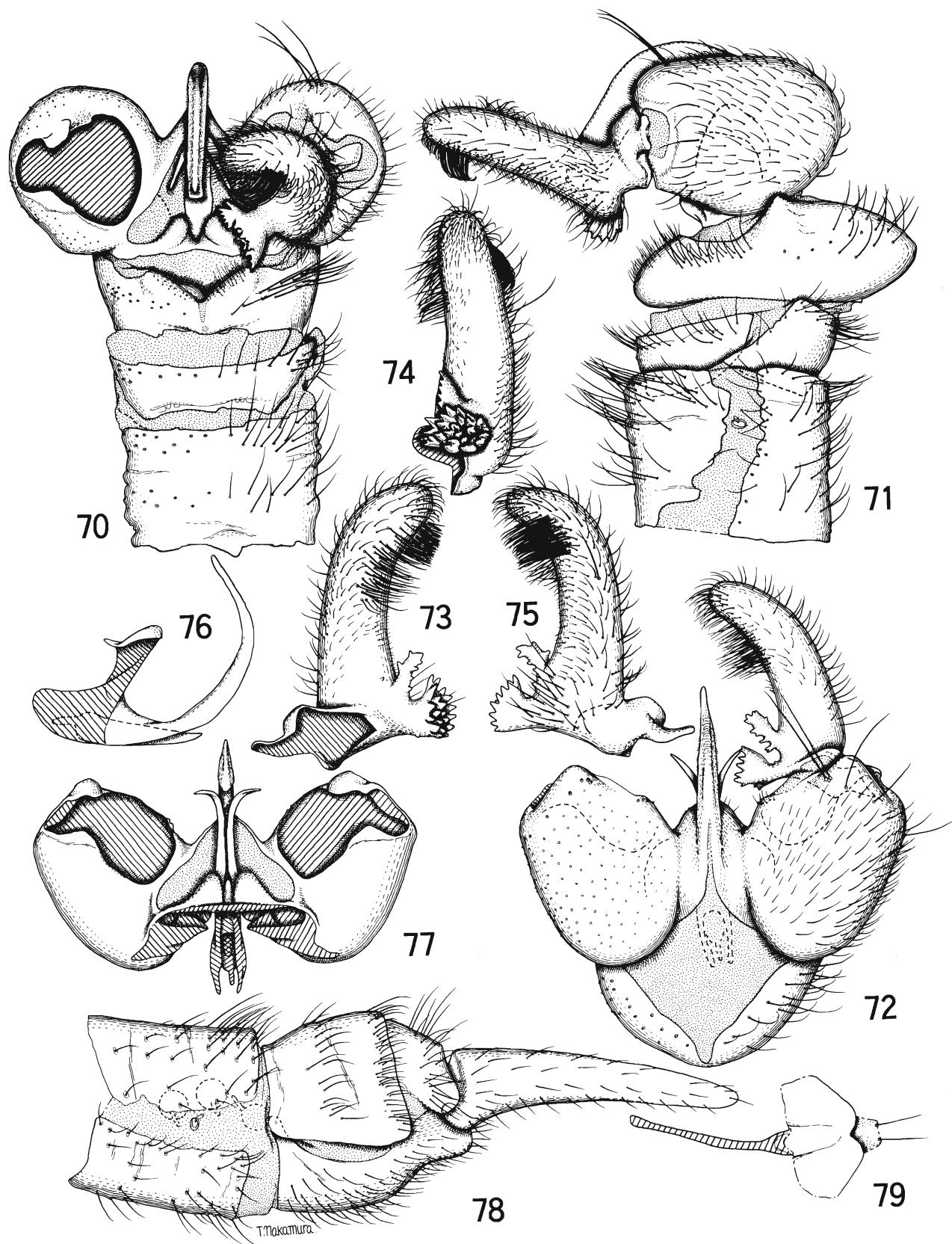
**the length of thorax as 100

Wing 3.0 times as long as broad. Membrane subhyaline with a yellowish tinge, without any markings; pterostigma concolorous to ground; veins pale yellowish brown, paled basally to yellow. Venation: Crossvein sc-r situated from opposite the basal 1/3 to 1/4 of Rs; R₂₊₃ subequal to R₂₊₃₊₄; crossvein r-m connecting with R₅ a short distance

beyond the fork of Rs; cell m much longer than petiole of M₁₊₂ fork. Halter as long as thorax, pale yellow, and with slightly infuscate knob.

Abdomen: General coloration dark blackish brown; 1st to 5th segments with scattered fine yellow setae. Sixth abdominal tergum more densely clothed with longish yellow setae on posterior 1/3 than on anterior 2/3; 7th abdominal tergum 0.45 times as long as wide, its posterior 1/2 slightly raised, more or less densely clothed with long yellow setae; 8th tergum slightly shorter than 2/5 length of 7th tergum, weakly tapered and curved posteriorly toward lateral margins; 8th sternum rectangular, 0.3 times as long as wide, both 8th tergum and sternum with a row of long yellow setae on posterior submarginal areas.

Genitalia dark brown to blackish brown, extraordinarily large and bulged, its width (distance between lateral margins of gonocoxites) 1.9-2.0 times as long as width of 8th segment; 9th segment 1.5 times as high as 8th segment; 9th segment with tergum and sternum completely fused with each other, anteriorly as wide as 8th sternum, much widened posteriorly, its posterior margin 1.7 times as wide as its anterior margin; tergal area of 9th segment slightly shorter than 8th tergum along dorsomedian line, more or less desclerotized dorsomedially, widely though weakly incised on dorsal to subdorsal portion of posterior margin, clothed with short subdecumbent setae on posterior 1/2 of dorsal and subdorsal portions, and long yellow setae on posterior 1/2 of sublateral areas; sternal area of 9th segment at sublateral portion twice as long as dorsomedian length of its tergum, conically produced ventromedially much beyond the level of posteroventral portion of 8th sternum, clothed with long yellow scattered setae, produced into a pair of short, broad lateral projections as condyle for gonocoxites, and with a deep V-shaped membranous posterior ventromedian incision, which is 0.6 times as long as sternal area. Tenth abdominal segment represented by a pair of L-shaped sclerites, of which anterior narrow transverse portion is associated with posterior margin of 9th tergum and of which posterior broader longitudinal portion is close to base of dorsal gonocoxal bridge. Gonocoxite large and bulged, almost globular, 1.2 times as long as wide, 1.6 times as long as 7th tergum, in dorsal aspect bluntly angulated distally and laterally beyond the middle, with a large membranous area surrounding base of gonostylus, clothed with scattered shorter setae and bearing a row of long strong yellowish setae along ventral submargin of socket of gonostylus, of which a few on posterior extremity of gonocoxite are very long and direct mesially. Dorsal gonocoxal bridge transverse and narrow, projecting into a pair of moderately large semioval, submesial lobes; ventral



Figs. 70-79. Male and female genitalia of *Trichocera (Metatrichocera) corallifera* sp. nov. — Fig. 70. Male genitalia without right gonostylus, dorsal aspect. Fig. 71. Ditto, lateral aspect. Fig. 72. Ditto without left gonostylus, ventral (posterior) aspect. Fig. 73. Left gonostylus, ventral aspect. Fig. 74. Ditto, mesial aspect. Fig. 75. Ditto, dorsal aspect. Fig. 76. Phallobase and phallus, lateral aspect. Fig. 77. Phallobase, phallus and gonocoxites, dorsal aspect. Fig. 78. Female terminalia, lateral aspect. Fig. 79. Ninth and 10th sterna of female, ventral aspect.

gonocoxal bridge extremely specialized, transformed into a strongly laterally compressed lamellate keel, which projects dorsally beyond the dorsal level of 9th tergum, evenly curved anteriorly subparallel to posterior margin of gonocoxite; its thickness (width of the lamella in lateral aspect) roughly same as that of gonostylus, the lamella slightly tapering toward tip with a short slender projection. Gonostylus thick and long, 3.8 times as long as medially wide, 1.4 times as long as gonocoxite, broad basally, with large dorsal and ventral condyles and outer proximal expansion for extensor muscle of gonostylus; gonostylus furnished with two black coral-like processes subbasally on mesial surface, the more proximal one larger, thick on stalk, widened and flattened on apical portion which bears some 20 short spine-like processes; the distal coral-like process slender and straight, provided with some 10 spines; main part of gonostylus cylindrical, slightly tapered toward tip, gently curved inward, bluntly ended, fine-pilose, sparsely clothed with longish setae on outer surface toward base, bearing several strong erect setae on dorsal surface near base of the coral-like processes, a subapical group of dense, curved, inwardly directed, long, black setae on dorsal surface, a subapical group of similar, though sparser setae on ventral surface, and fine, pale, short hairs at tip. Paramere slender, curved dorsally along the keeled ventral gonocoxal bridge; phallic organ small, not projecting posteriorly beyond phallotheca.

Female. Body length 4.3 – 5.2 mm, wing length 5.7 – 6.2 mm (in dried specimens).

General coloration and structures as in male. Antenna shorter than in male, 2.1 times as long as thorax, consisting of 16 segments, 1st flagellomere 1.8 times as long as 2nd.

Terminalia: Eighth and 9th terga, and anterior 2/3 of 8th sternum blackish brown, posterior 1/3 of 8th sternum, 10th tergum and cerci brown; 8th tergum completely fused with 9th tergum, area of 8th tergum 1/3 as long as 7th tergum, bearing row of rather long pale yellow setae on posterior submargin; area of 9th tergum as long as 8th tergum and wider than it, clothed somewhat densely with rather short, pale yellow setae along posterior margin; 10th tergum as long as 9th, sparsely clothed with long erect hairs on posterior 2/3; dorsal surface from 8th to 10th segments strongly convex; 8th sternum 1.1 times as long as 8th to 10th terga together, swollen ventrally and clothed with rather long hairs at anterior 3/4, and with short fine hairs at posterior 1/4; 9th sternum 1.7 times as wide as long, with a slender apodeme; 10th sternum weakly sclerotized, with pair of setae at posterior margin; cercus 1.8 times as long as 8th to 10th terga together, 4.0 times as long as broad,

broadest at base, gently curved downward, clothed sparsely with pale fine hairs on entire area. Spermatheca with neck region as long as diameter of its spherical body.

Types.

Holotype. ♂, Akaishi-gawa, Ajigasawa Town, Aomori Pref., Honshu, 27. x. 1996, T. Nakamura leg.

Paratypes. [Honshu] 69 ♂ 8 ♀, same data as holotype.

Distribution. Japan (Honshu).

Etymology. The specific name is based on the two coral-like processes on the male gonostylus.

Remarks. This new species is strikingly different from any other *Metatrachocera* species in the male genitalia with the gonocoxites and gonostyli directed upward at right angles to the body axis, the gonostylus armed with coral-like processes and ventral gonocoxal bridge projecting anterodorsally into a sword-like lamellate lobe. Large median projection of ventral gonocoxal bridge is observed in *T. (M.) gigantea* (Dahl, 1967) and *T. (M.) inexplorata* (Dahl, 1967). But these species differ from the present new species in the shape of gonostylus.

Trichocera (Metatrachocera) mirabilis Alexander, 1934

[Japanese name: Kongoh-gaganbodamashi]

(Figs. 7–8, 80–85)

Trichocera mirabilis Alexander, 1934, *Philip. Jour. Sci.*, 55: 20–21, [Type-locality: Kongo San (Korea)]; Alexander, 1938, *Philip. Jour. Sci.*, 67: 133; Tokunaga, 1938, *Tenthredo*, 2: 138; Tokunaga, 1939, *Fauna Nipponica*, 10 (Fas. 7, No. 2): 68, 77–79; Nakamura, 1995, *Jpn. J. Ent.*, 63: 260.

Metatrachocera mirabilis; Dahl, 1966, *Opusc. Ent.*, 31: 97.

Trichocera (Metatrachocera) mirabilis; Dahl and Alexander, 1976, *Ent. scand.*, 7: 14.

Description.

Male. Body length 4.2–6.4 mm, wing length 5.2–7.5 mm (in dried specimens).

Head: Cranium, mouthparts and antenna dark brown to blackish brown, grayish brown pollinose, occiput with dark brown setae, face with yellowish brown to dark brown setae; eye black. Antenna 2.8–2.9 times as long as thorax, consisting of 16 segments, pedicel and extreme base of 1st flagellomere paler; basal 6–7 flagellomeres covered with short curved pale hairs; remainder of flagellomeres covered with straight dark hairs; in addition, all flagellomeres sparsely clothed with long black setae irregularly distributed; 1st flagellomere 1.2

times as long as 2nd.

Thorax: General coloration dark brown, brown pollinose; lateral portion of postpronotum, postalar areas of scutum, and scutellum paler; pronotum, prescutum, scutum and scutellum clothed with yellowish brown to pale brown setae. Legs slender; coxae and trochanters brown with longish yellow hairs; femora and tibiae dark brown, covered with dark brown hairs; tibial spurs black; tarsi dark brown, distal segments blackish brown, as long as tibiae; each tarsomeres cylindrical and straight; claws short, 1/4 as long as 5th tarsomere, brown. Relative lengths of leg segments as in Table 9.

Table 9. Relative lengths* of leg segments of *Trichocera* (*Metarichocera*) *mirabilis* Alexander, a male.

	Femur	Tibia	Tarsomere					Claw
			1	2	3	4	5	
Fore leg	281	383	186	91	57	33	16	3
Mid leg	288	337	152	81	53	34	16	3
Hind leg	335	4103	174	86	57	35	15	3

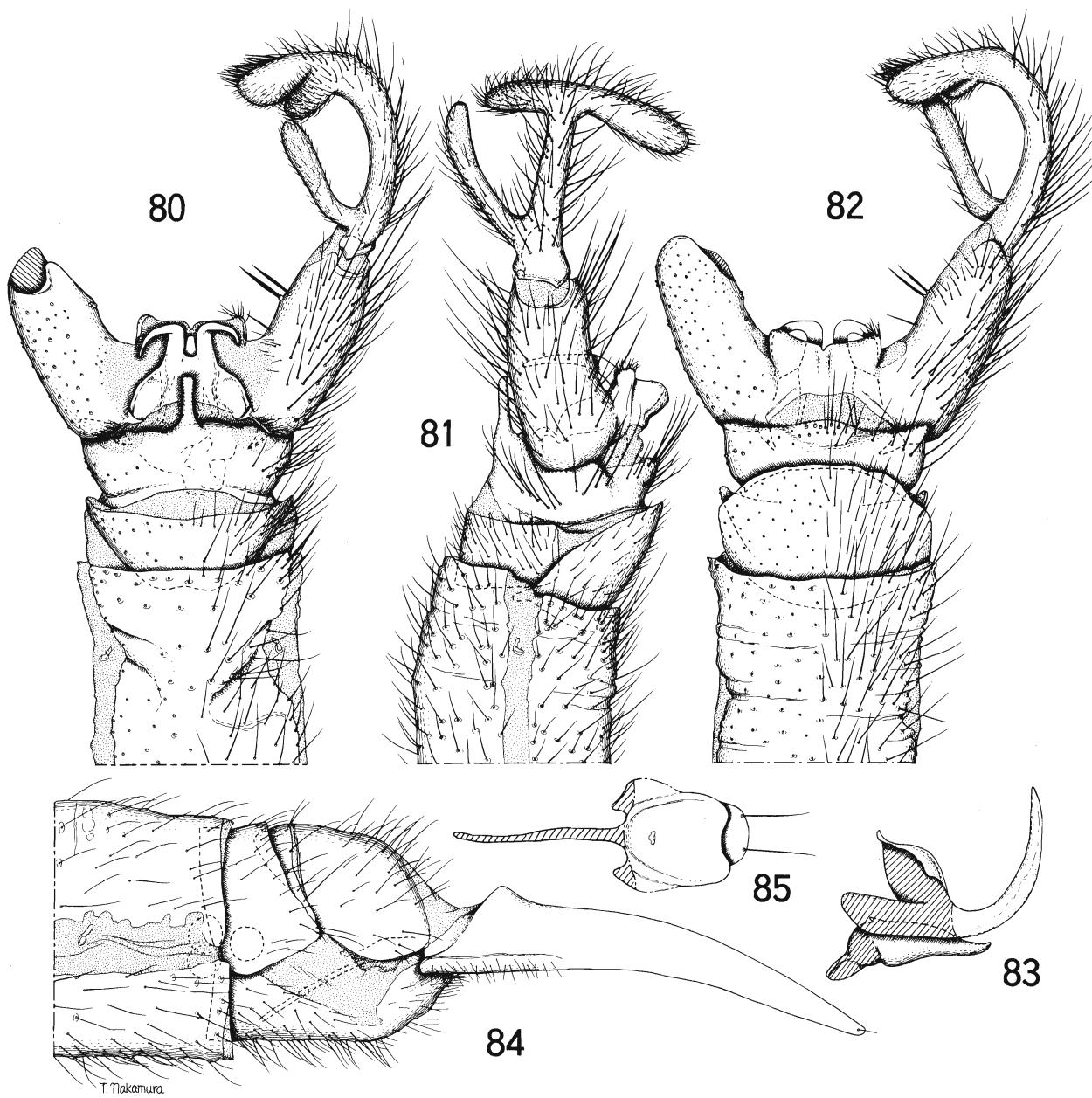
*the length of thorax as 100

Wing 3.0 times as long as broad. Membrane subhyaline with a pale brownish tinge, with small vague cloud on crossvein r-m which is often weak and unrecognizable; wing membrane bearing macrotrichia on distal 2/5 and along hind margins, most of macrotrichia on ventral surface; pterostigma obviously darker; veins dark brown, paled basally to yellowish brown. Venation: Crossvein sc-r situated at opposite the middle of Rs or slightly beyond it; R₂₊₃ a little longer than R₂₊₃₊₄; R₃ sinuate; crossvein r-m connecting with R₅ slightly beyond the fork of Rs; cell m₁ longer than petiole of M₁₊₂ fork. Halter exceptionally long, 1.5 times as long as thorax, pale yellow, and with infuscate knob.

Abdomen: General coloration dark brown; 2nd to 7th segments with scattered fine setae; 7th abdominal tergum rectangular, 2 times as long as wide; 8th abdominal tergum rectangular, 1/3 as long as wide, sparsely clothed with longish dark setae except on the anteromedian portion; 8th abdominal sternum 2.3 times as long as its tergum, 2/3 as long as wide, straight on anterior margin, rounded on posterior margin, evenly clothed with brown setae of which a few posterior ones are long.

Genitalia dark brown to brown, elongate, slightly longer than 3 times length of 8th sternum; maximum width of genitalia (distance between lateral margins of gonocoxites) 1.5 times as long as width of 8th sternum; 9th tergum and sternum completely fused with each other to form a complete sclerotized ring;

tergal area of 9th segment 3/4 as long as 8th tergum, 1/4 as long as wide, with anterior margin weakly emarginate, posterior margin weakly arched, and its dorsomedian portion produced into a posteriorly directed slender process, which is as long as dorsomedian length of the tergum, 6 times as long as its median width, slightly tapered apically on basal 1/2, and rounded apically; the tergal area bearing a pair of transverse sublateral rows of several strong setae 1.5 times as long as the tergal area; sternal area of 9th segment similar to the tergal area, but produced posteriorly into pair of short angulate lateral processes for articulations of gonocoxites, bearing row of long setae along posterior submargin; posteromedian oval area of 9th sternal area weakly raised, bearing 10-15 setae (the longest being twice as long as the sternal area). Tenth segment with a pair of L-shaped sclerites, of which basal portion is slender and close to posterior margin of 9th tergum, posterior longitudinal portion is rather broad; anal tube more or less pigmented. Gonocoxite long, thick, cylindrical, 2.7 times as long as wide, 2.9 times as long as 8th tergum, divergent posteriorly from opposite gonocoxite, evenly long setose and bearing 2 strong erect setae at 2/3 of mesial surface. Gonostylus slender and elongate, apical portion recurved, so that total of gonostylus being a U-shaped structure with a long dorsomesial process at base, a short dorsal process at the middle; length from base of gonostylus to the curved portion as long as gonocoxite, main portion of gonostylus 1/2 as thick as gonocoxite; basal process 0.8 times as long as gonocoxite, distinctly divergent from gonostylus, short setose, membranous on apical 1/2 except for posterior surface; dorsodistal process short, 2/3 as long as the basal process, directed dorsally, mostly membranous, pilose anteriorly, short setose posteriorly; apical process (or recurved distal 1/2 of gonostylus) of a weakly clavate process, directed base of opposite gonocoxite, covered with fine hairs anteriorly, clothed with dense short stiff setae on outer surface. Dorsal gonocoxal bridge small, with pair of small semioval processes; ventral gonocoxal bridge short and broad, projecting posteriorly from base of gonocoxite, slightly widened apically, with truncate posterior margin, of which lateral corners are clothed with a few short setae; the ventral bridge raised along ventromedian line which is more or less keeled; in lateral aspect the ventral bridge with bisinuate, ventral outline, and straight, vertical posterior margin. Paramere long and slender, strongly bent dorsally before the middle, then directed outward beyond the middle of apical portion, and extending dorsally at the level of dorsomedian process of 9th tergum; phallic organ moderately large, projecting posteriorly beyond phallotheca.



Figs. 80-85. Male and female genitalia of *Trichocera (Mrtrachocera) mirabilis* Alexander — Fig.80. Male genitalia without right gonostylus, dorsal aspect. Fig.81. Ditto, lateral aspect. Fig.82. Ditto without left gonostylus, ventral aspect. Fig.83. Phallobase and phallus, lateral aspect. Fig.84. Female terminalia, lateral aspect. Fig.85. Ninth and 10th sterna of female, ventral aspect.

Female. Body length 5.7 – 8.3 mm, wing length 7.0 – 8.8 mm (in dried specimens).

General coloration and structures as in male. Antenna a little shorter than in male, 2.7 times as long as thorax, consisting of 16 segments, 1st flagellomere 1.0–1.5 times as long as 2nd.

Terminalia: Eighth to 10th terga and cerci brown, 8th sternum brown to dark brown; 8th tergum 1/5 as long as 7th tergum, clothed sparsely with rather long, pale brown setae; 9th tergum 0.6 times as long as 8th tergum, narrowing laterally, bearing row of a few long hairs on posterior margin; 10th tergum 1.6 times

as long as 8th at dorsomedian portion, sparsely clothed with long erect hairs on posterior 2/3; 8th sternum 1.3 times as long as 8th to 10th terga together, clothed with erect pale brown hairs, and with shorter fine ones at distal portion; 9th sternum as wide as long, with a slender apodeme; 10th sternum weakly sclerotized, with pair of long setae at posterior margin; cercus long, 2.2 times as long as 8th to 10th terga together, 5.3 times as long as broad, broadest at basal 1/6, ventral surface of cerci almost straight at basal 1/2, then gently curved downward, clothed with short hairs on ventral portion of its basal 1/3.

Spermatheca with short neck region, 1/2 as long as diameter of its spherical body.

Specimens examined. [Honshu] 2 ♂, Akaishi-gawa, Ajigasawa Town, Aomori Pref., 27. x. 1996, T. Nakamura leg.; 24 ♂ 11 ♀, Ichinowatari-rindo, Hirosaki City, Aomori Pref., 28. x. 1996, T. Nakamura leg.; 2 ♂ 3 ♀, Nurukawa, Hiraka Town, Aomori Pref., 29. x. 1996, T. Nakamura leg.; 1 ♂ 8 ♀, Takinosawa Pass, Hiraka Town, Aomori Pref., 29. x. 1996, T. Nakamura leg.; 11 ♂ 6 ♀, Hiratsuto, Kawai Village, Iwate Pref., 30. x. 1996, T. Nakamura leg.; 1 ♂ 3 ♀, Matsukusa, Kawai Village, Iwate Pref., 31. x. 1996, T. Nakamura leg.; 8 ♂ 1 ♀, Shinyu spa, Ichinoseki City, Iwate Pref., 3. xi. 1996, T. Nakamura leg.; 9 ♂, Arikabe, Kannari Town, Miyagi Pref., 3. xi. 1996, T. Nakamura leg.; 6 ♂ 1 ♀, Minamizaoh-kogen, Shichikasyuku Town, Miyagi Pref., 14. x. 1995, T. Nakamura leg.; 3 ♂, Asahi-kosen spa, Asahi Town, Yamagata Pref., 4. xi. 1996, T. Nakamura leg.; 4 ♂ 4 ♀, Hosoo Pass, Nikko City, Tochigi Pref., 3. xi. 1993, T. Nakamura leg.; 2 ♂, Mt. Amemakiyama, Mashiko Town, Tochigi Pref., 23. xi. 1994, T. Nakamura leg.; 9 ♂ 11 ♀, Ayuta, Motegi Town, Tochigi Pref., 3. xii. 1993, T. Nakamura leg.; 7 ♂, Ayuta, Motegi Town, Tochigi Pref., 23. xi. 1994, T. Nakamura leg.; 20 ♂ 2 ♀, Hongo, Mashiko Town, Tochigi Pref., 23. xi. 1994, T. Nakamura leg.; 1 ♂ 1 ♀, Kawamata spa, Kuriyama Village, Tochigi Pref., 10. x. 1993, T. Nakamura leg.; 4 ♂ 3 ♀, Itamuro spa, Kuroiso City, Tochigi Pref., 12. xi. 1995, T. Nakamura leg.; 44 ♂ 5 ♀, Mt. Yamizosan, Kurobane Town, Tochigi Pref., 12. xi. 1995, T. Nakamura leg.; 8 ♂ 9 ♀, Ookoeji, Awano Town, Tochigi Pref., 3. xii. 1995, T. Nakamura leg.; 25 ♂ 10 ♀, Idoshitsugen, Awano Town, Tochigi Pref., 5. xi. 1995, T. Nakamura leg.; 7 ♂ 3 ♀, near Arakawa dam, Yaita City, Tochigi Pref., 5. xii. 1995, T. Nakamura leg.; 2 ♂, Shiobara-onsen spa, Shiobara Village, Tochigi Pref., 10. xii. 1995, T. Nakamura leg.; 1 ♂ 2 ♀, Dorobu, Kuriyama Village, Tochigi Pref., 19. xi. 1995, T. Nakamura leg.; 1 ♂, Tanzawa, Tsukui Town, Kanagawa Pref., 14. xi. 1996, T. Nakamura leg.; 1 ♂ 6 ♀, Sasagamine, Myokokogen Town, Niigata Pref., 7. xi. 1996, T. Nakamura leg.; 1 ♂, Togakushi-kogen, Togakushi Village, Nagano Pref., 8. xi. 1996, T. Nakamura leg.; 1 ♂ 1 ♀, Fujimi-kogen, Fujimi Town, Nagano Pref., 15. xi. 1996, T. Nakamura leg. [Kyushu] 1 ♂, Yamada-ryokuchi, Kitakyushu City, Fukuoka Pref., 25. xi. 1996, T. Saigusa leg.; 1 ♂, Minamihata dam, Nakagawa Town, Fukuoka Pref., 26. xi. 1996, M. Sugimoto & T. Saigusa leg.; 3 ♂, Taraibaru, Ooyama Town, Oita Pref., 19. xi. 1996, T. Saigusa leg.; 2 ♂, Oike, Shonai Town, Oita Pref., 26. xi. 1996, T. Nakamura leg.; 2 ♂, Shimotsuru, Tomochi Town, Kumamoto Pref., 19. xii. 1996, T. Nakamura leg.; 1 ♂, Kureko, Izumi Village, Kumamoto Pref., 20. xii. 1996,

T. Nakamura leg.

Distribution. Japan (Honshu, Kyushu), Korea. This species is recorded from Kyushu for the first time.

Remarks. *T. (M.) mirabilis* is somewhat similar to *T. (M.) cordata* in the general structure of the male genitalia, but *T. (M.) mirabilis* is extremely unique in having macrotrichia on the wing membrane, especially on the ventral surface of the distal portion. This species is also peculiar in having unusually long halteres. This species was first described from North Korea, and Nakamura (1995) recorded it from Central Honshu. Currently, it is found in many localities in Honshu and Kyushu including lowland forests.

Discussion

Polyphyly of the subgenus *Metatrachocera*.

As stated in the introduction, we incline to regard the subgenus *Metatrachocera* as an artificial assemblage of species. We discuss on the problem in more detail.

This subgenus was first founded as a genus by Dahl (1966) with the type species, *Trachocera lutea* Becher, 1886. In the original description she also assigned the following species to this taxon: *bituberculata* Alexander, 1924; *colei* Alexander, 1919; *forcipula* Nielsen, 1920; *mirabilis* Alexander, 1934; *salmani* Alexander, 1927; *schmidti* Alexander, 1959; *sibirica* Edwards, 1920; *stecki* Bangerter, 1948; *thaumastopyga* Alexander, 1960; *ursamajor* Alexander, 1959.

According to the published descriptions and illustrations (Dahl, 1957, 1967b, Bangerter, 1948), the type species, *lutea*, has distinctive male genitalia, which have (a) strongly swollen gonocoxites, (b) complicated gonostyli having an inflated subapical lobe, an elongate subbasal lobe and a bird-head shaped basal lobe on the mesial surface, (c) complete ventral gonocoxal bridge, represented by a simple, posteriorly protruding structure, (d) slender spine-like parameres ordinarily curved dorsally, (e) dorsal gonocoxal bridge produced into a pair of moderately large, roundly ended processes, and (f) 9th tergal and sternal areas simple and transverse, with posterior margins only slightly emarginated and lacking any specialized structure. The female of *lutea* has rather short and stout cerci with setae ventroproximally.

In the original description of *Metatrachocera*, Dahl (1966) enumerated several male genitalic characters as diagnostic to this taxon, that are summarized as follows: (a) gonocoxite inflated with numerous dorsolateral bristles, (b) gonostylus complicated in structure, variable in shape by species with tips

always strongly bristled, (c) ventral gonocoaxal bridge complete (often with ornamented midpoint), (d) paramere elongate and curved, with a pointed tip, (e) ventral fusion of parameres sclerotized and broad, and (f) 9th tergal area often with two spinose or setose plate-like outgrowths. The female diagnostic characters are, (a) cercus short, stout and strongly curved, (b) vaginal apodeme knob-like, and (c) supravaginal plate with two bristles.

Among the male diagnostic characters stated by Dahl, characters (c) and (d) are often found in species of the subgenus *Trichocera* sensu Dahl as already stated by Dahl herself in the original description, and character (f) is not a constantly recognized character and it is absent even in *lutea*, the type species. The character (e) is ambiguous and cannot be considered as a distinct generic or subgeneric character. Consequently, the male diagnostic characters exclusively found in *Metatrachocera* are characters (a) and (b). These characters are apparently recognized in the type species.

Among the female diagnostic characters stated by Dahl, all three characters are often found in the subgenus *Trichocera* sensu Dahl; i.e. character (a) found in *T. saltator* (Harris, 1776), and *japonica* Matsumura, 1915, characters (b) and (c) found in *T. hiemalis* (DeGeer, 1776), *japonica* and many other species. Therefore, all of these female characters cannot be treated as diagnostic. Therefore, the diagnostic characters of *Metatrachocera* are confined to the male characters (a) and (b), even for the original concept of this taxon.

After Dahl founded *Metatrachocera*, she (Dahl, 1967a, 1967b, 1976) assigned some other species to this taxon. These are *garretti* Alexander 1927 (=*alexanderi*, 1967) (inflated gonocoaxite; outcurved gonostylus with a small subbasal protuberance); *appendiculata* Alexander, 1938 (long bifid gonostylus), *candida* Dahl, 1976 (inflated gonocoaxite, subbasally swollen gonostylus), *gigantea* Dahl, 1967 (inflated gonocoaxite, basally long bifurcate gonostylus; elongate female cercus), *inexplorata* Dahl, 1967 (inflated gonocoaxite, only weakly medially tuberculate gonostylus; elongate female cercus), *latilobata* Alexander, 1938 (normal, not inflated, gonocoaxite, only weakly medially tuberculate gonostylus) and *mackenzie* Dahl, 1967 (inflated gonocoaxite; basally long bifurcate gonostylus; elongate female cercus). We mentioned the character states of gonocoaxite, gonostylus and, if available, of female cercus in parentheses after each specific name of these species. Among these additional species, those having the above-mentioned two male diagnostic characters are only *gigantea* and *mackenzie*; species only with

character (a) are *garretti*, *candida*, *inexplorata*; species only with character (b) is *appendiculata*, and even *latilobata* cannot be regarded as having any of these diagnostic characters. In addition, the originally included *salmani* and *mirabilis* have gonocoaxites which are not specially inflated as in many species of the subgenus *Trichocera* sensu Dahl. Indeed, the degree of inflation of the gonocoaxites gradually changes among species, and cannot be sharply coded into two states in the genus *Trichocera*, and Dahl did not mention the degree to be included in *Metatrachocera* in any of her papers. A similar tendency is also found in the degree of development of the mesial process of the gonostylus in the genus *Trichocera*. The gonostylus of the subgenus *Trichocera* sensu Dahl are somewhat variable in this degree by species. *T. major* Edwards, 1921, *mendli* Dahl, 1976, *sapporensis* Alexander, 1935, etc. have simple gonostyli which are cylindrical and lacking in any protuberance. *T. maculipennis* Meigen, 1818, *parva* Meigen, 1804, *arctica* Lundstrom, 1915, etc. have a small subbasal tubercle on the mesial surface of the gonostylus. Furthermore, in *T. hiemalis*, *T. tetonensis* Alexander, 1945 and *T. sakaguchii* Alexander, 1930, the gonostylus has distinctly short or rather long process on the mesial surface, which is found in *inexplorata* and *latilobata* (in this species the process is less developed) assigned to *Metatrachocera* by Dahl.

Thus, the only two diagnostic characters of *Metatrachocera*, the inflation of the gonocoaxite and the complication of the gonostylus, are not sharply definable, and even according to Dahl's definition, some of the species assigned to *Metatrachocera* by Dahl do not have either of these two characters. Therefore, *Metatrachocera* defined and consisting of species assigned by Dahl is an ambiguously characterized taxon, including species having subjectively inflated gonocoaxites and/or subjectively complicated gonostyli.

The inflation of the gonocoaxite is almost certainly associated with the development of muscles, mainly adductor, of the gonostylus. The inflation is not always associated with the complication of the gonostylus as observed in *mirabilis* and *cordata*. Probably the gonocoaxites are inflated in species which have complicated gonostyli having strong mesial process(es) and which powerfully hold the female terminalia during copulation.

Although the taxonomic range of *Metatrachocera* is vague as stated above, the species having both the gonocoaxites and gonostyli most extremely specialized in degree as in *lutea* may be safely regarded as belonging to *Metatrachocera*. Such species with the typical inflation of gonocoaxites associated with the complication of gonostyli are *chaetopyga*, *crassicauda*,

monstrosa and *corallifera* among Japanese species and *ursamajor* from North America, *mackenzie* from North America and Europe, and *gigantea* from Europe, in addition to the type, *lutea*, from Europe. Notwithstanding the "similarity" of the gonocoxites and of the gonostyli, these species are much diversified in many other morphological characters in the male genitalia. The only close affinities found among these species are *T. crassicauda* and *monstrosa*. Based on the out-group comparison with the genus *Paracladura* Brunetti, 1911 and partly with *Diazosma* Bergroth, 1913, the plesiomorphic condition of the male genitalia and pregenital segments of the genus *Trichocera* is assumed as follows: the pregenital segments of ordinary, simple structure without any protuberances or special vestiture; 9th tergum and sternum fused together, and the united sclerotized ring simple in structure without special processes or vestiture; 10th abdominal segment represented by a pair of simple small dorsal sclerites loosely associated with the posterior margin of 9th tergum and a pair of small ventral sclerites on the subanal area; dorsal gonocoaxal bridge simple with a pair of weakly produced processes; ventral gonocoaxal bridge of a simple, more or less posteriorly produced structure without any special processes or modifications; paramere elongate, spine-like, and curved dorsally. The above-mentioned species are much differentiated in their genital and/or pregenital structures from the plesiomorphic states as defined above. They are quite different in the transformations of the tenth abdominal segment, of the modifications of 9th abdominal tergum and sternum, of the ventral gonocoaxal bridge, and of the modification of gonostylus. None of these transformations indicate close phylogenetic relationships between any two species. Therefore, we consider that even *Metatrichocera* of the strict sense including only the above-mentioned specialized species is not a monophyletic, but apparently a polyphyletic group.

As stated in the introduction, we tentatively accept *Metatrichocera* as a "traditional" subdivision of the genus *Trichocera*. At present, we cannot determine the monophyletic range of *Metatrichocera* as there was no chance to examine specimens of any foreign species of this taxon. More precise taxonomic status of this taxon will be decided when the phylogenetic relationships of the world species of the genus *Trichocera* are analyzed sufficiently.

Phylogenetic relationships of some species in *Metatrichocera*.

The phylogenetic analysis of the genus *Trichocera* is indispensable to establish the systematics of this genus as stated in the preceding section.

We tentatively discuss the phylogenetic relationships among a few species assignable to *Metatrichocera* in this section.

(a) Relationship among *truncata*, *bifurcata*, *crassicauda* and *monstrosa*. These four species share a special modification of the 10th abdominal segment. The dorsal portion of the 10th abdominal segment of the genus *Trichocera* is considered to be occupied partly by a pair of L-shaped or triangular sclerites just posterior to the 9th tergum in generalized condition. The anterior margin of L-shaped or triangular sclerite is associated with the posterior margin of the 9th tergum, and the lateral portion is usually associated with the dorsoproximal portion of gonocoxite, especially the base of dorsal gonocoaxal bridge. The membranous portion including these sclerites is usually flexed and sunk (telescoped) under the 9th tergum in most of dried, or macerated specimens, and the element of the 10th segment is not observable in dorsal aspect. This generalized condition is widely represented in various species of the genus *Trichocera*, and also in genera *Paracladura* and *Diazosma* as far as known, and consequently this condition can be regarded as plesiomorphic as stated in the preceding section.

T. truncata, *bifurcata*, *crassicauda* and *monstrosa* have a dorsal sclerotized area just posterior to the 9th tergum, and partly fused with it, and this sclerotized area projects into a pair of glabrous processes various in shape, and has a close relationship with dorsoproximal portions of the gonocoxites. We homologize this sclerotized area with a pair of dorsal sclerites and their basal area of the 10th segment. This kind of sclerotization is found only in these four species in the Japanese species. The resemblance of characters of this structure among the four species and the restricted distribution of this structure confined to them strongly suggest this resemblance is synapomorphic to them. Thus, we infer a monophyletic group comprising these four species.

(b) Relationship between *truncata* and *bifurcata*. As stated above, *truncata* and *bifurcata* have a pair of glabrous processes of the 10th segment. The character states of the sclerotization of the dorsal portion of the 10th abdominal segment are similar to each other in the two species as follows. The area between the glabrous sclerites is wide and flat, more or less membranous on upper surface and weakly sclerotized on under surface, and the anus opens on posterior portion of upper surface. In addition to this apomorphic condition, the structure of the ventral gonocoaxal bridge and the bifurcate gonostylus with a very long subbasal process almost as long as the main part of the gonostylus are shared by the two species. The reduction or obliteration of the crossvein of discal

cell in the wing is another synapomorphic feature between the two species. We consider that the two have a sister species relationship with each other based on these four synapomorphic character states. *T. truncata* is more apomorphic than *bifurcata* in the very wide truncate ventral gonocoxal bridge, while *bifurcata* is more apomorphic in the shortened and lamellate parameres.

(c) Relationship between *crassicauda* and *monstrosa*. These two species share many derived conditions of the male genitalic structure. The area between a pair of dorsal sclerotizations of the 10th abdominal segment is complicated, often represented by a single or paired anterodorsal lobes, and paired, black pigmented areas below the anus. The subventral formations on posterior margin, and the complicated concavity on dorsal surface of the ventral gonocoxal bridge in the two species are very similar to each other. Moreover, the basic structure of the gonostylus is quite the same in detail between the two, and is also unique to them. Based on this evidence, we convincingly assume that they undoubtedly constitute a monophyletic group. *T. monstrosa* represents the specialized sister species, as almost all the male genitalic characters of this species are apomorphic to those of *crassicauda*; i.e. *monstrosa* has a pair of small lobules on the anterior margin of the 9th tergum, the sublateral processes of the 9th abdominal tergum are larger and rectangular, the subventral process of the ventral gonocoxal bridge is more elaborate and is bird-head shaped, etc. The dorsomedian prolongation of the 8th abdominal tergum in *crassicauda* is one of a few characters apomorphic to *monstrosa*. The geographical distributions of these two species, Hokkaido of *monstrosa* and northern Honshu of *crassicauda*, suggest the vicariant speciation of the two species.

(d) Relationship between *gigantea* and *mackenzie*. Judging from the published illustrations and descriptions of the male genitalia, *T. gigantea* and *mackenzie* are extremely similar to each other in the structure of the gonostylus; i.e. gonostylus with a long basal process erected and directing mesially and sharply pointed apically, and the ventral gonocoxal bridge is enormously developed. These two character states seem to be unique to them. The latter character is much more apomorphic in *mackenzie* than in *gigantea*.

(e) Phylogenetic position of other Japanese species. Japanese species of *Metatrachocera* other than those mentioned above are each very peculiar in having unique apomorphies. *T. chaetopyga* has curious modifications of the 9th to 10th abdominal terga; i.e. the dorsomedian portion of the 9th abdominal tergum produced posteriorly into a slender

process, which bears a pair of spine-like lateral processes, is associated with a pair of ordinary dorsal sclerites of the 10th abdominal segment, and is connected with a tongue-shaped dorsomedian sclerite of the 10th segment. While the general shape of the gonostylus of *chaetopyga* somewhat resembles that of *T. colei* Alexander, 1919, from North America, the two species seem to be much different in other male genitalic structures.

T. corallifera has the male genitalia as a whole arranged rather vertically, not parallel, to the body axis; the gonostylus is unique in having two peculiar coral-like processes, and the ventral gonocoxal bridge is extraordinarily compressed like a sword. A similar specialization is found in *T. inexplorata* (Dahl, 1967) from Europe. *T. corallifera* is also unique in having the female cerci evenly setose on the whole surface. In other species of *Metatrachocera*, the female cerci are clothed with setae only on the ventroproximal portion.

T. hypandrialis is rather slightly specialized in the male genitalia, but this species has two unique apomorphies; one is the posterior prolongation of the sternal region of the 9th abdominal segment and the other is the shape of the gonostylus. In this species, the gonostylus has an almost apical hook-like process and a small apical swelling, both of which are furnished with a patch of minute setulae. The prolongation of the 9th abdominal sternum is observed in *T. gigantea* and *mackenzie*, but the character states of *hypandrialis* and the other two species do not seem to have the same origin judging from the tendency of their specializations.

T. mirabilis and *cordata* are similar to each other in the elongate gonopods with apically bifurcate gonostylus. Otherwise they are rather primitive in the male genitalia in having the plesiomorphic male 10th abdominal segment. We are not convinced that the apical structure of the gonostylus is synapomorphic between the two species. *T. mirabilis* is extremely peculiar in having many macrotrichia on the wing membrane in addition to the veins on the outer portion of the wings. At present we do not have any idea on the origin of this unique distribution of the macrotrichia.

References

- Alexander,C.P. (1934) New or little-known Tipulidae from Eastern Asia (Diptera), XXI. *Phillip. J. Sci.*, 55: 19-60, 3 plts.
- Alexander,C.P. (1938) New or little-known Tipulidae from Eastern Asia (Diptera), XL. *Phillip. J. Sci.*, 67: 129-166, 3 plts.
- Alexander,C.P. and Alexander,M.M. (1967) A

- catalogue of the Diptera of the Americas south of the United States, 3 Family Trichoceridae (Petauristidae, Melusinidae) .: 3.1-3.4, Departamento de Zoologia, Secretaria de Agricultura do Estado de Sao Paulo, Sao Paulo.
- Bangerter, H. (1948) Neue Diptera nematocera. *Mitt. Schweiz. Ent. Ges.*, 21: 185-192.
- Dahl, C. (1957) Die Gattung *Trichocera* in Spitzbergen, Baereninsel und Jan Mayen (Dipt.). *Opusc. Ent.*, 22: 227-237.
- Dahl, C. (1966) Notes on the taxonomy and distribution of Swedish Trichoceridae (Dipt. Nemat.). *Opusc. Ent.*, 31: 93-118.
- Dahl, C. (1967a) Additional notes on the taxonomy and distribution of Swedish Trichoceridae (Dipt. Nemat.). *Opusc. Ent.*, 32: 188-200.
- Dahl, C. (1967b) Notes on the taxonomy and distribution of Arctic and Subarctic Trichoceridae (Dipt. Nem.) from Canada, Alaska and Greenland. *Opusc. Ent.*, 32: 49-78.
- Dahl, C. (1976) Description of three new species of Trichoceridae (Diptera, Nematocera) from northern Sweden and the Alps. *Ent. scand.*, 7: 59-65.
- Dahl, C. and Alexander, C.P. (1976) A world catalogue of Trichoceridae Kertész, 1902 (Diptera). *Ent. scand.*, 7: 7-18.
- Nakamura, T. (1995) New record of *Trichocera mirabilis* ALEXANDER (Diptera, Trichoceridae) from Japan. *Jpn. J. Ent.*, 63: 260.
- Nakamura, T. and Saigusa, T. (1996) Two New Species of *Trichocera (Metatrichocera)* (Diptera; Trichoceridae) from Japan. *Jpn. J. Ent.*, 64: 795-804.
- Nielsen, P. (1920) Description of *Trichocera forcipula* n. sp., with notes on *Limnophila meridiana* Staeg. *Ent. Med.*, 13: 160-162.
- Tokunaga, M. (1938) New or little-known Trichoceridae from Japan (Diptera). *Tenthredo*, 2: 137-148, 2 plts.
- Tokunaga, M. (1939) Family Tanyderidae, Family Ptychopteridae, Family Trichoceridae, Family Deuterophlebiidae. *Fauna Nipponica*, 10 (Fas. 7, No. 2): 1-126 (in Japanese).

Received: February 7, 1997

Accepted: February 25, 1997

CORRIGENDA

The editorial board would like to apologize for errors that occurred in this issue.

Nature and Human Activities, no.2

P. 91, Title

Immature stages of *Pseudregolis wedah* (Kollar, 1844) (Lepidoptera, Nymphalidae) should be read as;

Immature stages of *Pseuderゴolis wedah* (Kollar, 1844) (Lepidoptera, Nymphalidae)

+ ***Pseuderゴolis wedah*** +

P. 62, Figs. 1-8

Figures were printed incorrectly. The correct version appears below.

