



Three new species of the *Harnischia* complex from the Sino-Indian Region, with a review of *Demicryptochironomus* Lenz (Diptera: Chironomidae)

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Abstract

Three new species, *Demicryptochironomus (Irmakia) retusus*, *Microchironomus brochus*, and *Parachironomus lobus* are described and figured as males. *Demicryptochironomus (Demicryptochironomus) asamaprimus* Sasa et Hirabayashi, *D. (D.) chuzequartus* Sasa, *D. (D.) ginzancedeus* Sasa et Suzuki, *D. (D.) uresicarinus* Sasa, and *Demicryptochironomus clarilatus* (Guha et Chaudhuri) are re-examined based on type material. *Cryptotendipes inawabeceus* Sasa, Kitami et Suzuki, *C. tamacutus* Sasa and *Parachironomus harunasecundus* Sasa are transferred to *Demicryptochironomus* as new combinations. *Parachironomus inageheus* Sasa, Kitami et Suzuki is placed as a junior synonym of *Demicryptochironomus ginzancedeus* Sasa et Suzuki. The relationships of some genera within the *Harnischia* complex are discussed. A key to the males of *Demicryptochironomus* is presented.

Key words: Chironomidae, *Microchironomus*, *Parachironomus*, *Demicryptochironomus*, *Irmakia*, new species, key, Sino-Indian region

Introduction

The genera of the *Harnischia* complex are not all clearly delimited as imagines. While most species can be assigned to genus, several species apparently are intermediate between different genera. The immatures, however, mostly are distinctly different and can be easily assigned to genera.

Sæther (1977) gave keys to males, pupae and larvae of the *Harnischia* complex. Part of this key, especially for the males, needs reinterpretations and additions. Reiss (1988) split the genus *Demicryptochironomus* into two subgenera, *Demicryptochironomus s. str.* and *Irmakia* Reiss. Zorina (2007) erected the genus *Olecryptotendipes*. In the key by Sæther (1977) it is mentioned for *Demicryptochironomus* that the inferior volsella is absent, but that the superior volsella may be double giving the impression of two pairs of volsella. However, more recently described species show that there really is, although reduced, an inferior volsella in most members of the subgenus *Demicryptochironomus s. str.*, while the subgenus *Irmakia* lacks an inferior volsella. Thus the subgenus *Irmakia* will key to *Demicryptochironomus* in Sæther (1977), while most *Demicryptochironomus s. str.* will key near *Paracladopelma* Harnisch.

Other differences between the two subgenera, among others, consist in the presence of a Y-shaped anal tergite band in *Irmakia*, while *Demicryptochironomus s. str.* is without such a band. A Y-shaped anal tergite band also is present in several other members of the *Harnischia* complex and is a diagnostic character both for *Saetheria* Jackson (Jackson 1978) and *Olecryptotendipes* Zorina (Zorina 2007). According to Zorina the male of *Olecryptotendipes* is very similar to *Cryptotendipes* Lenz. However, we find that the general shape of the

hypopygium is more similar to that of some *Demicryptochironomus* (*Irmakia*) species such as *D. (I) neglectus* Reiss (Reiss 1988, fig. 4). Since *Olecryptotendipes* apparently has an inferior volsella the male will not key neither to *Cryptotendipes* nor to *Irmakia*, but close to *Paracladopelma* including *Saetheria*. The pupa keys to *Chernovskiiia* Sæther, the larva to “*Cryptochironomus*” sp. Pagast in Sæther (1977). However, ignoring the accessory body segments, the larval antenna, the 3-“segmented” labral sensilla, etc. show that *Olecryptotendipes* is more closely related to *Paracladopelma*, *Saetheria* and *Demicryptochironomus*. In fact the larval antenna of *Olecryptotendipes* cannot be distinguished from that of *Saetheria* sp. 1 as illustrated by Jackson (1978, fig. 34).

Three new species described here all have Y-shaped tergite bands and a shape of the hypopygium resembling some *Irmakia*. However, one of them is lacking frontal tubercles and have the apical setae of the superior volsella placed in distinct pits with additional apical tooth as in *Parachironomus* Lenz. Another new species have the apical tooth of the gonostylus typical for *Microchironomus*. Only the third species we tentatively place in the subgenus *Irmakia*.

The relationships between *Saetheria*, *Olecryptotendipes*, *Demicryptochironomus* and *Irmakia* need to be better elucidated, but this cannot be done without associated immatures.

Yan *et al.* (2005) revised the genus *Demicryptochironomus* from China and provided a key to the males of the world, comprising 22 species: 11 Palaearctic, 3 Nearctic, 5 Oriental, 2 Afrotropical and 1 Australasian. Freeman (1961) recorded *Chironomus* (*Cryptochironomus*) *curtivalva* Kieffer from Australia. Sæther (1977) and Yan *et al.* (2005) incorrectly placed this species in *Demicryptochironomus*. According to Carew *et al.* (2005) and Cranston and Martin (1989), it belongs in the genus *Cladopelma*. Thus, so far no species of *Demicryptochironomus* is recorded from the Australasian region.

Prior to this study, 19 species of *Demicryptochironomus* have been reported from the Sino-Indian region: 1 from Nepal, 2 from India, 4 from Japan, 7 from the Russian Far East, and 9 from China (Chaudhuri *et al.* 2001; Makarchenko *et al.* 2005; Reiss 1988; Sasa & Kikuchi 1995; Sasa & Suzuki 2001; Wang 2000; Wang & Zheng 1994; Yan *et al.* 2005; Yan & Wang 2006). Yan *et al.* (2005) suggested that 5 Japanese species originally placed in the genus *Cryptotendipes* by Sasa and his co-authors should be transferred to *Demicryptochironomus*. Yan and Wang (2006) transferred the Indian species *Microchironomus clarilatus* Guha *et* Chaudhuri to *Demicryptochironomus*.

Based on re-examination of type material *Cryptotendipes inawabeceus* Sasa, Kitami *et* Suzuki, *C. oyabeprimus* Sasa, Kawai *et* Ueno and *C. tamacutus* Sasa are here formally transferred to *Demicryptochironomus* as new combinations. *Cryptotendipes inawaabeus* Sasa, Kitami *et* Suzuki should be placed in the genus *Cladopelma* as a new junior synonym of *Cladopelma edwardsi*. *Cryptotendipes irioabeus* Sasa *et* Suzuki is tentatively kept in the genus *Demicryptochironomus* since the type material is unavailable.

We also re-examined holotypes of the genus *Parachironomus* from Japan. *P. inageheus* Sasa, Kitami *et* Suzuki and *P. harunasecundus* Sasa both should be transferred to *Demicryptochironomus* since they are lacking a distinct preapical tooth and conspicuous setal pits on the superior volsella; characters of the superior volsella, gonostylus and the anal tergite all fit the diagnosis of *Demicryptochironomus*. *Parachironomus inageheus* is a new junior synonym of *Demicryptochironomus ginzancedeus* Sasa *et* Suzuki.

So far there are 24 species of *Demicryptochironomus* recorded from the Sino-Indian region including the new species described in this paper. A revised key to the males of *Demicryptochironomus* of the world is provided.

Material and methods

The material examined was mounted on slides following the procedure outlined by Sæther (1969). The morphological nomenclature follows Sæther (1980) with the additions and corrections given by Sæther (1990).

Measurements are given as ranges followed by the mean when more than 3 specimens were measured, followed by the number measured (n) in parentheses.

The Sino-Indian region includes the whole of the traditional Oriental region and the southeastern parts of the Palaearctic region (Banarescu 1992).

Type material studied is housed in the following institutions: Wang collection, Department of Biology, Life Science College, Nankai University, Tianjin, China (BDN); Shinohara collection, National Science Museum, Tokyo, Japan (NSM); and Chaudhuri and Mazumdar collection, Entomological laboratory, Burdwan University, India (EB).

Key to the males of *Demicryptochironomus* Lenz

1. Anal tergite bands V- or U-shaped; superior volsella digitiform or bilobed, with or without microtrichia; minute inferior volsella present or absent; gonostylus banana-shaped, without median constriction (subgenus *Demicryptochironomus*).....2
- Anal tergite bands Y-shaped; superior volsella digitiform or racquet-shaped, never bilobed; inferior volsella absent; gonostylus constricted medially (subgenus *Irmakia*)17
2. Inferior volsella present3
- Inferior volsella absent..... 11
3. Gonostylus without conspicuous longitudinal keel; anal point strongly swollen medially. Sino-Indian.
..... *D. (D.) minus* Yan, Tang *et* Wang, 2005
- Gonostylus with distinct longitudinal keel; anal point falciform or nearly parallel-sided4
4. Inferior volsella bare. Palaearctic, Sino-Indian *D. (D.) inawabeceus* (Sasa, Kitami *et* Suzuki, 1999)
- Inferior volsella with setae and/or microtrichia.....5
5. Inferior volsella sheet-shaped, without setae, and covered entirely with microtrichia.....6
- Inferior volsella tubercle-shaped or lobe-shaped, with setae, covered with microtrichia basally or without microtrichia.....7
6. Gonostylus rounded apically; superior volsella thumb-like. Palaearctic, Sino-Indian.....
..... *D. (D.) asamaprimus* Sasa *et* Hirabayashi, 1991
- Gonostylus pointed apically; superior volsella with 1–3 tubercles. Palaearctic, Sino-Indian
..... *D. (D.) tamacutus* (Sasa, 1983)
7. Inferior volsella without microtrichia.....8
- Inferior volsella with microtrichia9
8. Inferior volsella with 1–2 large, even tubercles, bearing 2 apical setae. Palaearctic, Sino-Indian
..... *D. (D.) chuzequartus* Sasa, 1984
- Inferior volsella widened at base, with small lateral projection, bearing 1 apical and 1 subapical seta. Palaearctic, Sino-Indian..... *D. (D.) harunasecundus* (Sasa, 1996)
9. Gonostylus nearly straight; inferior volsella lobe-like, with microtrichia in basal 2/3. Palaearctic, Sino-Indian *D. (D.) ginzancedeus* Sasa *et* Suzuki, 2001
- Gonostylus bent medially or in apical 1/3; inferior volsella tubercle-like, with microtrichia at base.10
10. Anal point parallel-sided; superior and inferior volsella subequal in length, neither surpassing margin of gonostylus; HR 1.75–1.80. Palaearctic, Sino-Indian..... *D. (D.) evgenii* Zorina, 2004
- Anal point widened at apical 1/3, superior volsella 1.88–2.00 times longer than inferior volsella, both surpassing margin of gonostylus, HR 1.00. Palaearctic, Sino-Indian *D. (D.) lutoga* Zorina, 2004
11. Superior volsella with single long seta. Palaearctic, Sino-Indian..... *D. (D.) uresicarinus* Sasa, 1989
- Superior volsella with at least two long setae.....12
12. Base of anal point with shoulders making base subrectangular. Afrotropical.....

	<i>D. (D.) zairensis</i> Lehmann, 1979	
- Base of anal point triangular.....		13
13. Gonostylus nearly without longitudinal keel.....		14
- Gonostylus with strong longitudinal keel.....		16
14. Superior volsella covered with microtrichia. Sino-Indian.....	<i>D. (D.) antennarius</i> Yan, Tang <i>et</i> Wang, 2005	
- Superior volsella without microtrichia.....		15
15. Anal point with median ridges covered with microtrichia. Sino-Indian.....		
	<i>D. (D.) yui</i> Yan, Tang <i>et</i> Wang, 2005	
- Anal point bare, without median ridges. Palaearctic, Sino-Indian ...	<i>D. (D.) irioabeus</i> Sasa <i>et</i> Suzuki, 2000	
16. Superior volsella patch-like, not reaching margin of gonostylus; gonostylus nearly parallel-sided. Sino-Indian.....	<i>D. (D.) pannus</i> Yan, Tang <i>et</i> Wang, 2005	
- Superior volsella digitiform, extending to margin of gonostylus; gonostylus curved inwards. Palaearctic, Sino-Indian.....	<i>D. (D.) vulneratus</i> (Zetterstedt, 1838)	
17. Superior volsella without setae. Sino-Indian.....	<i>D. (I.) clarilatus</i> (Guha <i>et</i> Chaudhuri, 1981)	
- Superior volsella with setae.....		18
18. Tergite IX with shoulder-like posterior margin.....		19
- Tergite IX with cone-shaped posterior margin.....		20
19. Superior volsella digitiform, with 2 apical setae; anal point nearly parallel-sided. Afrotropical.		
	<i>D. (I.) cinereithorax</i> Goetghebuer, 1934	
- Superior volsella spatulate, with 3 subapical setae, anal point strongly constricted medially. Sino-Indian ..		
	<i>D. (I.) retusus</i> sp. n.	
20. AR 3.25; base of anal point large, about 2/3 as long as anal point. Holarctic.....		
	<i>D. (I.) cuneatus</i> (Townes, 1945)	
- AR 1.14–2.64; base of anal point small, less than 1/2 as long as anal point.....		21
21. Base of anal point not constricted; anal point parallel-sided or conical.....		22
- Base of anal point constricted; anal point spatulate.....		25
22. Superior volsella swollen distally, with subapical setae.....		23
- Superior volsella parallel-sided, with apical setae.....		24
23. AR 1.63; gonostylus with strong inner concavity in apical 1/3; superior volsella with 2 setae. Palaearctic, Sino-Indian.....	<i>D. (I.) concavus</i> Yan, Tang <i>et</i> Wang, 2005	
- AR 2.27; gonostylus with weak inner concavity in apical 1/3, superior volsella with 3 setae. Palaearctic, Sino-Indian.....	<i>D. (I.) oyabeprimus</i> (Sasa, Kawai <i>et</i> Ueno, 1988)	
24. Gonostylus with basal projection and rounded apex. Palaearctic, Sino-Indian.....		
	<i>D. (I.) neglectus</i> (Reiss, 1988)	
- Gonostylus without basal projection and pointed apex. Holarctic, Sino-Indian.....		
	<i>D. (I.) fastigatus</i> (Townes, 1945)	
25. Superior volsella narrow, digitiform, pointed, with 1 median lateral seta and 1 subapical seta. Sino-Indian.....		
	<i>D. (I.) banepae</i> (Reiss, 1988)	
- Superior volsella cylindrical or swollen distally, with 2–3 subapical or apical setae.....		26
26. Superior volsella cylindrical with 2 apical setae.....		27
- Superior volsella racket-like, swollen at apex, with 2 subapical setae.....		28
27. Ridges on base of anal point with lateral setae; gonostylus strongly curved in apical 1/3; AR 2.32; LR ₁ 1.93. Sino-Indian.....	<i>D. (I.) constrictus</i> Yan, Tang <i>et</i> Wang, 2005	
- Ridges on base of anal point without lateral setae; gonostylus weakly curved in apical 1/3; AR 1.41–1.62; LR ₁ 1.60–1.69. Palaearctic.....	<i>D. (I.) schachti</i> Reiss, 1988	
28. Anal point strongly swollen medially, ridges with lateral setae; AR 2.03; LR ₁ 1.86–2.08. Sino-Indian.....		
	<i>D. (I.) spatulatus</i> Wang <i>et</i> Zheng, 1994	

- Anal point slightly swollen medially, ridges without lateral setae; AR 1.43-1.56; LR₁ 1.71–1.72. Palearctic *D. (I.) latior* Reiss, 1988

Subgenus *Demicryptochironomus* Lenz

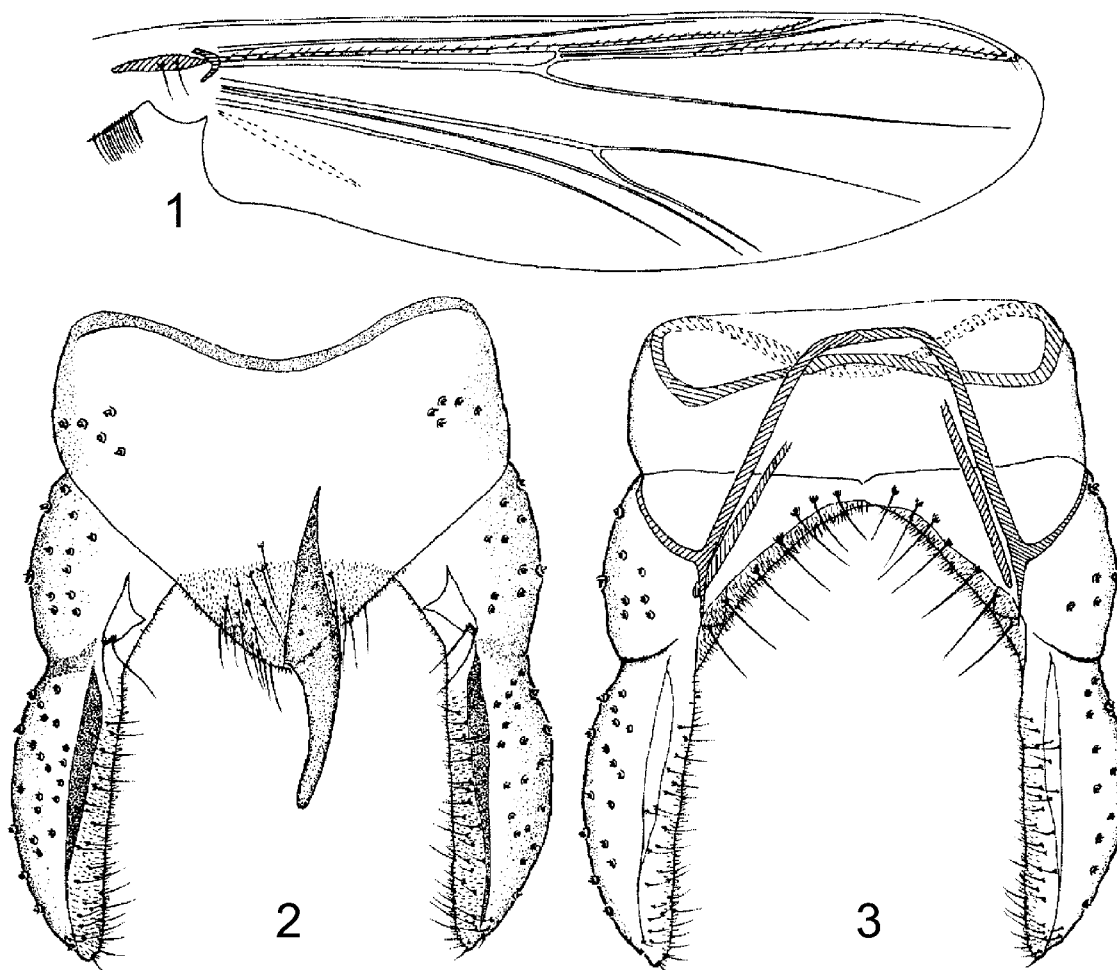
***Demicryptochironomus (Demicryptochironomus) asamaprimus* Sasa et Hirabayashi**

(Figs 1–3)

Demicryptochironomus asamaprimus Sasa et Hirabayashi, 1991: 117; Sasa and Okazawa (1991a: 53); Sasa and Okazawa (1991b: 106); Sasa (1993: 82).

Material examined. Holotype male (NSM No. 203: 71, misprinted as No. 203: 74 in the original paper), JAPAN: Nagano Prefecture, Asama-Onsen in the suburbs of Matsumoto City, 17.v.1990, light trap.

Diagnostic characters. The species can be separated from other members of the subgenus by the thumb-like superior volsella with 2 setae; reduced inferior volsella with microtrichia; prominent frontal tubercles; and AR of about 2.5.



FIGURES 1–3. *Demicryptochironomus (Demicryptochironomus) asamaprimus* Sasa et Hirabayashi, 1991, holotype male. 1—wing; 2—hypopygium, dorsal view; 3—hypopygium, ventral view.

Male (Figs 1–3). As in Sasa and Hirabayashi (1991: 117) with the following corrections and additions: AR 2.51. Brachiolum with 2 setae, R with 21 setae, R₁ with 20 setae, R₄₊₅ with 22 setae. Midleg without sen-

silla chaetica. Tergite IX with 34 setae. Laterosternite IX with 5 setae. Anal tergite bands V-shaped. Phallopodeme 118 μm long. Transverse sternapodeme 82 μm long. Inferior volsella sheet-shaped, covered with microtrichia. Gonocoxite 128 μm long, inner margin with 7 strong setae. Gonostylus 193 μm long, swollen medially, tapering towards apex, inner margin with 20 setae. HR 0.66; HV 2.45.

Distribution. The species is recorded from Japan.

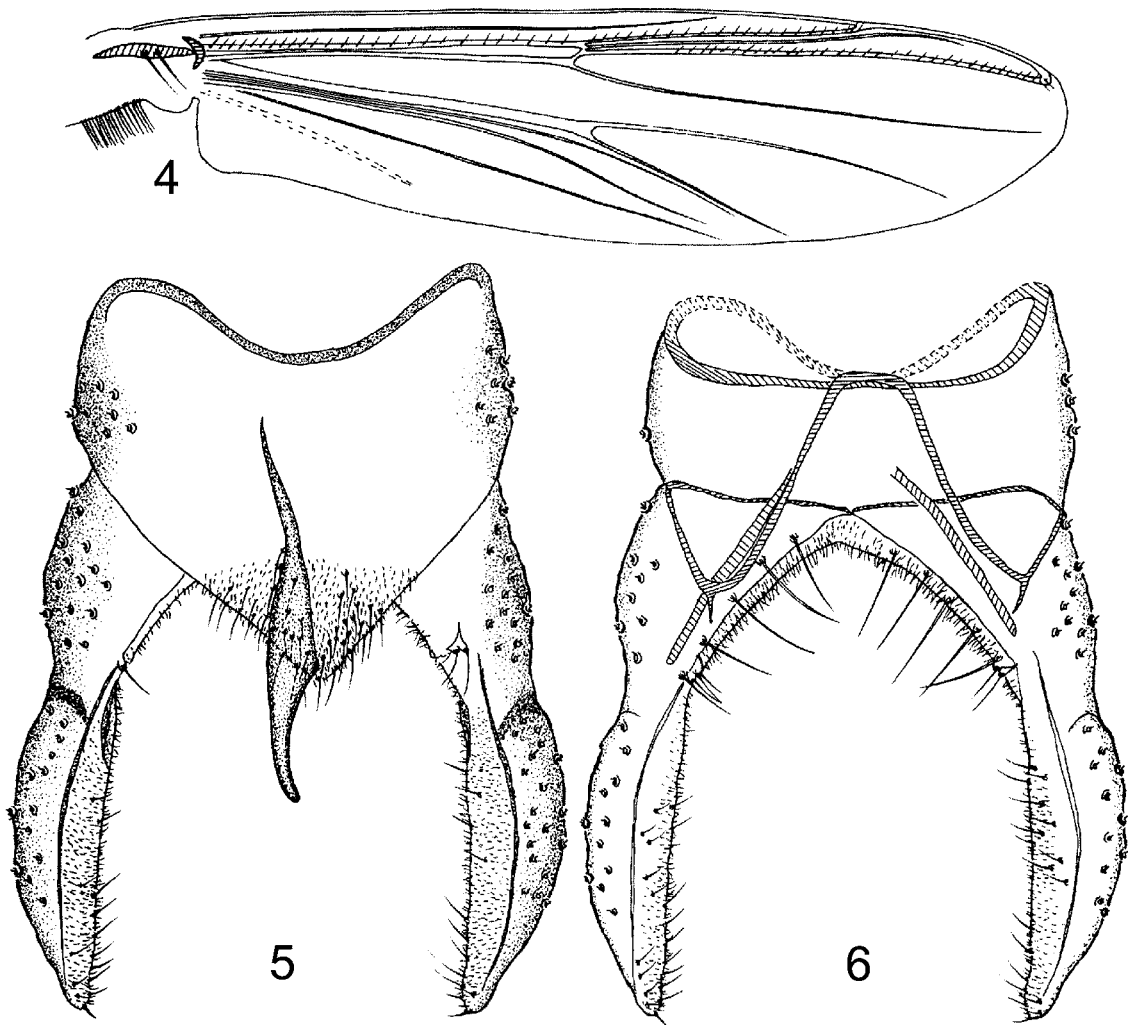
Demicryptochironomus (Demicryptochironomus) chuzequartus Sasa

(Figs 4–6)

Demicryptochironomus chuzequartus Sasa, 1984: 47; Sasa (1985: 111, 1989: 70); Zorina (2004: 225); Makarchenko *et al.* (2005: 409).

Material examined. Holotype male (NSM No. A 39: 96), **JAPAN:** Lake Chuzenji, 28.iv.1979, M. Sasa.

Diagnostic characters. The species can be distinguished by the following combination of characters: AR 2.93; LR₁ 1.60; frontal tubercles prominent; both superior and inferior volsella tubercle-like, with 1–3 setae, lacking microtrichia.



FIGURES 4–6. *Demicryptochironomus (Demicryptochironomus) chuzequartus* Sasa, 1984, holotype male. **4**—wing; **5**—hypopygium, dorsal view; **6**—hypopygium, ventral view.

Male (Figs 4–6). As in Sasa (1984: 47) with the following corrections and additions: Brachiolum with 2 setae, R with 26 setae, R_1 with 22 setae, R_{4+5} with 34 setae. Mid ta_1 with 3 sensilla chaetica. Tergite IX with 39 setae. Laterosternite IX with 7 setae. Anal tergite bands V-shaped. Phallapodeme 108 μm long. Transverse sternapodeme 48 μm long. Superior volsella with 1–2 setae, without microtrichia. Inferior volsella with 2–3 setae, without microtrichia. Gonocoxite 183 μm long, inner margin with 5 strong setae. Gonostylus 235 μm long, swollen medially, tapering towards apex, inner margin with 12 setae. HR 0.78; HV 2.63.

Remarks. Without examining type material, Dutta *et al.* (1996) proposed that *D. chuzequartus* Sasa is as a synonym of *Demicryptochironomus vulneratus* (Zetterstedt). However, according to our examination the species should be retained as a valid species.

Zorina (2004) recorded the species from Sakhalin Island, Russia. The Russian specimens have the superior volsella covered with microtrichia, and the inferior volsella can be strongly reduced or absent.

Distribution. The species is recorded from Japan and the Russian Far East.

Demicryptochironomus (Demicryptochironomus) ginzancedeus Sasa et Suzuki

(Figs 7–12)

Demicryptochironomus ginzancedeus Sasa et Suzuki, 2001: 11.

Parachironomus inageheus Sasa, Kitami et Suzuki 2002: 6. **Syn. n.**

Material examined. Holotype male of *Demicryptochironomus ginzancedeus* Sasa et Suzuki (NSM No. 403: 10), **JAPAN:** Hokkaido, Ginzan, 2.ix.2000, light trap, H. Suzuki. Holotype male of *Parachironomus inageheus* Sasa, Kitami et Suzuki (NSM No. 402: 63), **JAPAN:** Inawashiro Lake, 21.ix.2000, light trap, K. Kitami.

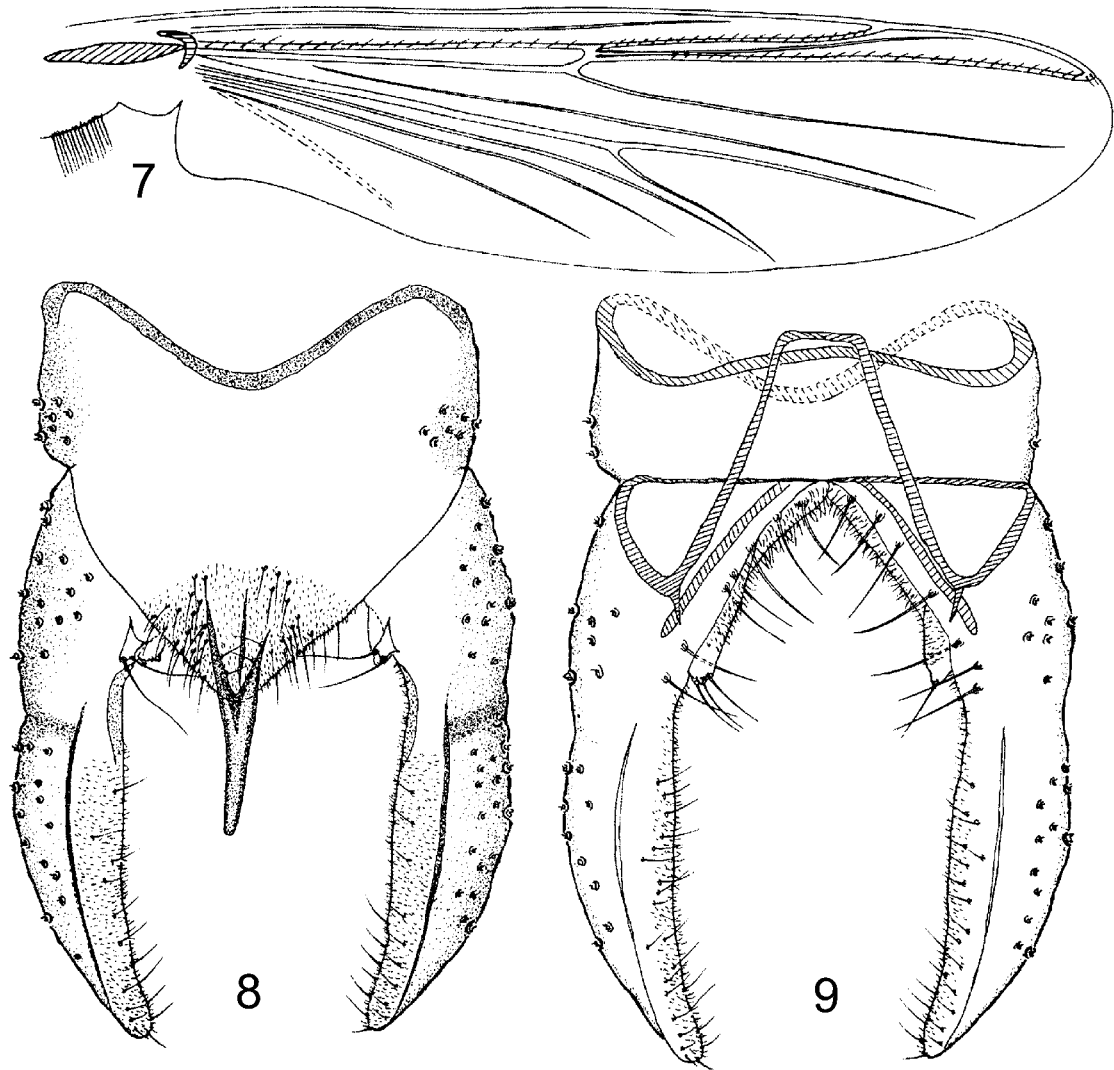
Diagnostic characters. The species is easily distinguished from other known species of the genus by having inferior volsella with bare caudal projection with 1–3 setae; digitiform superior volsella with 2 setae, and prominent frontal tubercles.

Male (Figs 7–9). As in Sasa and Suzuki (2001: 11) with the following corrections and additions: Frontal tubercles absent. R with 22 setae, R_1 with 21 setae, R_{4+5} with 32 setae. Midleg without sensilla chaetica. Tergite IX with 41 setae. Laterosternite IX with 7 setae. Anal tergite bands V-shaped. Phallapodeme 130 μm long. Transverse sternapodeme 45 μm long. Superior volsella digitiform, with 2 setae. Inferior volsella covered with microtrichia in basal 1/2, with bare caudal projection with 1–3 long setae. Gonocoxite 150 μm long, inner margin with 7 strong setae. Gonostylus 200 μm long, swollen basally, tapering towards apex, inner margin with 11 setae. HR 0.75; HV 2.43.

Remarks. We also re-examined the holotype male of *Parachironomus inageheus* Sasa, Kitami et Suzuki. The description of the male is as in Sasa *et al.* (2002: 6) with the following corrections and additions: R with 27 setae, R_1 with 22 setae, R_{4+5} with 35 setae. Mid ta_1 with 2 sensilla chaetica. Tergite IX with 29 setae. Laterosternite IX with 5 setae. Anal tergite bands V-shaped. Phallapodeme 87 μm long. Transverse sternapodeme 41 μm long. Superior volsella digitiform, with 1 apical seta and 1 subapical seta. Inferior volsella covered with microtrichia in basal 1/2, with bare caudal projection with 1–2 long setae. Gonocoxite 145 μm long, inner margin with 5 strong setae. Gonostylus 210 μm long, swollen basally, tapering towards apex, inner margin with 17 setae. HR 0.69; HV 2.30. Wing and hypopygium as in Figs 10–12.

Parachironomus inageheus Sasa, Kitami et Suzuki should be transferred to *Demicryptochironomus*. *Parachironomus* species have a distinct preapical tooth and conspicuous setal pits on the superior volsella, while *P. inageheus* is lacking both. The species is identical to *Demicryptochironomus ginzancedeus* Sasa et Suzuki in most characters except for the presence of frontal tubercles and sensilla chaetica on midleg. We consider this as intraspecific variation and thus place *Parachironomus inageheus* as a junior synonym of *Demicryptochironomus ginzancedeus* Sasa et Suzuki.

Distribution. The species is recorded from Japan.



FIGURES 7–9. *Demicryptochironomus (Demicryptochironomus) ginzancedeus* Sasa et Suzuki, 2001, holotype male. 7—wing; 8—hypopygium, dorsal view; 9—hypopygium, ventral view.

***Demicryptochironomus (Demicryptochironomus) harunasecundus* (Sasa) comb. n.**
(Figs 13–15)

Parachironomus harunasecundus Sasa, 1996: 95.

Material examined. Holotype male (NSM No. 291: 11), **JAPAN:** Gunma Prefecture, Haruna Lake, 25.ix.1994, light trap, M. Sasa.

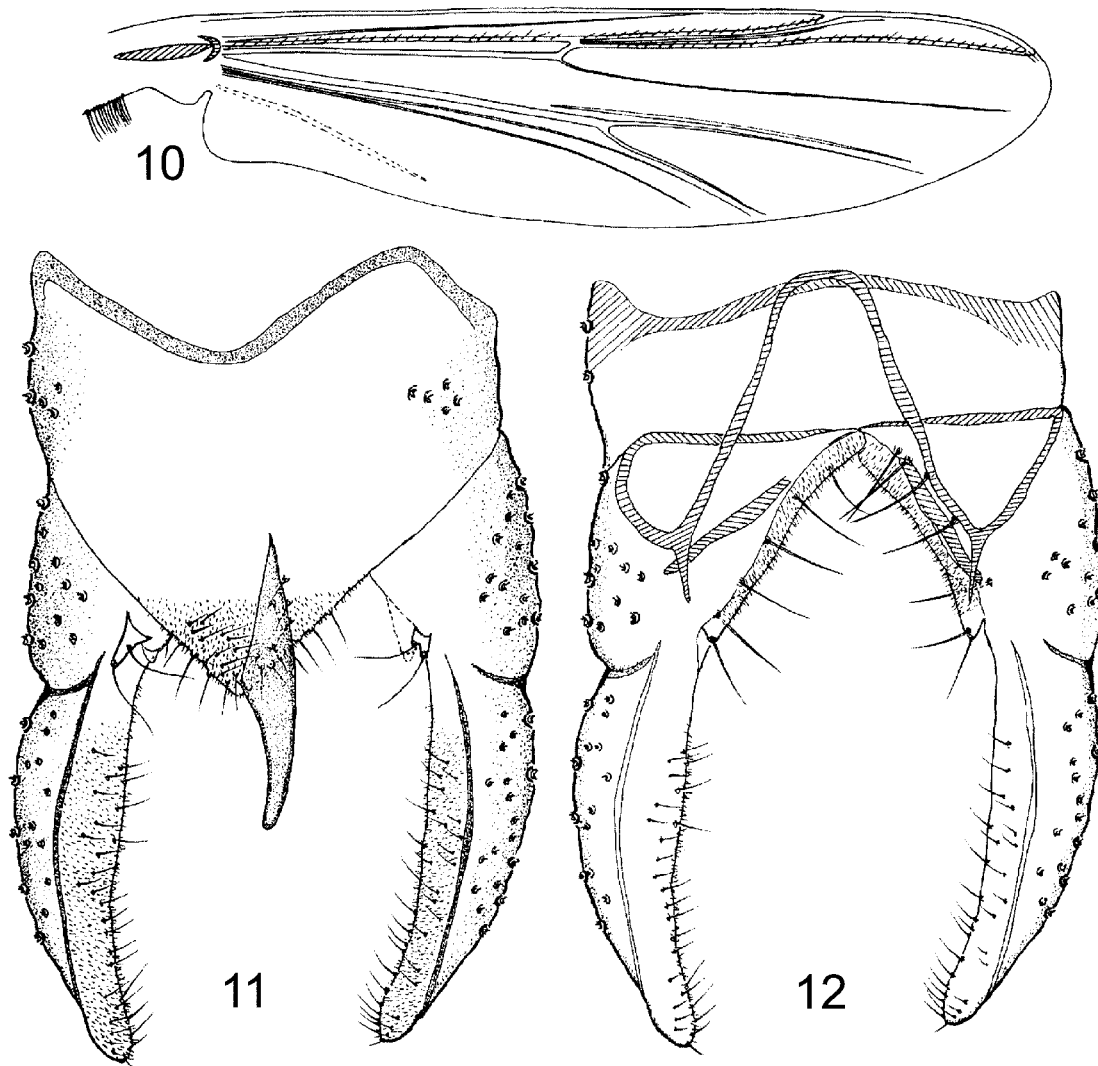
Diagnostic characters. The species closely resembles *Demicryptochironomus ginzancedeus* Sasa et Suzuki in the shape of the superior volsella. It differs in having a bare inferior volsella with lateral projection with single apical seta.

Male (Figs 13–15). As in Sasa (1996: 95) with the following corrections and additions: R with 24 setae, R₁ with 20 setae, R₄₊₅ with 32 setae. Midleg without sensilla chaetica. Tergite IX with 35 setae. Laterosternite IX with 4 setae. Anal tergite bands V-shaped. Phallapodeme 90 µm long. Transverse sternapodeme 30 µm long. Inferior volsella lacking microtrichia, with 1 apical seta, with lateral projection with 1 apical seta. Gono-

coxite 138 μm long, inner margin with 6 strong setae. Gonostylus 188 μm long, swollen midially, tapering towards apex, inner margin with 13 setae. HR 0.73; HV 2.13.

Remarks. The holotype of *Parachironomus harunasecundus* Sasa do not have a distinct apical tooth and conspicuous setal pits on the superior volsella. The characters of the superior volsella, gonostylus and the anal tergite are consistent with the diagnosis of *Demicryptochironomus*. The species is thus transferred to *Demicryptochironomus* as a new combination.

Distribution. The species is recorded from Japan.

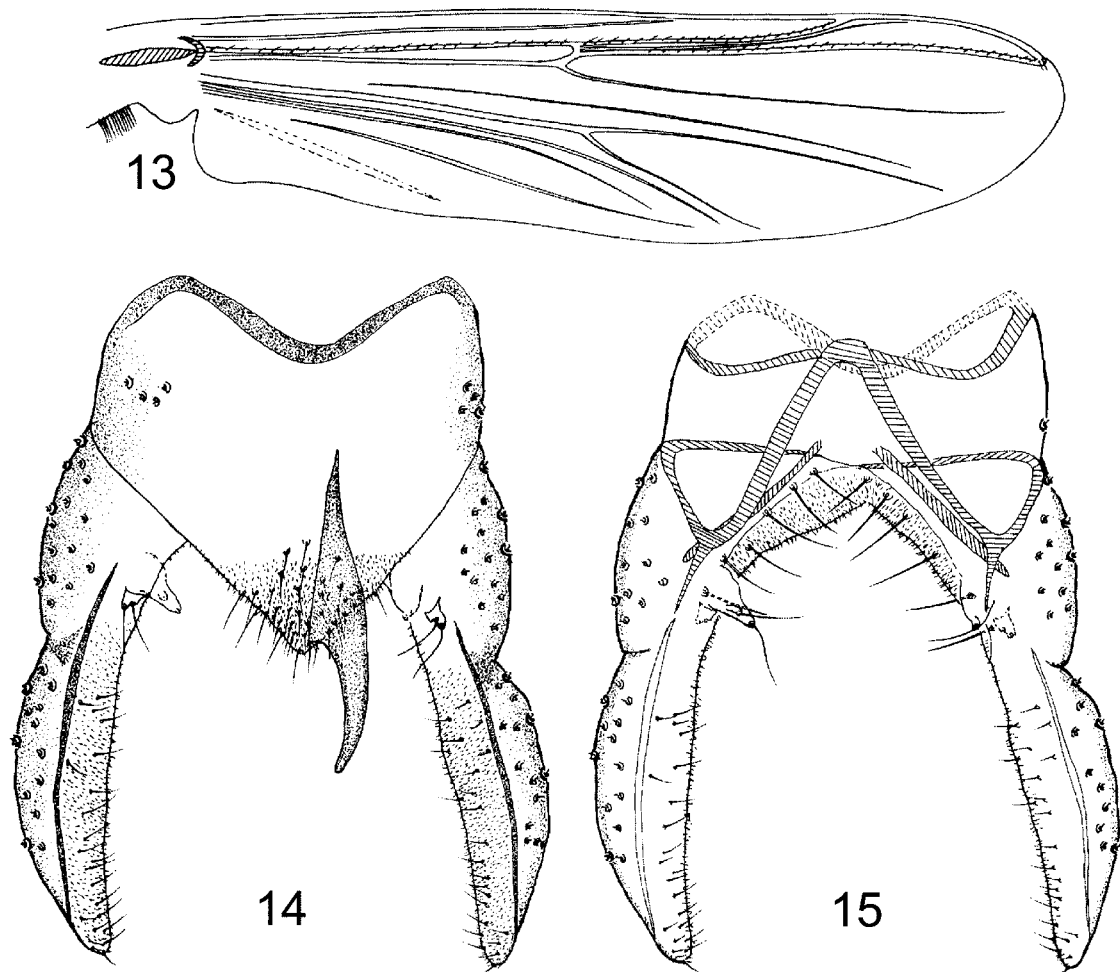


FIGURES 10–12. *Parachironomus inageheus* Sasa, Kitami *et* Suzuki, 2001, syn. n., holotype male. **10**—wing; **11**—hypopygium, dorsal view; **12**—hypopygium, ventral view.

Demicryptochironomus (Demicryptochironomus) inawabeceus (Sasa, Kitami *et* Suzuki) comb. n.
(Figs 16–18)

Cryptotendipes inawabeceus Sasa, Kitami *et* Suzuki, 1999: 9; Yan *et al.* (2005: 27).

Material examined. Holotype male (NSM No. 389: 54), **JAPAN:** Fukushima Prefecture, Inawashiro Lake, 20.viii.1999, light trap and sweep net, K. Kitami.



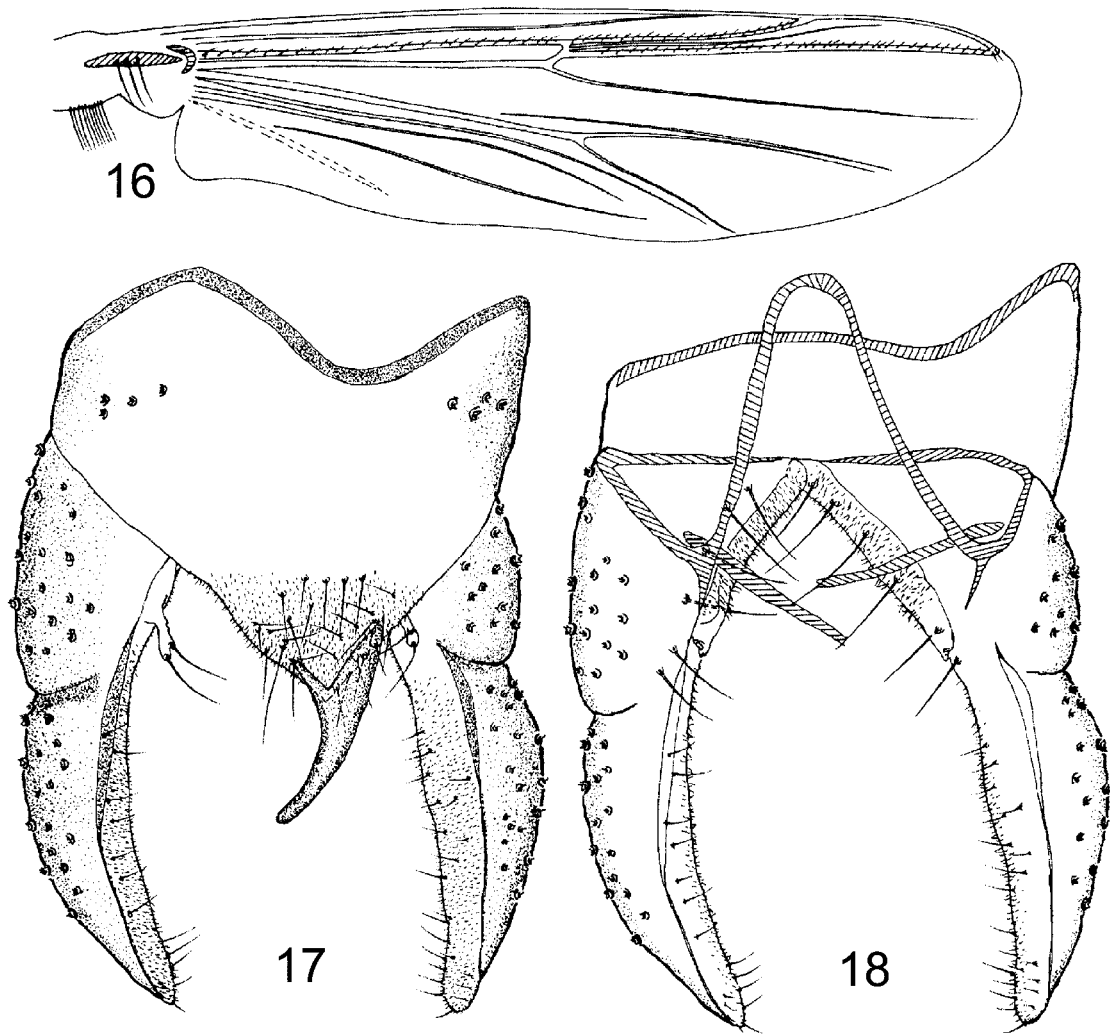
FIGURES 13–15. *Demicryptochironomus (Demicryptochironomus) harunasecundus* (Sasa, 1996) comb. n., holotype male. 13—wing; 14—hypopygium, dorsal view; 15—hypopygium, ventral view.

Diagnostic characters. The species is similar to *Demicryptochironomus vulneratus* (Zetterstedt) in having a digitiform superior volsella, but differs in having a bare inferior volsella.

Male (Figs 16–18). As in Sasa *et al.* (1999: 9) with the following corrections and additions: AR 2.91. Brachiolum with 3 setae, R with 24 setae, R_1 with 22 setae, R_{4+5} with 36 setae. Mid ta_1 with 3 sensilla chaetica. Tergite IX with 26 setae. Laterosternite IX with 4 setae. Anal tergite bands V-shaped. Phallapodeme 98 μm long. Transverse sternapodeme 35 μm long. Gonocoxite 150 μm long, inner margin with 6 strong setae. Gonostylus 190 μm long, swollen in basal 1/3, tapering towards apex, inner margin with 12 setae. HR 0.79; HV 2.64.

Remarks. Yan *et al.* (2005) suggested that the species should be placed in *Demicryptochironomus* based on the original description and figures. After re-examining the holotype, we confirm this formally. The genus *Cryptotendipes* differs from *Demicryptochironomus* in having an inner expansion on the base of the gonostylus.

Distribution. The species is recorded from Japan.



FIGURES 16–18. *Demicryptochironomus (Demicryptochironomus) inawabeceus* (Sasa, Kitami *et* Suzuki, 1999) comb. n., holotype male. **16**—wing; **17**—hypopygium, dorsal view; **18**—hypopygium, ventral view.

***Demicryptochironomus (Demicryptochironomus) tamacutus* (Sasa) comb. n.**
(Figs 19–21)

Cryptotendipes tamacutus Sasa, 1983: 6; Yan *et al.* (2005: 27).

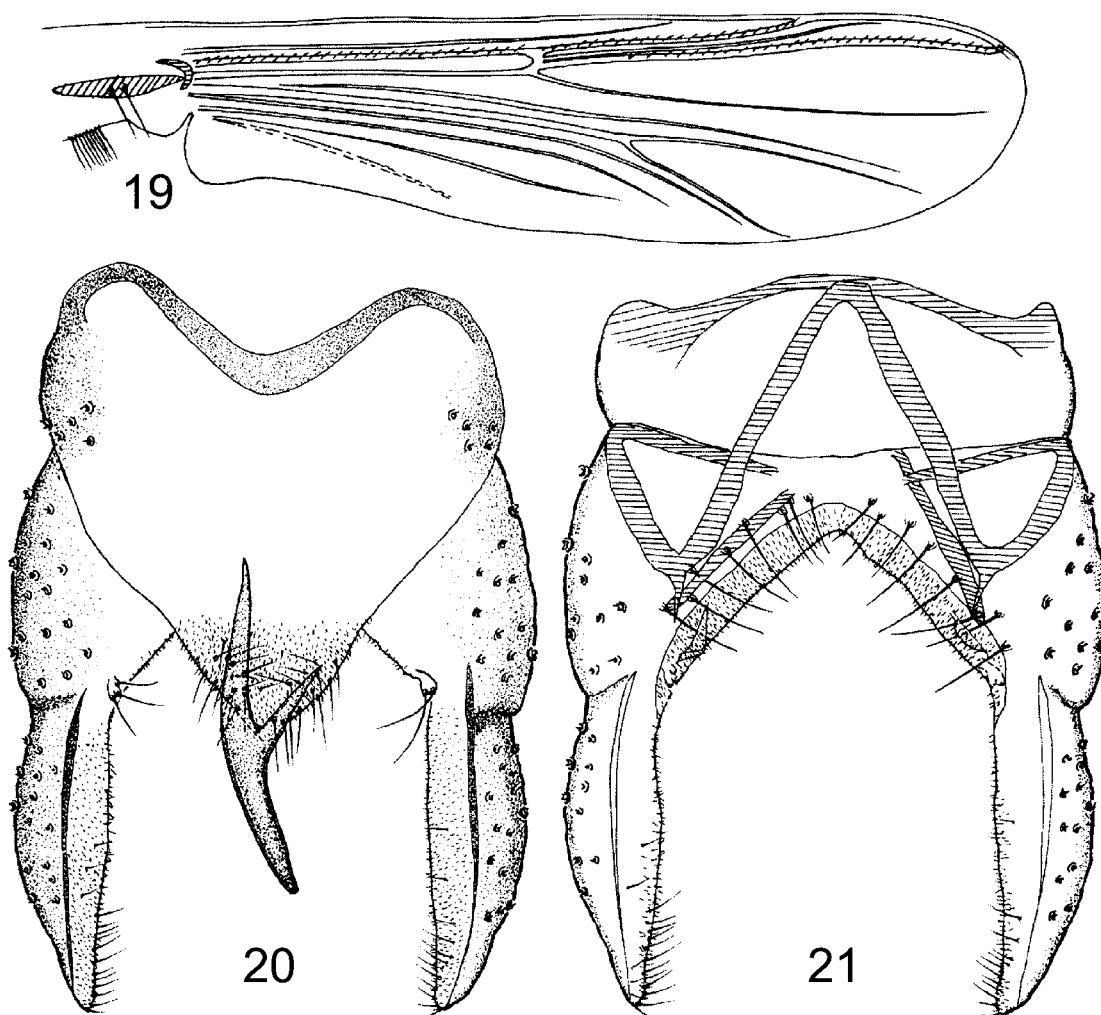
Material examined. Holotype male (NSM No. 67: 21), **JAPAN:** Tama River, Okutama, 26.vi.1981.

Diagnostic characters. The species is similar to *Demicryptochironomus asamaprimus* Sasa *et* Hirabayashi in having a sheet-shaped inferior volsella covered by microtrichia. It can be separated on the tubercle-like superior volsella.

Male (Figs 19–21). As in Sasa (1983: 6) with the following corrections and additions: Brachiolum with 2 setae, R with 28 setae, R₁ with 22 setae, R₄₊₅ with 32 setae. Midleg without sensilla chaetica. Tergite IX with 28 setae. Laterosternite IX with 5 setae. Anal tergite bands V-shaped. Phallapodeme 105 µm long. Transverse sternapodeme 28 µm long. Superior volsella tubercle-like, with 2–3 setae. Inferior volsella reduced, sheet-shaped, covered with microtrichia. Gonocoxite 155 µm long, inner margin with 8 strong setae. Gonostylus 178 µm long, swollen medially, tapering towards apex, inner margin with 12 setae. HR 0.87; HV 2.34.

Remarks. Yan *et al.* (2005) suggested that the species should be placed in *Demicryptochironomus* based on the original description and figures. Re-examination of the holotype revealed that the base of the gonostylus of *Cryptotendipes tamacutus* Sasa is lacking an inner expansion. Based on the tubercle-like superior volsella and the shape of the gonostylus the species is transferred to *Demicryptochironomus* as a new combination.

Distribution. The species is recorded from Japan.



FIGURES 19–21. *Demicryptochironomus (Demicryptochironomus) tamacutus* (Sasa, 1983) comb. n., holotype male. 19—wing; 20—hypopygium, dorsal view; 21—hypopygium, ventral view.

***Demicryptochironomus (Demicryptochironomus) uresicarinus* Sasa, 1989**
(Figs 22–24)

Demicryptochironomus uresicarinus Sasa, 1989: 77; Makarchenko *et al.* (2005: 409).

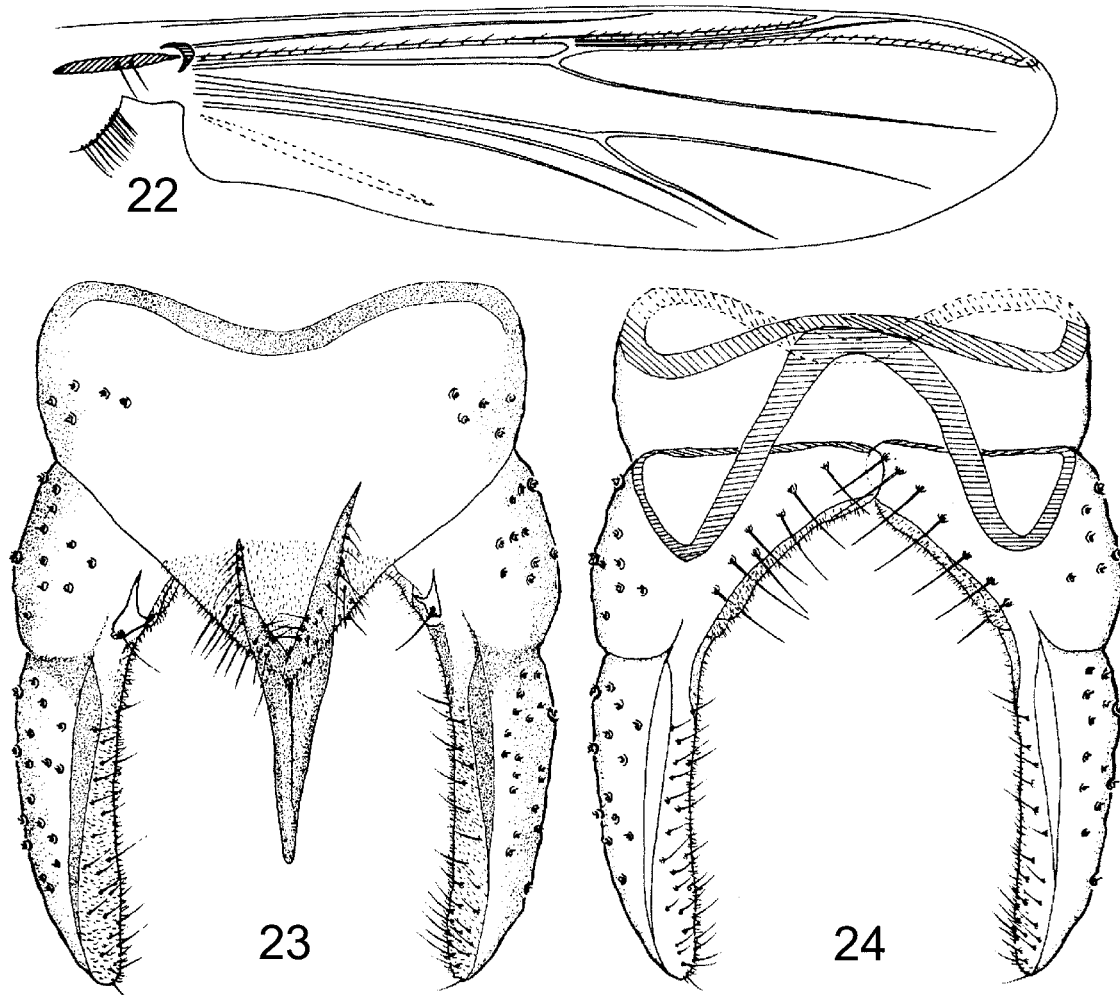
Material examined. Holotype male (NSM No. 158: 01), JAPAN: Saga, Ureshino River, 10.xi.1988, light trap.

Diagnostic characters. The species is similar to *D. (D.) asamaprimus* Sasa *et* Hirabayashi in the shape of the superior volsella. It can be separated by the following combination of characters: Superior volsella with 1 seta, inferior volsella absent, gonostylus swollen basally, AR 2.52, LR₁ 1.89.

Male (Figs 22–24). As in Sasa (1989: 77) with the following corrections and additions: Brachiolum with

2 setae, R with 18 setae, R_1 with 18 setae, R_{4+5} with 28 setae. Mid ta_1 with 1 sensilla chaetica. Tergite IX with 42 setae. Laterosternite IX with 5 setae. Anal tergite bands V-shaped. Phallapodeme 70 μm long. Transverse sternapodeme 65 μm long. Inner margin of superior volsella not covered with microtrichia. Gonocoxite 115 μm long, inner margin with 7 strong setae. Gonostylus 175 μm long, swollen basally, tapering towards apex, inner margin with 11 setae. HR 0.66; HV 2.19.

Distribution. The species is recorded from Japan and the Russian Far East.



FIGURES 22–24. *Demicryptochironomus* (*Demicryptochironomus*) *uresicarinus* Sasa, 1989, male. 22—wing; 23—hypopygium, dorsal view; 24—hypopygium, ventral view.

Subgenus *Irmakia* Reiss

Demicryptochironomus (*Irmakia*) *clarilatus* (Guha et Chaudhuri)

Microchironomus clarilatus Guha et Chaudhuri, 1981: 143.

Demicryptochironomus clarilatus (Guha et Chaudhuri); Yan and Wang (2006: 65).

Material examined. Paratype male (EB), **INDIA:** Burdwan, 9.iv.1983, D.K. Guha.

Remarks. Yan and Wang (2006) transferred the species to *Demicryptochironomus*. Based on the re-examination of a paratype of the species, the paratype material shows that it may belong to a different species, as it

has AR 1.81 and LR_1 1.62, while in the original description Guha and Chaudhuri (1981: 143) give AR 3.5 and LR_1 1.19. However, as the holotype is unavailable, we tentatively keep the species in *Demicryptochironomus*.

Distribution. The species is recorded from India.

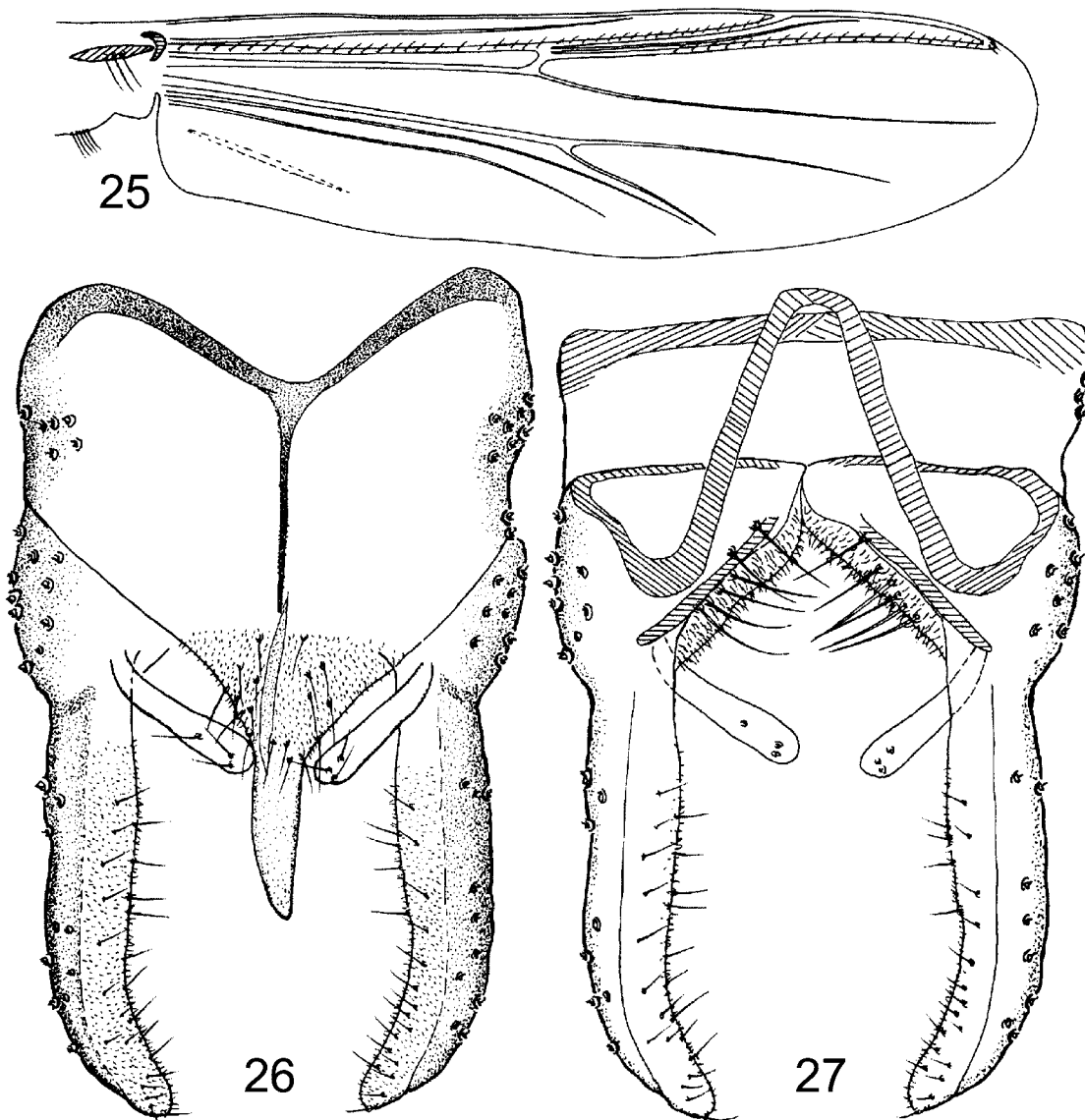
Demicryptochironomus (Irmakia) oyabeprimus (Sasa, Kawai *et* Ueno) comb. n.

(Figs 25–27)

Cryptotendipes oyabeprimus Sasa, Kawai *et* Ueno, 1988: 32; Sasa, Kitami and Suzuki (2002: 5); Yan *et al.* (2005: 27); Makarchenko *et al.* (2005: 409).

Material examined. Holotype male (NSM No. 136: 55), JAPAN: Toyama Prefecture, Oyabe River, 19.viii.1987, sweep net.

Diagnostic characters. The species can be distinguished from other species of the genus by the rod-like superior volsella lacking elongated projection or pits, anal point with pointed apex, and gonostylus curved in distal 1/3.



FIGURES 25–27. *Demicryptochironomus (Irmakia) oyabeprimus* (Sasa, Kawai *et* Ueno, 1988), holotype male. 25—wing; 26—hypopygium, dorsal view; 27—hypopygium, ventral view.

Male (Figs 25–27). As in Sasa *et al.* (1988: 32) with the following additions: Brachiolum with 3 setae, R with 23 setae, R₁ with 17 setae, R₄₊₅ with 23 setae. Midleg without sensilla chaetica. Tergite IX with 18 setae. Laterosternite IX with 7 setae. Phallapodeme 85 m long. Transverse sternapodeme 37 m long. Superior volsella swollen distally. Gonocoxite 100 m long, inner margin with 6 strong setae. Gonostylus 185 m long, curved in distal 1/3, inner margin with 12 setae. HR 0.54; HV 1.75.

Remarks. Yan *et al.* (2005) suggested that the species should be placed in *Demicryptochironomus* based on the original description and figures. Re-examination of the holotype show that the species belong in the subgenus *Irmakia*, as it has Y-shaped anal tergite bands, a nearly parallel-sided gonostylus, rod-like superior volsella, and lacks inferior volsella. *Cryptotendipes* species have an inner expansion at the base of the gonostylus.

Distribution. The species is recorded from Japan and the Russian Far East.

Demicryptochironomus (Irmakia) retusus sp. n.

(Figs 28–30)

Type material. Holotype male (BDN No. 24108), **CHINA:** Jiangxi Province, Wuyi Mountain Nature Conservation Area, 13.vi.2004, 900 m a.s.l., light trap, C. Yan. Paratypes (BDN Nos 24114, 24115): 2 males, same as holotype.

Diagnostic characters. The species closely resembles *D. (I.) spatulatus* Wang *et* Zheng in the antennal ratio and the swollen anal point. It can be distinguished by the shoulder-like posterior margin of tergite IX, the superior volsella with 3 setae and small notches distally, and by having the gonostylus bent in distal 1/3.

Etymology. From Latin *retusus*, notch, referring to the distal notch of the superior volsella.

Male (n = 3, unless otherwise stated). Total length 3.20–3.48, 3.36 mm. Wing length 1.68–1.85, 1.67 mm. Total length/wing length 1.73–2.07, 1.91. Wing length/length of profemur 1.95–2.11, 2.01.

Coloration. Thorax yellowish brown, with vittae, mid preepisternum, median anepisternum and anterior 1/3 of postnotum dark brown. Foreleg with femur yellowish brown, tibia blackish brown, and tarsi dark brown; mid- and hind legs with femur and tibia yellowish brown, tarsi dark brown with ta₅ blackish brown. Abdomen with tergite I–V yellowish green, tergite VI–VIII and hypopygium dark brown.

Head. AR 1.91–2.16, 2.00. Ultimate flagellomere 630–690, 653 µm long. Frontal tubercles conical, 10–15, 12 µm long, 5–6, 5 µm wide at base. Temporal setae 22–23, 22 including 6–8, 7 inner verticals; 6–10, 8 outer verticals; and 6–7, 7 postorbitals. Clypeus with 10–15, 12 setae. Tentorium 113–130, 123 µm long, 35–46, 39 µm wide. Palpomere lengths (in µm): 38–40; 43–45; 155–160; 155–163; 233–245 (2). Palp segment 5/3 1.50–1.53 (2).

Thorax. Anteprenotals 3–6, 4; acrostichals 8–10, 9; dorsocentrals 9–11, 10; prealars 4–5, 4. Scutellum with 12–14, 13 setae.

Wing (Fig. 28). VR 1.12–1.18, 1.16. Brachiolum with 2 setae; R with 15–20, 17 setae; R₁ with 10–13, 12 setae; R₄₊₅ with 15–17, 16 setae. Squama with 9 (2) setae.

Legs. Foretibia with 3 subapical setae, 110–115, 113; 115–132, 122; and 125–140 (2) µm long. Spurs of midtibia 25–30, 27 and 30–36, 33 µm long; comb with 30–36, 34 teeth, 10–12, 11 µm long. Spurs of hind tibia 25–30, 27 and 35–40, 37 µm long; comb with 48–52, 50 teeth, 10–13, 12 µm long. Mid- and hind legs without sensilla chaetica. Lengths and proportion of legs as in Table 1.

Hypopygium (Figs 29–30). Tergite IX with shoulder-like posteriolateral corners, each with 3 setae. Laterosternite IX with 3–5, 4 setae. Anal tergite bands Y-shaped, transverse bands not united, median longitudinal band not connected to transverse bands. Anal point originating on triangular posterior margin of anal tergite, with 20–26, 24 setae on triangular region. Anal point 105–117, 110 µm long, constricted medially, rounded apically, with ridge at base bearing 7–10, 8 setae and microtrichia. Superior volsella 105–117, 110

μm long, parallel-sided, $10\ \mu\text{m}$ wide medially, 13–15, $14\ \mu\text{m}$ wide distally; with 3 subapical setae, with 2–3, 2 small posterolateral notches. Phallapodeme 80–83, $81\ \mu\text{m}$ long. Transverse sternapodeme narrow, 15–25, $22\ \mu\text{m}$ long. Gonocoxite swollen, 93–100, $95\ \mu\text{m}$ long, inner margin with 6 strong setae. Gonostylus 190–213, $199\ \mu\text{m}$ long, slightly widened in basal 1/3, straight in basal 1/2, strongly curved in distal 1/3, inner margin with 14–18, 15 setae in two rows. HR 0.47–0.49, 0.48; HV 1.50–1.79, 1.69.

Distribution. The species is known only from the type locality in Jiangxi Province in China.

TABLE 1. Lengths (in μm) and ratios of legs of *Demicryptochironomus (Irmakia) retusus* sp. n., male ($n = 3$).

	fe	ti	ta ₁	ta ₂
p ₁	840–940, 880	570–640, 597	1210 (1)	560 (1)
p ₂	770–820, 790	650–720, 683	430–480, 453	210–230, 220
p ₃	900–960, 927	830–930, 880	590–640, 613	310–330, 320
	ta ₃	ta ₄	ta ₅	LR
p ₁	430 (1)	370 (1)	170 (1)	2.12 (1)
p ₂	160–170, 167	100	70–80, 77	0.66–0.67, 0.66
p ₃	260–280, 270	150–160, 153	90–100, 97	0.69–0.71, 0.70

Microchironomus brochus sp. n.

(Figs 31–33)

Type material. Holotype male (BDN No. 08223), **CHINA:** Fujian Province, Fuzhou City, Jinshan Town, 22.iv.1993, light trap, W. Bu. Paratypes (BDN Nos 05245, 05246, 05247): 3 males, Fujian Province, Fuzhou Agricultural University, 22.iv.1993, light trap, W. Bu.

Diagnostic characters. The species differs from other members of the genus except *M. nigrovittatus* (Malloch) by having a slightly curved gonostylus. The broadly lanceolate anal point will separate the species from *M. nigrovittatus*.

Etymology. From Latin *brochus*, tooth, referring to the apical tooth on the gonostylus.

Male ($n = 4$, unless otherwise stated). Total length 3.75–4.03, 3.91 mm. Wing length 1.83–2.05, 1.96 mm. Total length/wing length 1.97–2.24, 2.03. Wing length/length of profemur 2.21–2.29, 2.26.

Coloration. Thorax yellowish brown to brown, with slightly darker brown vittae; mid preepisternum, median anepisternum, and anterior 1/2 of postnotum dark brown. Foreleg with femur yellowish brown with distal part dark brown, tibia and tarsi dark brown. Mid- and hind legs with femur, tibia and basal 1/2 of ta₁ yellowish green, remaining tarsi brown to dark brown. Abdomen with tergite I–V yellowish green, tergite VI–VIII yellowish brown and hypopygium dark brown.

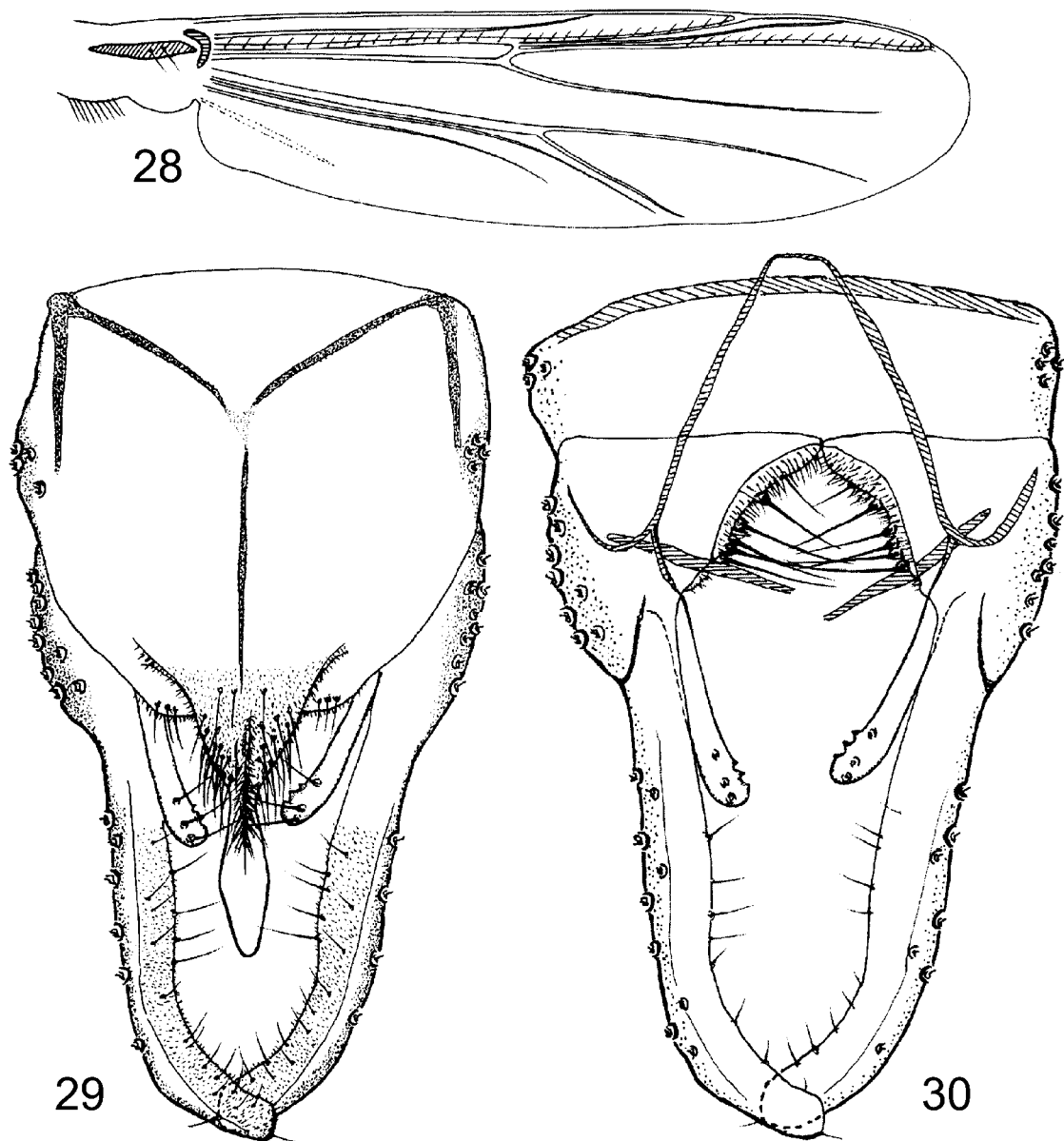
Head. AR 2.21–2.56, 2.37. Ultimate flagellomere 720–810, $758\ \mu\text{m}$ long. Frontal tubercles cylindrical, 9 (1) μm long, 3 μm wide; or rounded, 4 (1) μm in diameter; or absent (2). Temporal setae 17–20, 19 including 3–5, 4 inner verticals; 7–12, 10 outer verticals; and 3–6, 5 postorbitals. Clypeus with 11–14, 12 setae. Tentorium 120–132, $127\ \mu\text{m}$ long; 40–55, $48\ \mu\text{m}$ wide. Palpomere lengths (in μm): 30–43, 37; 45–50, 49; 138–165, 152; 163–165, 164; 215–243, 231. Palp segment 5/3 1.44–1.59, 1.52.

Thorax. Anteprenotals 2–5, 4; acrostichals 8–11, 10; dorsocentrals 7–11, 10; prealars 4. Scutellum with 10–16, 12 (3) setae.

Wing (Fig. 31). VR 1.16–1.18, 1.17. Brachiolum (with 2–3, 2 setae; R with 5–12, 8 setae; R₁ with 3–6, 4 setae; R₄₊₅ with 5–13, 10 setae. Squama with 10–11 (2) setae.

Legs. Foretibia with 3 subapical setae, 108–130, 119; 120–162, 137; and 133–138, 136 (2) μm long. Spurs

of midtibia 24–28, 26 and 25–30, 27 μm long; comb with 32–40, 36 teeth, 10–12, 12 μm long. Spurs of hind tibia 26–33, 30 and 35–36, 35 μm long; comb with 44–56, 51 teeth, 10–13, 12 μm long. Mid ta, without or with 1–2 (2) sensilla chaetica. Lengths and proportions of legs as in Table 2.



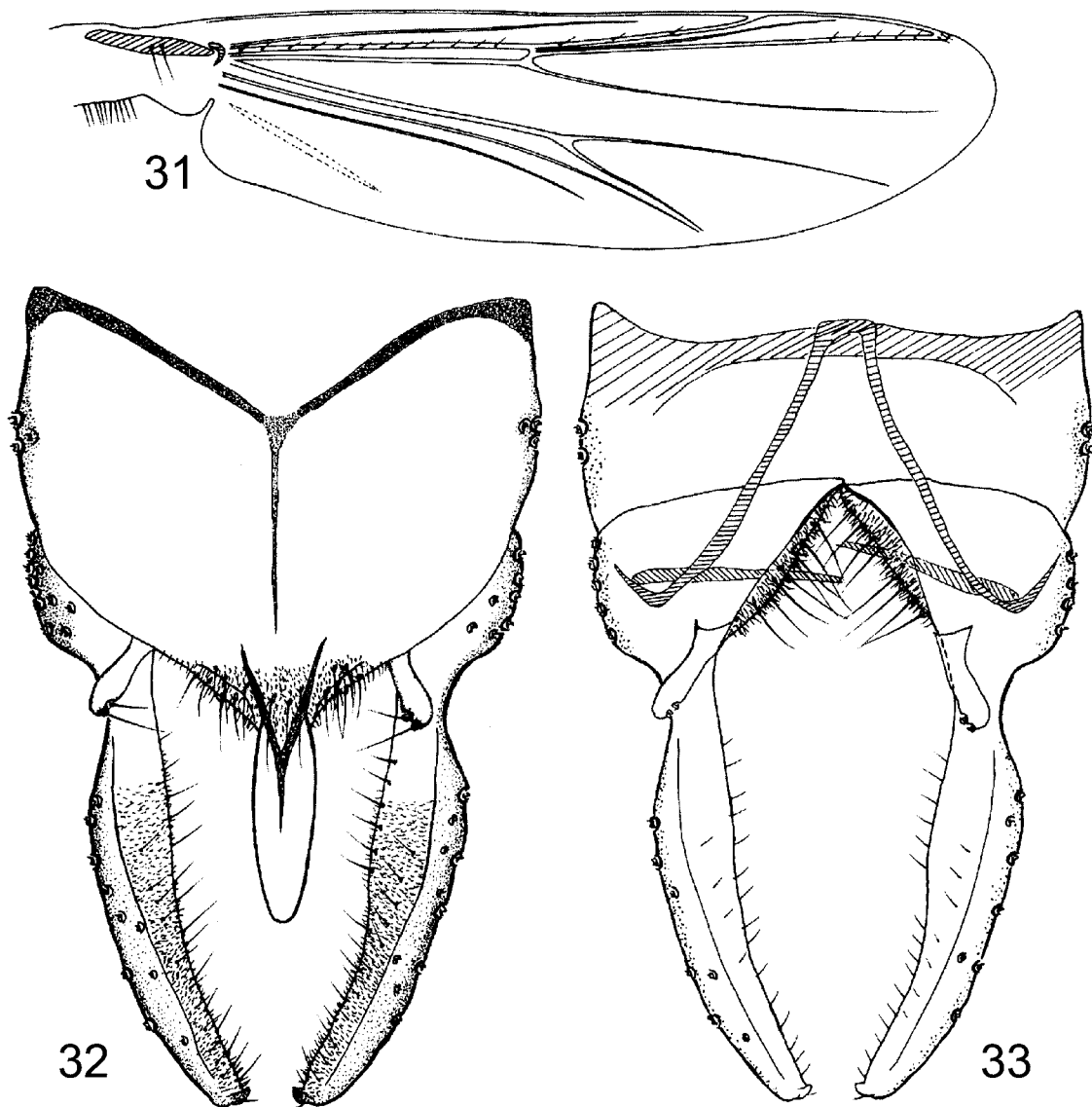
FIGURES 28–30. *Demicrochironomus (Irmakia) retusus* sp. n., male. 28—wing; 29—hypopygium, dorsal view; 30—hypopygium, ventral view.

Hypopygium (Figs 32–33). Tergite IX with 18–26, 23 setae at base of anal point. Laterosternite IX with 2–5, 3 setae. Anal tergite bands Y-shaped. Anal point originating from conical posterior margin of anal tergite; 93–100, 97 μm long, 20–23, 21 μm wide at base, 25–30, 27 μm wide medially, 8–11, 9 μm wide apically, apex rounded; with Y-shaped ridge extending to tergite IX. Superior volsella thumb-like, 55–75, 62 μm long, slightly widened distally; with 2 apicolateral setae in distinct pits. Phallapodeme 76–98, 87 μm long. Transverse sternapodeme 35–48, 43 μm long. Gonocoxite swollen, 75–80, 77 μm long; inner margin with 8–10, 9 strong setae. Gonostylus 203–225, 214 μm long; with apical tooth; widened basally, slightly curved in distal 1/3; inner margin with 16–22, 18 setae. HR 0.35–0.37, 0.36; HV 1.76–1.92, 1.83.

Distribution. The species was collected in a subtropical area in Fujian Province in China.

TABLE 2. Lengths (in μm) and ratios of legs of *Microchironomus brochus* sp. n., male ($n = 4$).

	fe	ti	ta ₁	ta ₂
p ₁	800–900, 855	550–620, 585	1005–1120, 1069	510–540, 525
p ₂	780–850, 813	580–710, 663	400–430, 420	200–210, 208
p ₃	900–1000, 950	870–970, 918	570–630, 605	330–340, 333
	ta ₃	ta ₄	ta ₅	LR
p ₁	400–420, 408	300–340, 325	160–170, 168	1.78–1.89, 1.83
p ₂	150–160, 155	90–110, 100	80–90, 85	0.59–0.72, 0.64
p ₃	280–290, 283	160–170, 168	110–120, 118	0.65–0.68, 0.66



FIGURES 31–33. *Microchironomus brochus* sp. n., male. **31**—wing; **32**—hypopygium, dorsal view; **33**—hypopygium, ventral view.

***Parachironomus lobus* sp. n.**

(Figs 34–36)

Type material. Holotype male (BDN No. 078), **CHINA:** Hainan Island, Changjiang County, Bawangling Nature Conservation Area, 11.v.1989, light trap, X. Wang. Paratype male (BDN No. 070), same data as holotype.

Diagnostic characters. The broad, tapering anal point together with the reduced inferior volsella, the small size (wing length about 1.4 mm) and the low antennal ratio (AR 1.1–1.2) will separate the species from other members of the genus.

Etymology. From Latin *lobus*, projection, referring to the superior volsella having an elongated projection apically.

Male (n = 2, unless otherwise stated). Total length 2.55–2.75 mm. Wing length 1.38 mm. Total length/wing length 1.85–1.99. Wing length/length of profemur 1.97–2.06.

Coloration. Thorax yellowish brown, vittae darker brown. Foreleg with femur yellowish green, tibia dark brown, and tarsi brown. Mid- and hind legs with femur and tibia yellowish green, tarsi brown. Abdomen with tergite I–VI yellowish green, tergite VII–VIII and hypopygium dark brown.

Head. AR 1.14–1.17. Ultimate flagellomere 400–410 µm long. Frontal tubercles absent. Temporal setae 10 (1), including 2 (1) inner verticals, 4 (1) outer verticals, and 4 (1) postorbitals. Clypeus with 14 setae. Tentorium 100–105 µm long, 28–30 µm wide. Palpomere lengths (in µm): 25–35; 33–38; 100–113; 113–123; 141–170. Palp segment 5/3 1.41–1.50.

Thorax. Anteprenotals 2, acrostichals 8–10, dorsocentrals 7–8, prealars 3–4. Scutellum with 8–10 setae.

Wing (Fig. 34). VR 1.20–1.24. Brachiolum with 1–3 setae, R with 13 setae, R₁ with 10–12 setae, R₄₊₅ with 15–16 setae. Squama with 10–12 setae.

Legs. Foretibia with 2 subapical setae, 105–108 and 113–115 µm long. Spurs of midtibia 18–25 and 25–33 µm long; comb with 28–36 teeth, 10 µm long. Spurs of hind tibia 25 and 33–35 µm long; comb with 34–46 teeth, 10–11 µm long. Mid- and hind legs without sensilla chaetica. Lengths and proportions of legs as in Table 3.

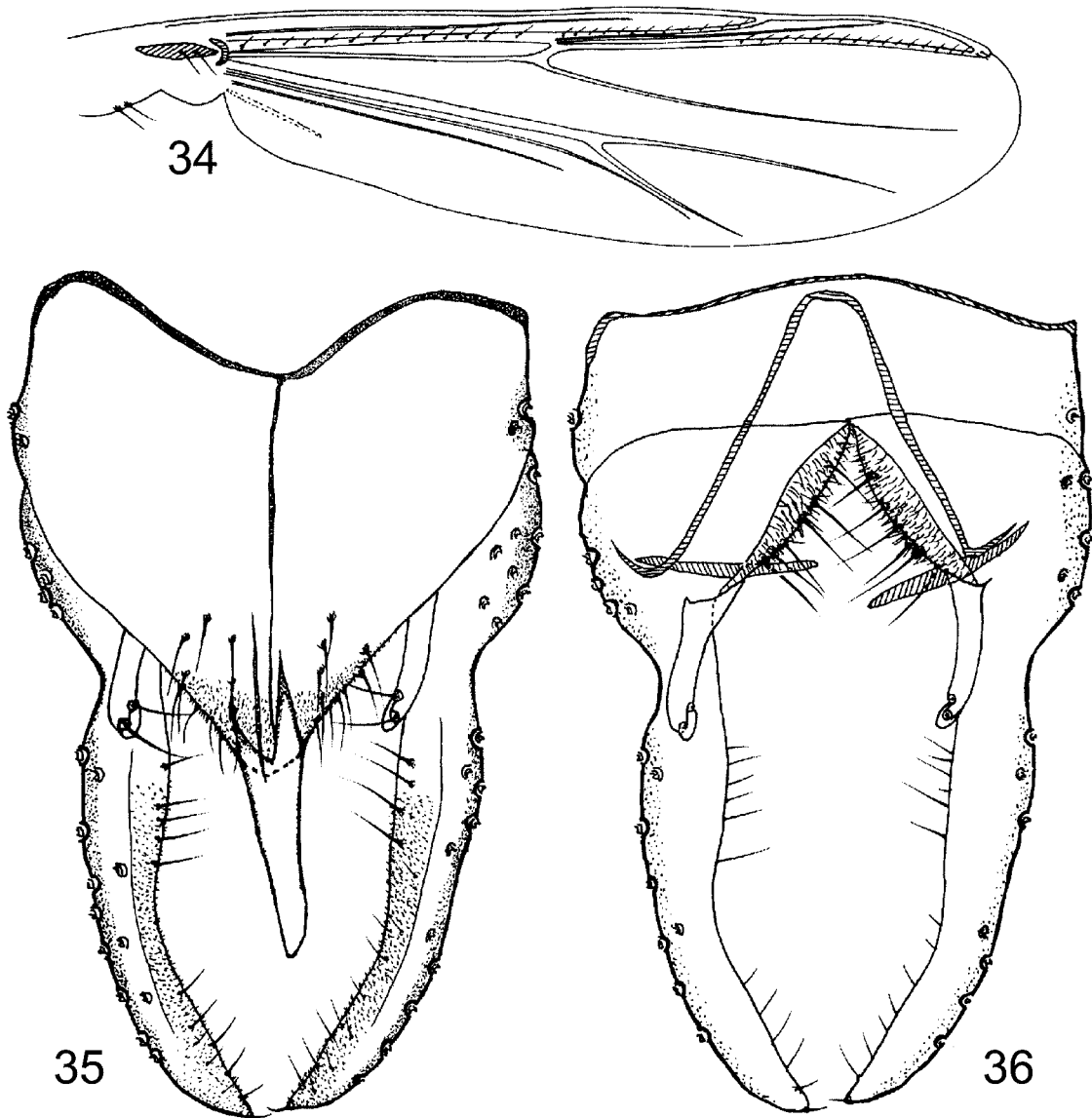
TABLE 3. Lengths (in m) and ratios of legs of *Parachironomus lobus*, sp. n., male (n = 2).

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR
p ₁	670–700	450–460	890–910	420	330–340	270–280	130–140	1.98
p ₂	620–630	510–520	340–350	160	120–120	70–80	60–70	0.44–0.52
p ₃	710–720	650–670	480–500	240	210	120–130	70–80	0.66–0.67

Hypopygium (Figs 35–36). Tergite IX with conical posterior margin, with 18–20 setae at base of anal point in dorsal view, 8–10 setae in ventral view. Laterosternite IX with 1–2 setae. Anal tergite bands Y-shaped, with narrow longitudinal band. Anal point originating from conical area on anal tergite, 63–70 µm long, 18–20 µm wide at base, tapering to pointed apex. Superior volsella digitiform, nearly parallel-sided, weakly curved, 52–58 µm long, with one apical and one subapical seta in distinct pits, with small elongated apical projection. Phallapodeme 60 µm long. Transverse sternapodeme 24–28 µm long. Gonocoxite 70 µm long, inner margin with sharp median angle and 6–7 strong setae. Gonostylus 160–168 µm long, slightly expanded basally, curved medially, inner margin 11–13 setae. HR 0.42–0.44; HV 1.52–1.72.

Remarks. In Lehmann (1970) *Parachironomus lobus* will key to *P. arcuatus* (Goetghebuer) or to *P. siljanensis* Brundin; both, however, are distinctly larger species. In Langton and Pinder (2007: 181) it keys to couplet 12, *P. arcuatus* and *P. frequens* (Johannsen), differing from both in the shape of the anal point.

Distribution. The species was collected in a subtropical mountain area in Hainan Island, China.



FIGURES 34–36. *Parachironomus lobus* sp. n., male. 34—wing; 35—hypopygium, dorsal view; 36—hypopygium, ventral view.

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