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Japanese *Pseudosmittia* Edwards (Diptera: Chironomidae)

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Abstract

The types of species previously placed in *Pseudosmittia* Edwards and some related genera in the Sasa collection at The National Museum of Sciences, Tokyo, Japan, have been examined. Twenty-four new synonyms are given: *Pseudosmittia ogasatridecima* Sasa *et* Suzuki, 1997a is a synonym of *P. bifurcata* (Tokunaga, 1936); *P. jintuvicesima* Sasa, 1996, and *P. seiryupequea* Sasa, Suzuki *et* Sakai, 1998 of *P. danconai* (Marcuzzi, 1947); *P. mongolzeaea* Sasa *et* Suzuki, 1997b of *P. forcipata* (Goetghebuer, 1921); *P. hachijotertia* Sasa, 1994 of *P. holsata* Thienemann *et* Strenzke, 1940; *P. itachibifurca* Sasa *et* Kawai, 1987, *P. furudobifurca* Sasa *et* Arakawa, 1994, *P. hibaribifurca* Sasa, 1993, and *P. (Nikismittia) shofukuundecima* Sasa, 1998 of *P. mathildae* Albu, 1968; *P. yakymenea* Sasa *et* Suzuki, 2000a, and *P. yakyneoa* Sasa *et* Suzuki, 2000a of *P. nishiharaensis* Sasa *et* Hasegawa, 1988; *P. kurobeokasia* Sasa *et* Okazawa, 1992a, *P. togarisea* Sasa *et* Okazawa, 1992b, *P. hachijosecunda* Sasa, 1994, *P. toyamaresea* Sasa, 1996, *P. yakyopea* Sasa *et* Suzuki, 2000a, *P. yakypequea* Sasa *et* Suzuki, 2000a, *Parakiefferiella hidakagehea* Sasa *et* Suzuki, 2000b, and *Parakiefferiella hidakaheia* Sasa *et* Suzuki, 2000b of *Pseudosmittia oxoniana* (Edwards, 1922); *P. famikelea* Sasa, 1996a of *P. tokaraneoa* Sasa *et* Suzuki, 1995; *P. ikemaensis* Sasa *et* Hasegawa, 1988, and *P. amamiagina* Sasa *et* Suzuki, 1993 of *P. topei* Lehmann, 1979;

P. toyanigra Sasa, 1988 of *Camptocladius stercorarius* (De Geer, 1776); *P. kurojekeus* Sasa, 1996 of *Prosmittia jemtlandica* (Brundin, 1947); and *P. tobaunvicesima* Kikuchi *et* Sasa, 1990 of *Pseudosmittia guineensis* (Kieffer, 1918). Two new combinations are given: *Pseudosmittia mongolzebea* Sasa *et* Suzuki, 1997b belongs in *Pseudorthocladius* and *Parakiefferiella yakytriangulata* Sasa *et* Suzuki, 2000a is placed in *Rheosmittia*.

Thirteen species are recognized for Japan. Among these, five species are known only from Japan, one is known from Christmas Island and the Bonin (Ogasawara) Islands (Japan), one from Africa, Okinawa and the Nansei Archipelago (Japan), and one species is Palaearctic and Oriental but in Japan known only from Okinawa. The remaining five species are widespread in the Holarctic with one also being Afrotropical and the others occurring in the Pacific parts of Japan and in Oriental China. Of the two species described as *Pseudosmittia* from Mongolia, *Pseudosmittia mongolzebea* Sasa *et* Suzuki belongs to *Pseudorthocladius*, whereas *P. mongolzeaea* Sasa *et* Suzuki is a synonym of *P. forcipata* (Goetghebuer). *Pseudosmittia tobaunvicesima* Kikuchi *et* Sasa, from Indonesia is a synonym of the Afrotropical *P. guineensis* (Kieffer).

Pseudosmittia bifurcata (Tokunaga), *P. jintuoctava* (Sasa) comb. n., *P. kisotriangulata* Sasa *et*

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Kondo and *P. tokaraneoa* Sasa *et* Suzuki, are redescribed as male imagines, and *P. togadistalis* Sasa, Watanabe *et* Arakawa as male and female imago. The description of *P. littoralis* (Tokunaga) is reiterated. A key to male imagines of the known Japanese species of *Pseudosmittia* is presented.

Key words: *Pseudosmittia,* new synonyms, keys, Chironomidae, Japan

Introduction

Aquatic species of non-biting midges (Chironomidae) are among the most important members of freshwater invertebrates. They occupy key positions in aquatic systems from an ecological perspective and are very valuable indicators in biogeographical, faunal-history, and phylogenetic patterns. Much less emphasis has, however, been placed on rearing, associating and describing semiaquatic and semiterrestrial species as well as species from temporary freshwater habitats and marine intertidal zones. Consequently, the biodiversity of such midges is much less well known. These groups, however, are very important, phylogenetically as well as biogeographically, since they show adaptations found both among the more primitive and among the most derived groups of Chironomidae. Most of the semiaquatic species of midges are found within the subfamily Orthocladiinae where one of the larger genera remaining to be revised is the genus *Pseudosmittia* Edwards. This genus is particularly interesting since it contains a diverse range from a few purely aquatic species to species that are terrestrial, semiaquatic, or even intertidal marine as larvae and pupae. The genus is worldwide in distribution.

Numerous species of *Pseudosmittia* has been described from Japan by Dr. Masaaki Tokunaga and, more recently, especially by Dr. Manabu Sasa and co-workers. However, since the genus has not been well defined or recently revised several of these species have been described under various synonyms or should be allotted to other genera. Vice versa, some species that belong to *Pseudosmittia*, have been placed in other genera. A paper describing the Neotropical members of the genus together with a world revision of the genus are under preparation and are showing that the variation within some widespread species is very large.

Methods and morphology

Morphological nomenclature follows Sæther (1980) with the modifications and additions given in Sæther (1989, 1990). Measurements are given as ranges followed by a mean when 4 or more measurements were made, followed by the number of measurements in parentheses (n).

In several species the wing shows an extra vein formed by a preapical bifurcation of the postcubitus (e.g. Fig. 1). A new ratio VR_2, which is the distance from the arculus to the

postcubital fork divided by the length of M, is defined and given in redescriptions of species with the preapical bifurcation. In figures of male hypopygia the dorsal aspect is shown to one side, the ventral aspect and the apodemes to the other.

Material

All the Japanese material examined originates from the Sasa collection at The National Museum of Sciences, Tokyo, Japan (NMST). The Tokunaga collection at Kyushu University, Japan (KU) contains the holotype of *P. bifurcata* (Tokunaga) and two paratypes of *P. littoralis* (Tokunaga), but I have been unable to obtain a loan. However, a specimen of *P. bifurcata* in The Commonwealth Scientific and International Research Organization, Canberra, Australia (CSIRO) identified by Tokunaga has been examined. Type specimens of the more widespread species and their synonyms deposited in among others Institute Royal de Sciences Naturelle de Belgique, Bruxelless, Belgium (IRSN), The Natural History Museum [British Museum (Natural History)] (BMNH) and The Natural History Collections, Bergen Museum, University of Bergen, Bergen, Norway (ZMBN) also have been examined.

The following species listed by Sasa and co-workers under *Pseudosmittia* or its synonym *Orthosmittia* have been allocated to other genera:

Orthosmittia fujiquinta Sasa, 1985: 125 [= *Pseudorthocladius fujiquintus* (Sasa); Yamamoto (2004: 81)].

Orthosmittia togauvea Sasa *et* Okazawa, 1992b: 147 [= *Tokunagaia togauvea* (Sasa *et* Okazawa), Yamamoto (2004: 108)].

Pseudosmittia (Hibarasmittia) hibaraundecima Sasa *et* Suzuki, 1998: 27 [= *Prosmittia hibaraundecima* (Sasa *et* Suzuki); Sæther *et al.* (2000: 183), Yamamoto (2004: 77)].

Pseudosmittia itachisecunda Sasa *et* Kawai, 1987: 53 [tentatively placed as *Lappokiefferiella itachisecunda* (Sasa *et* Kawai) by Sæther *et al.* (2000: 179); as *Epoicoladius itachisecundus* (Sasa *et* Kawai) by Yamamoto (2004: 31)].

Pseudosmittia jintusexta Sasa, 1990b: 48 [= *Prosmittia jemtlandica* (Brundin), Sæther and Ferrington (1993: 259), Sæther *et al.* (2000: 183), Yamamoto (2004: 77)].

Pseudosmittia kurojekeus Sasa, 1996b: 30 [transferred to *Prosmittia* Brundin by Yamamoto (2004: 77) = *Prosmittia jemtlandica* (Brundin). Syn. n.].

Pseudosmittia mongolzebea Sasa *et* Suzuki, 1997b: 185 [= *Pseudorthocladius mongolzebea* (Sasa *et* Suzuki). Comb. n.].

Pseudosmittia morispinosa Sasa, 1994: 42 [= *Epoicocladius itachisecundus* (Sasa *et* Kawai), se above; Yamamoto (2004: 31)].

Pseudosmittia seiryuquerea Sasa, Suzuki *et* Sakai, 1998: 118 [= *Boreosmittia seiryuquerea* (Sasa, Suzuki *et* Sakai); Yamamoto (2004: 6)].

Pseudosmittia togasitea Sasa *et* Okazawa, 1992b: 161 [= *Camptocladius stercorarius* (De Geer, 1776); Sæther and Ferrington (2003: 4). Erroneously placed in *Prosmittia* by

Yamamoto (2004: 78)].

Pseudosmittia togativea Sasa *et* Okazawa, 1992b: 162 [= *Camptocladius stercorarius* (De Geer, 1776); Sæther and Ferrington (2003: 4). Erroneously placed in *Prosmittia* by Yamamoto (2004: 78)].

Pseudosmittia toyamaquerea Sasa, 1996a: 38 [= *Krenosmittia toyamaquerea* (Sasa); Yamamoto (2004: 45)].

Pseudosmittia toyanigra Sasa, 1988: 48 [transferred to *Prosmittia* Brundin by Yamamoto (2004: 78) = *Camptocladius stercorarius* (De Geer, 1776). Syn. n.].

Pseudosmittia yakytaira Sasa *et* Suzuki, 2000a: 95 [= *Prosmittia yakytaira* (Sasa *et* Suzuki); Yamamoto (2004: 78)].

The following species were transferred to *Pseudosmittia* by Yamamoto (2004), but belong in other genera:

Parakiefferiella yakykelea Sasa *et* Suzuki, 2000a: 90. Judging from the holotype (♂ NMST No. 381: 77) the species belongs in *Parakiefferiella* Thienemann. Although a microtrichial tuft on mid-scutum is not clear, in specimens examined there is a median hump without strong acrostichals.

Parakiefferiella yakytriangulata Sasa *et* Suzuki, 2000a: 89. Judging from the holotype (♂ NMST No. 383:33), the species neither belongs in *Pseudosmittia* nor in *Parakiefferiella*. It is here tentatively placed in *Rheosmittia* Brundin as *R. yakutriangulata* (Sasa *et* Suzuki) comb. n., but it could deserve a separate genus.

Species described by Kikuchi and Sasa (1990) from Indonesia:

Pseudosmittia tobaunvicesima Kikuchi *et* Sasa, 1990: 325 [= *Pseudosmittia guineensis* (Kieffer, 1918: 81). Syn. n.].

Species described by Sasa and Suzuki (1997b) from Mongolia:

Pseudosmittia mongolzeaea Sasa *et* Suzuki, 1997b: 335 [= *P. forcipata* (Goetghebuer, 1921). Syn. n.].

Pseudosmittia **Edwards**

Pseudosmittia Goetghebuer (1932: 126, as subgenus of *Smittia* Holmgren), nomen nudum. No type species designated as required by ICZN (1999: Article 13.3).

Pseudosmittia Edwards, 1932: 141. Edwards described the genus by reference ICZN (1999: Article 13.1.2) and fixed the type species. Following ICZN (1999: Article 50.1), *Pseudosmittia* must be credited to Edwards (1932). See Spies and Reiss (1996) and Spies and Sæther (2004) for more details.

Orthosmittia Goetghebuer, 1943: 110 *in* Goetghebuer 1940–1950 (as subgenus of *Smittia* Holmgren, 1869: 47). *Orthosmittia* has mistakenly been synonymized with *Smittia* both by Freeman (1956: 346) and Sæther (1981: 25). Syn. n.

Lindebergia Tuiskunen, 1984: 121. See Sæther and Ferrington (2003) and Spies and Sæther (2004).

Prosmittia Brundin sensu Cranston and Oliver, 1988: 449, pro parte, misidentification. See Sæther and Ferrington (1993).

Nikismittia nomen nudum (Sasa, 1996a: 106; Sasa, 1998a: 42; Sasa 1998b: 113; Sæther *et al*. 2000:

185; Yamamoto, 2004: 88). No type species has been designated as required by ICZN (1999: Article 13.3).

Not *Hibarasmittia* Sasa *et* Suzuki, 1998: 27, as subgenus of *Pseudosmittia*. Synonymized with *Prosmittia* Brundin, 1956 by Yamamoto (2004).

Not *Diplosmittia* Sæther, 1981 sensu Sæther *et al*. (2000: 185), misidentification.

Type species

Spaniotoma (Smittia) angusta Edwards, 1929, by original designation (Edwards 1932: 141).

Diagnostic characters

The imagines are separable from other Orthocladiinae with bare eyes, wings and squama, by having either 2 or 4–16 short, biserial acrostichals on mid-scutum without an additional tubercle, hump or microtrichial tuft; non-extended, non-protruding eyes; antenna occasionally with straight apical seta; palp not reduced (although palpomeres 4 and 5 may be partly fused); costa not to moderately extended; VR high to extremely high; Cu_1 sinuate, curved or straight; wing often with additional vein caused by bifurcation of postcubitus; male anal point absent or placed forward on tergite IX and usually with microtrichia reaching to apex; single, plate- or spine-like, median virga sometimes with additional pairs of lateral rows of spines; male gonostylus not double, but occasionally furcate or bilobed; female genitalia with gonocoxite IX long and low with characteristic sclerotized margin against tergite IX; small dorsomedian lobe; large ventrolateral lobe; and spermathecal duct with loop.

The pupae can be separated from other orthoclads by lacking thoracic horns and precorneal tubercles; by having a reduced or smoothly rounded anal lobe without or with fine hair-like setae; three precorneals and two median antepronotals all fine and hair-like, and by both dorsal and ventral conjunctives usually being armed with spinules.

The larvae are separable from all other orthoclads except *Camptocladius* v. d. Wulp by having broad, bifid SI and SII, reduced antenna and no procerci. They differ from *Camptocladius* larvae by having premandibles with brushes, and reduced to relatively well developed posterior parapods, usually with claws.

Keys to males of Japanese *Pseudosmittia* Edwards

1. With about 4 acrostichals, antepronotal lobes not reduced medially, supraalar present, superior volsella indicated as basal swelling, inferior volsella with accessory lobe..... ..... *P. jintuoctava* (Sasa)
- With 2 acrostichals; antepronotal lobe reduced in some species; supraalar absent; superior volsella indicated to well developed, as basal swelling or as appendix; inferior volsella with or without accessory lobe..... 2

2. Virga consisting of median single spine, difficult to distinguish, and distinct lateral spinules; superior volsella weak or absent; inferior volsella with accessory lobe always present; dorsomedian sections of antepronotal lobes and oral projections of transverse sternapodeme usually well developed 3
- Virga consisting of median spine without distinct lateral spinules; superior and median volsellae present or absent; inferior volsella with or without accessory lobe; dorsomedian sections of antepronotal lobes and oral projections of transverse sternapodeme usually reduced 4
3. Inner verticals (1–2) conspicuous, up to 40–60 μm long; gonostylus with more or less well developed outer heel; AR 0.38–0.71 ..... *P. oxoniana* (Edwards)
- Inner verticals absent, gonostylus without distinct outer heel, AR about 2.0 .... *P. kisotriangulata* Sasa *et* Kondo
4. Virga consisting of a very large U-shaped spine, about 60–90 μm long; postcubitus forked ..... *P. tokaraneoa* Sasa *et* Suzuki
- Virga shorter, spine- or plate-like; postcubitus usually not forked 5
5. Phallapodeme with hook-like apical projection ending in 2–3 distinct, sharp teeth; superior volsella absent or indicated as basal swelling of inner margin of gonocoxite .. .. *P. togadistalis* Sasa, Watanabe *et* Arakawa
- Phallapodeme without hook-like projection; superior volsella absent, single or double. 6
6. Gonostylus bifurcate ..... *P. mathildae* Albu
- Gonostylus simple 7
7. Superior volsella well developed as a swelling on inner basal margin of gonocoxite or as an appendage 8
- Superior volsella absent 10
8. Superior volsella well developed as a swelling on inner basal margin of gonocoxite, anal point triangular ..... *P. holsata* Thienemann *et* Strenzke
- Superior volsella digitiform or lobe-like, separate or completely fused with median volsella; anal point present or absent 9
9. Superior volsella separate (Fig. 4), anal point present. ..... *P. forcipata* (Goetghebuer)
- Superior volsella completely fused with median volsella and with outer corners, anal point absent ..... *P. danconai* (Marcuzzi)
10. Anal point narrowly triangular, inferior volsella triangular, postcubitus sometimes forked, antenna without apical seta ..... *P. topei* Lehmann
- Anal point broadly triangular; inferior volsella either tongue-shaped, digitiform with basal projection or placed far posterior on gonocoxite; postcubitus forked; antenna with strong apical seta 11
11. Inferior volsella digitiform with basal proximal projection. ..... *P. bifurcata* (Tokunaga)
- Inferior volsella not digitiform with basal projection 12
12. Inferior volsella triangular, placed far posterior on gonocoxite, with accessory lobe .... *P. littoralis* (Tokunaga)

- Inferior volsella more proximal, tongue-shaped without distinct accessory lobe..... ..... *P. nishiharaensis* Sasa *et* Hasegawa

***Pseudosmittia bifurcata* (Tokunaga)**
(Figs. 1, 2)

Spaniotoma (Smittia) bifurcata Tokunaga, 1936: 310.
Spaniotoma (Orthosmittia) bifurcata (Tokunaga); Goetghebuer (1940–1950: 110).
Pseudosmittia ogasatridecima Sasa *et* Suzuki, 1997a: 335; Yamamoto (2004: 89). Syn. n.

Material examined

KIRIBATI: Kiritinati (Christmas Island), Settlement, 10.25ºS, 105.41ºE, yellow trap, 1♂, 11.–30.iv.1989, J.S. Carsdale (CSIRO). JAPAN: Tokyo Metrop., Ogasawara (Bonin) Islands, Hahajima Island, Chibusi Dam, holotype ♂ of *Pseudosmittia ogasatridecima*, 19.iv.1996, H. Suzuki (NMST, No. 308: 29).

Diagnostic characters

Adult male wing with postcubital fork, inferior volsella with a proximal enlargement, antenna with a strong apical seta, mid tibia with single spur, 7 antepronotals and 22 dorsocentrals.

Description

Male (n = 2, except when otherwise stated). Total length 1.64 mm (1) (1.96–2.18 mm in Sasa & Suzuki 1997a). Wing length 0.83–1.06 mm. Total length/wing length 1.98 (1). Wing length/length of profemur 2.60–2.67. Coloration according to Sasa & Suzuki (1997b) largely dark brown and yellow in humeral and lateral areas, with scutellum, postnotum, legs and abdominal tergites entirely dark brown.

Head (Sasa & Suzuki 1997a: fig. 13a). AR 0.50–0.76. Terminal flagellomere 150–244 μm long, strong apical seta 37–45 μm long. Temporal setae 4–6, consisting of 0–2 inner verticals, 4 outer verticals, no postorbitals. Clypeus with 10 setae. Tentorium 94–109 μm long, 16–26 μm wide. Stipes 82–105 μm long, 26–27 μm wide. Palpomere lengths (in μm): 21–23, 25–38, 50–60, 60–75, 89–116; third palpomere with 14 (1) sensilla clavata.

Thorax (Sasa & Suzuki 1997a: fig. 13b, c). Median antepronotal lobes reduced, antepronotum with 1–2 lateral setae. Dorsocentrals 12–22 (12–16 in Sasa & Suzuki 1997a), acrostichals 2, prealars 5–7 (4–6 in Sasa & Suzuki 1997a), no supraalar seta. Scutellum with 8 setae.

Wing (Fig. 1; Tokunaga 1936: fig. 1a; Sasa & Suzuki 1997a: fig. 13d). VR_1 1.55–1.79, VR_2 1.27–1.35. Anal lobe not projecting. Costal extension 0–11 μm long. R_{4+5} ending far proximal to apex of M_{3+4}; Cu_1 straight. Brachiolum with 1 seta, R with 2 seta, other veins bare.

Legs. Spur of fore tibia 34–53 μm long, spur of middle tibia 30–32 μm long, spurs of hind tibia 41–51 μm and 25–26 μm long (Sasa & Suzuki 1997a: fig. 13e–g). Width at apex of fore tibia 21–30 μm, of mid tibia 23–32 μm, of hind tibia 34–45 μm. Comb of 12–13 setae, 25–41 μm long. Lengths and proportions of legs as in Table 1.

TABLE 1. Lengths (in μm) and proportions of legs of *Pseudosmittia bifurcata* (Tokunaga), male (n = 1–2).

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	311–406	360–473	259	123	80	47	38	0.53	3.92	3.51	–
p_2	342–463	360–482	162–236	90–123	63–85	32–47	23–38	0.45–0.49	4.03–4.17	4.00–4.33	4.0
p_3	351–463	369–501	302	161	137	66	47	0.60	3.08	3.19	–

Hypopygium (Fig. 2; Tokunaga 1936: fig. 1b; Sasa & Suzuki 1997a: fig. 13j). Anal point triangular, pointed, 27–36 μm long, with 8–14 lateral setae; laterosternite IX with 3–4 setae. Phallapodeme 48–69 μm long, sternapodeme rounded without oral projections. Anterior sclerotized part of virga 23 μm long, but apparently with some lateral and apical partly sclerotized parts resulting in a total length of 49 μm. Gonocoxite 123–152 μm long; superior volsella lobe-like, 24–26 μm long, partly fused with 51–68 μm long median volsella; inferior volsella adpressed to gonocoxite, 86 μm long, reaching to apex of gonocoxite, without apparent accessory lobe. Gonostylus 70–97 μm long, with basal group of 6 stiff setae 21 μm long, crista dorsalis long and low, megaseta 8–9 μm long. HR 1.56–1.77, HV 2.34 (1).

Female, pupa and larva. Unknown.

Ecology and distribution

Tokunaga (1936: 311) gives the habitat as the tidal zone of a gravely shore. The species is known from the Bonin (Ogasawara) Islands (Japan) and Christmas Island (Kiribati).

***Pseudosmittia danconai* (Marcuzzi)**
(Fig. 3)

Smittia danconai Marcuzzi, 1947: 12, (incorrect original spelling "*D'Anconai"*).
Smittia hamata Freeman, 1956: 358; Sæther and Ferrington (2003: 4).
Pseudosmittia hamata Strenzke, 1960: 433.
Pseudosmittia neohamata Cranston *in* Ashe and Cranston, 1990: 223, replacement name for *P. hamata* Strenzke.
Pseudosmittia jintuvicesima Sasa, 1996b: 72; Yamamoto (2004: 88). Syn. n.
Pseudosmittia seiryupequea Sasa, Suzuki *et* Sakai, 1998: 117; Yamamoto (2004: 89). Syn. n.

Material examined

JAPAN: Honshu, Toyama Pref., Niita at Jinshu River, holotype ♂ of *P. jintuvicesima*, 30.v.1989, M. Sasa (NMST, No. 319: 99); Shikoku, Kochi Pref., Nishitosa-Mura, Ekawasaki, holotype ♂ of *P. seiryupequea*, 26.iv.1998 (NMST, No. A 358: 80). In addition material from Germany, South Africa, Spain, Zimbabwe, and USA has been examined.

Diagnostic characters

The male imago differs from other known males of the genus by having R_{4+5} ending proximal to apex of M_{3+4}, anal point absent, superior and median volsella fused forming a single appendage with projecting anterior- and posteromedian corners, inferior volsella hooked, and an AR of 0.68–1.08. The female is characterized by having an LR_1 of 0.50–0.54 and presence of a strong apical seta on the last flagellomere of the antenna. The pupa is characterized by having strong shagreen anteriorly and posteriorly, no setae on anal segment, genital sac without spinules, tergal conjunctive II/III with 0–20 spinules, at least some other tergal conjunctives with more than 40 spinules, sternal conjunctive III/IV bare and VII/VIII with 33–51 spinules. The larva has 3 inner teeth on mandible, 4 pairs of lateral teeth on the mentum, posterior parapods each with 3 slender claws about 16 µm long, and the antennal blade about twice as long as the basal antennal segment.

Description

The species will be redescribed in a world-wide revision of *Pseudosmittia* (in prep.).

Distribution

The species is known from Finland, France, Germany, Greece, Italy, The Netherlands, Romania, Spain, Lebanon, Japan, South Africa, Zimbabwe, and USA.

***Pseudosmittia forcipata* (Goetghebuer)**

(Fig. 4)

Camptocladius forcipatus Goetghebuer, 1921: 87.
Smittia (Pseudosmittia) forcipata (Goetghebuer 1940–1950: 106).
Pseudosmittia forcipata (Goetghebuer); Pinder (1978: 94); Cranston and Oliver (1988: 450).
Smittia triappendiculata Goetghebuer, 1931: 216; Sasa (1985: 124); Sæther and Ferrington (2003: 4).
Pseudosmittia antillaria Sæther, 1981: 29; Sæther and Ferrington (2003: 3).
Pseudosmittia mongolzeaea Sasa *et* Suzuki, 1997b: 185. Syn. n.

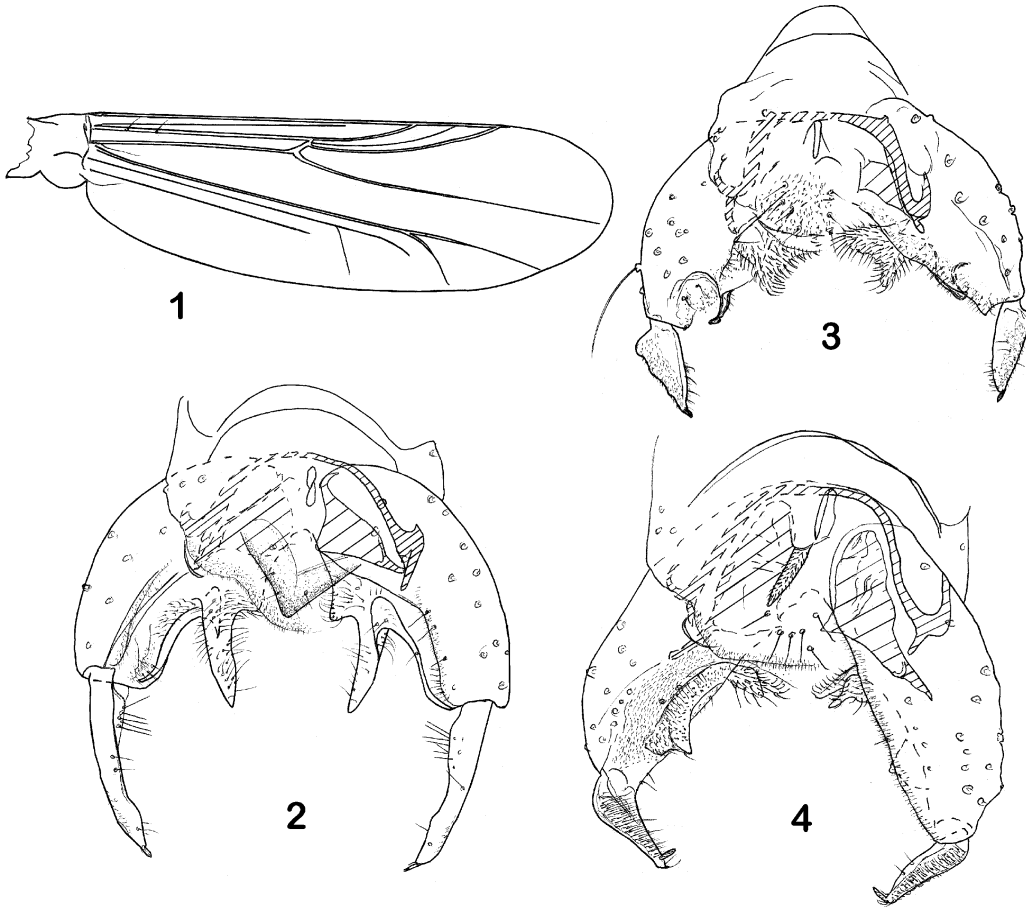
Material examined

Holotype ♂, BELGIUM: Destelbergen, 31.x.1916, M. Goetghebuer (IRSN). BELGIUM: Knockes-sur-Mer, Zwijn, 1 ♂, 9.ix.1931, M. Goetghebuer, holotype of *P. triappendiculata* (IRSN); SAINT VINCENT: Majorca Estate, SVT 218B, 1 ♂ August 1972, A.D. Harrison,

holotype of *P. antillaria* (ZMBN, Type no. 33). MONGOLIA: Mount Bogdrhan, 2,400 m a.s.l., holotype ♂ of *P. mongolzeaea*, 5.viii.1995, H. Suzuki (NMST, No. 306: 52). In addition material from Canada, China, Columbia, Brazil, Germany, Norway, Thailand, and USA has been examined.

Diagnostic characters

The male imago can be separated from other species with superior and median volsellae by the shape of the accessory lobe of the inferior volsella, and AR of 0.74–1.48, an anal point length of 11–48 µm, and a clearly sinuate Cu_1.



FIGURES 1–4. *Pseudosmittia* spp., male imagines. 1–2. *P. bifurcata* (Tokunaga) (holotype of *P. ogasatridecima* Sasa *et* Suzuki), wing (1), hypopygium (2). 3. *P. danconai* (Marcuzzi) (holotype of *P. seiryupequea* Sasa, Suzuki *et* Sakai), hypopygium. 4. *P. forcipata* (Goetghebuer) (holotype of *P. mongolzeaea* Sasa *et* Suzuki), hypopygium.

Description

The species will be redescribed in a world-wide revision of *Pseudosmittia* (in prep.).

Ecology and distribution

The species is widely distributed throughout the Holarctic and known from the Neotropical region. The record from Thailand is from the highest mountain in the country near Chiang Mai in the north, but still within the Oriental region. Reared larvae are from moist or saturated soils over lateral lines of a septic system in an urban lawn. It is likely that larvae of this species typically inhabit similar types of moist or saturated organically rich substrate.

Pseudosmittia holsata **Thienemann *et* Strenzke**
(Fig. 5)

Pseudosmittia holsata Thienemann *et* Strenzke, 1940: 238.
Pseudosmittia hachijotertia Sasa, 1994: 48; Yamamoto (2004: 87). Syn. n.

Material examined

JAPAN: Tokyo Metrop., Hachijyo Island, Tohmi Water Fall, holotype ♂ of *P. hachijotertia*, 29.v.1994, M. Sasa (NMST, No. A 265: 69). In addition material from Austria, China, Germany, and USA has been examined.

Diagnostic characters

The male imago has 2 acrostichals, superior volsella consisting of rounded, well developed basal swelling of inner margin of gonocoxite and lacking microtrichia at the margin, triangular anal point, virga slightly more than 1/3 as long as the gonostylus, crista dorsalis preapical and conspicuous, and AR of 0.21–0.27. The female imago is characterised by R_{4+5} ending distal to the apex of M_{3+4}, costa with 23–24 non-marginal setae between R_1 and apex of R_{4+5}, and LR_1 of 0.53–0.55. Pupa with stronger anterior and posterior, weaker median shagreen on tergites, without spinules on tergal conjunctives III/IV, anal segment with 2 posterolateral mounds each with 2 strong contiguous teeth with setae between. Larva with 3 inner teeth on mandible, mentum with 4 pairs of lateral teeth, posterior parapods with 5 claws, and antennal blade subequal in length to width of basal antennal segment.

Description

The species will be redescribed in a world-wide revision of *Pseudosmittia* (in prep.).

Ecology and distribution

According to Strenzke (1950: 292) the larvae occur on submersed moss on solid substrates especially along the shores of lakes, but also in springs. The Nearctic larvae all were collected from a moist bank of the Savannah River. The species is known from Austria, Germany, China, Japan and the USA.

***Pseudosmittia jintuoctava* (Sasa) comb. n.**
(Figs. 6, 7)

Mesosmittia jintuoctava Sasa, 1990b: 46; Yamamoto (2004: 51).

Material examined

JAPAN: Honshu, Toyama Pref., Jinshu River at Ousawano, holotype ♂, 30.v.1989, M. Sasa (NMST, No. A 207: 38, misspelled *Mesosmittia jintunona*).

Diagnostic characters

The male imago differs from other Japanese species of the genus by antepronotal lobes not reduced medially, about 4 acrostichals, supraalar present, superior volsella indicated as basal swelling, and inferior volsella with accessory lobe.

Description

Male (n = 1). Total length 1.98 mm. Wing length 1.10 mm. Total length/wing length 1.80. Wing length/length of profemur 2.64. Coloration pale brown with darker brown vittae, preepisternum, scutellum and postnotum.

Head (Sasa 1990b: fig. 9a). AR 0.61. Terminal flagellomere 244 μm long, apically slightly expanded, then abruptly narrowed with pointed apex. Temporal setae 4, consisting of 1 inner vertical and 3 outer verticals. Clypeus with 6 setae. Tentorium 198 μm long, 30 μm wide. Stipes 83 μm long, 26 μm wide. Palpomere lengths (in μm): 26, 38, 56, 56, 71; third palpomere with 2 sensilla clavata.

Thorax (Sasa 1990b: fig. 9c). Antepronotal lobes not reduced medially, antepronotum with 4 lateral setae. Dorsocentrals 5, acrostichals 4, prealars 3, and 1 supraalar seta. Scutellum with 6 setae.

Wing (Fig. 6; Sasa 1990b: fig. 9d). VR 1.27. Anal lobe weak. Costal extension 26 μm long. R_{4+5} ending distal to apex of M_{3+4}; Cu_1 distinctly sinuate. Brachiolum with 1 seta, other veins bare.

Legs. Spur of fore tibia 34 μm long; spurs of middle tibia 19 μm and 15 μm long; of hind tibia 38 μm long, the other lost (Sasa 1990b: figs. 9e–g). Width at apex of fore tibia 26 μm, of middle tibia 30 μm, of hind tibia 34 μm. Number of setae in comb not measurable, but setae 21–34 μm long. Lengths and proportions of legs as in Table 2.

TABLE 2. Lengths (in μm) and proportions of legs of *Pseudosmittia jintuoctava* (Sasa) comb. n., male (n = 1)

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV
p_1	416	463	208	123	85	57	47	0.45	3.48	4.23
p_2	454	444	203	104	76	43	47	0.46	4.09	4.42
p_3	473	482	236	123	113	47	43	0.49	3.65	4.04

Hypopygium (Fig. 7; Sasa 1990b: fig. 9 h). Anal tergite apparently with complex, possibly divided anal point or longitudinal ridge (specimen distorted); tergite IX with about 8 setae; laterosternite IX apparently with 2 setae. Phallapodeme 95 μm long; transverse sternapodeme 59 μm long, with barely projecting oral projections. Virga 6 μm long, 5 μm wide at base. Gonocoxite 166 μm long; superior volsella barely indicated as basal swelling; median volsella absent; inferior volsella reaching to 0.66, accessory lobe to 0.75 of gonocoxite length. Gonostylus 55 μm long; megaseta broad, 9 μm long, 5 μm wide. HR 2.50, HV 2.99.

Female, pupa and larva: Unknown.

Remarks

The hypopygium of the only known specimen is squashed and partly on its side. The interpretation of the anal tergite having a ridge similar to that in *Mesosmittia* Brundin thus may be incorrect.

Distribution

The species is known only from Japan.

Pseudosmittia kisotriangulata **Sasa *et* Kondo**
(Figs. 8, 9)

Pseudosmittia kisotriangulata Sasa *et* Kondo, 1993: 101; Yamamoto (2004: 89).

Material examined

JAPAN: Honshu, Aichi Pref., Bisai, Kiso River, holotype ♂, 21.xii.1989, S. Kondo (NMST, No. 222: 73).

Diagnostic characters

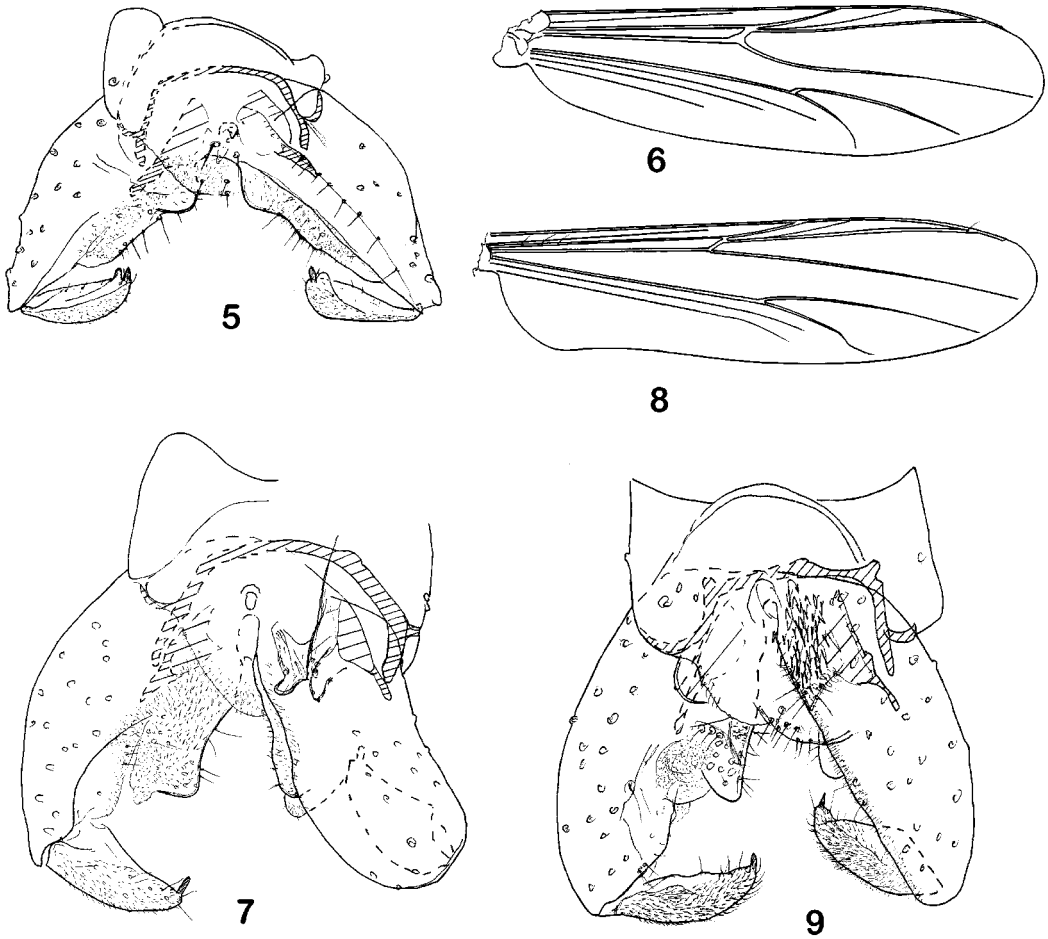
The species differs from other Japanese species except *P. oxoniana* by having a virga consisting of a median single spine difficult to distinguish, and strong lateral spinules; superior volsella absent; inferior volsella with accessory lobe always present; and dorsomedian sections of antepronotal lobes and oral projections of transverse sternapodeme usually well developed. The male imago differs from similar species by having an AR of about 2.0. Inner verticals appear to be lacking as in *P. ruttneri* Strenzke *et* Thienemann, 1942. The combination of very large body size, the high antennal ratio and strong virgal spines will separate the species from all other *Pseudosmittia.*

Description

Male (n = 1). Total length about 3.9 mm. Wing length 2.29 mm. Total length/wing length about 1.7. Wing length/length of profemur 3.23. Coloration brownish black.

Head (Sasa & Kondo 1993: fig. 7.4a). AR 2.02. Terminal flagellomere 808 µm long. Temporal setae about 5, consisting of outer verticals. Clypeus with 10 setae. Tentorium 143 µm long, 45 µm wide. Stipes 135 µm long, 45 µm wide. Palpomere lengths (in µm): 41, 75, 188, 152, 184; third palpomere apparently with 1 lanceolate sensillum clavatum.

Thorax (Sasa & Kondo 1993: fig. 7.4c). Antepronotum with well developed but slightly narrowed median lobes and apparently 2 lateral setae. Dorsocentrals 8, acrostichals 2, prealars 3, supraalars absent. Scutellum with 6 setae.



FIGURES 5–9. *Pseudosmittia* spp., male imagines. 5. *P. holsata* Thienemann *et* Strenzke (holotype of *P. hachijotertia* Sasa), hypopygium. 6–7. *P. jintuoctava* (Sasa), wing (6), hypopygium (7). 8–9. *P. kisotriangulata* Sasa *et* Kondo, wing (8), hypopygium (9).

Wing (Fig. 8; Sasa & Kondo 1993: fig. 7.4d). VR 1.18. Anal lobe projecting. Costal extension about 23 µm long, R_{4+5} ending distal to apex of M_{3+4}, Cu_1 sinuate. Brachiolum with 1 seta, R with 3 setae, R_{4+5} with 1 seta, other veins bare.

Legs. Spur of fore tibia 68 µm long, spurs of middle tibia 26 µm and 19 µm long, of hind tibia 60 µm and 23 µm long (Sasa & Kondo 1993: fig. 7.4e–g). Width at apex of fore and middle tibiae 43–45 µm each, of hind tibia 49 µm. Comb of 12 setae, 23–41 µm long. Lengths (in µm) and proportions of legs as in Table 3.

TABLE 3. Lengths (in µm) and proportions of legs of *Pseudosmittia kisotriangulata* Sasa *et* Kondo, male (n = 1).

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV
p_1	709	945	444	255	170	113	66	0.47	3.47	3.72
p_2	822	907	473	246	180	104	66	0.52	3.70	3.66
p_3	832	992	524	274	236	113	66	0.53	3.40	3.48

Hypopygium (Fig. 9; Sasa & Kondo 1993: fig. 7.4j): Anal point apparently about 32 µm long, tergite IX including anal point with about 15 setae, laterosternite IX with 7 setae. Phallapodeme 90 µm long; transverse sternapodeme 75 µm long, with weak oral projections. Virga consisting about 30 strong spinules and probably a median spine. Gonocoxite 236 µm long; superior volsella absent; inferior volsella prominent with low accessory lobe, reaching to 0.61 and 0.76 gonocoxite length, respectively. Gonostylus 94 µm long, megaseta 13 µm long. HR 2.52, HV about 4.1.

Female, pupa and larva: Unknown.

Distribution and ecology

The species is known only from the type locality, where it emerged from a bottom sample in the Kiso River. Like the closely related *P. ruttneri* this species thus is probably truly aquatic.

***Pseudosmittia littoralis* (Tokunaga)**

(Figs. 10, 11)

Spaniotoma (Smittia) littoralis Tokunaga, 1936: 303.
Smittia (Pseudosmittia) littoralis (Tokunaga); Goetghebuer (1940–1950: 107).
Pseudosmittia littoralis (Tokunaga); Yamamoto (2004: 89).

Type material

JAPAN: Holotype lost, paratypes Wakayama Prefecture, Seto, 5.vii.1934 and Mie Prefecture, Ukijama, 6.viii.1934, M. Tokunaga (KU) (not examined).

Diagnostic characters

The male imago can be separated from other members of the genus by the

combination of a strong apical seta on the antenna and an inferior volsella more triangular than in *Pseudosmittia xanthostola* (Kieffer) and *P. brevifurcata* (Edwards). According to Tokunaga (1936: plate viii, fig. 5) it also may have an accessory lobe of the inferior volsella.

Description

Male. No type material was available for loan, but the description by Tokunaga (1936) is reasonably complete. He gives the total length as about 1.2 mm and the coloration as dull black with brownish black abdomen, antennal ratio as 0.5–0.8 (0.6), temporals apparently consisting of outer verticals only, clypeus with 6 or 7 setae, and relative lengths of four last palpomeres as 6:15:17:28.

The median antepronotal lobes are reduced medially, with 2 lateral antepronotal setae; dorsocentrals probably relatively numerous since they are biserial in front; prealars 6–7; scutellum with 6 setae.

The wing as illustrated by Tokunaga (1936: fig. 1) is shown in Fig. 10. The VR_1 is about 1.65, VR_2 about 1.25, anal lobe obtuse, costa not extended and Cu_1 slightly sinuous.

The middle tibia carries only one apical spur, the hind tibial comb consists of 12–14 setae. The relative lengths of the leg segments (fe to ta_5) are as follows:

Fore leg: 19.5: 19.5: 13.5: 7: 4.5: 3: 3.

Mid leg: 20: 20: 11: 6: 4.5: 3: 3.

Hind leg: 22: 22: 14: 7: 7: 3: 3.

The hypopygium as illustrated by Tokunaga (1936: fig. 5) is reproduced in Fig. 11. The anal point is triangular with straight sides, pointed, and apparently with about 20 lateral setae. The phallapodeme, sternapodeme and virga are unknown. The inferior volsella is placed posterior on the gonocoxite, and apparently with an accessory lobe.

Female, pupa and larva: The female is inadequately described by Tokunaga (1936). However, according to Tokunaga (1964: 520) the gonocoxite has horn-like posterior extensions, i.e. similar to *P. guamensis* (Tokunaga) (Tokunaga 1964: fig. 7e). The pupa and larva are unknown.

Ecology and distribution

According to Tokunaga (1936: 303) the species was swarming in the evening on a gravelly seashore, about 10 cm above the ground and usually above the zone of the high-tide mark. The species is known only from the Pacific coast of Kii Peninsula, Honshu, Japan.

Pseudosmittia mathildae **Albu**

(Fig. 12)

?Pseudosmittia sp. B Strenzke (1950: 309).
Pseudosmittia mathildae Albu, 1968: 4.

Pseudosmittia itachibifurca Sasa *et* Kawai, 1987: 54; Yamamoto (2004: 87). Syn. n.
Pseudosmittia amamibifurca Sasa, 1990a: 132; Sæther and Ferrington (2003: 3); Yamamoto (2004: 87) as syn. of *P. itachibifurca*.
Pseudosmittia trilobata (Edwards, 1929: 364); Langton, (1991: 173), pro parte, misidentification.
Pseudosmittia furudobifurca Sasa *et* Arakawa, 1994: 100; Yamamoto (2004: 88) as syn of *P. itachibifurca*. Syn. n.
Pseudosmittia hibaribifurca Sasa, 1993: 80; Yamamoto (2004: 88) as syn of *P. itachibifurca*. Syn. n.
Pseudosmittia (Nikismittia) shofukuundecima Sasa, 1998a: 42; Yamamoto (2004: 88) as syn of *P. itachibifurca*. Syn. n.
Diplosmittia amamibifurca (Sasa); Sæther *et al.* (2000: 185).
Diplosmittia furudobifurca (Sasa *et* Arakawa); Sæther *et al.* (2000: 185).
Diplosmittia hibarabifurca (Sasa) Sæther *et al.* (2000: 185).
Diplosmittia itachibifurca (Sasa); Sæther *et al.* (2000: 185).
Diplosmittia shofukuundecima (Sasa); Sæther *et al.* (2000: 185).

Material examined

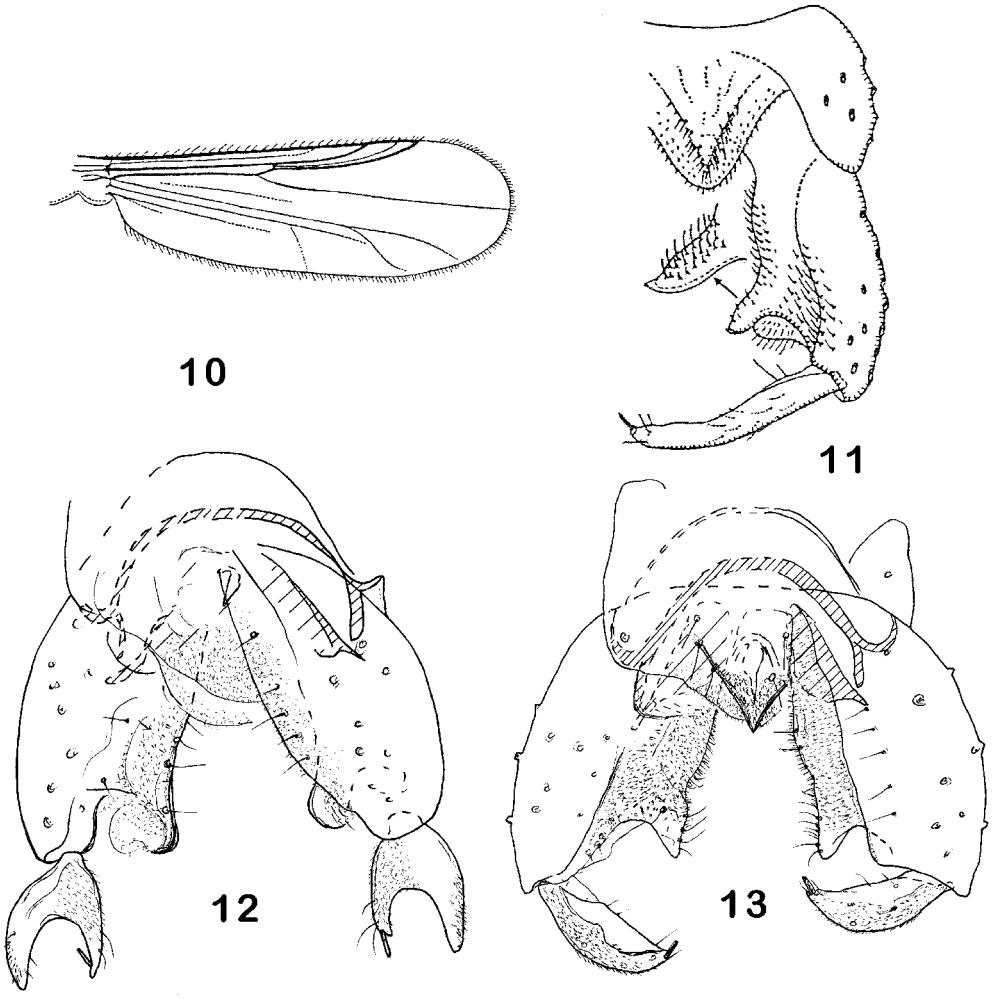
JAPAN: Honshu, Toyama Pref., Itachigawa River, holotype ♂ of *P. itachibifurca*, 16.iv.1986, S. Nagai *et al.* (NMST, No. A 115: 03); Honshu, Toyama Pref., Lake Furudo, holotype ♂ of *P. furudobifurca*, 23.viii.1993, M. Sasa & R. Arakawa (NMST, No. A 248: 37); Honshu, Toyama Pref., Kurobe, holotype ♂ of *P. shoufukuundecima*, 30.iv.1996, M. Sasa (NMST, No. 326: 50); Honshu, Fukushima Pref., Lake Hibara, holotype ♂ of *P. hibarabifurca*, 8.vi.1991, M. Sasa (NMST, No. A 223: 90); Nansei Archipelago, Kagoshima Pref., Amami-Oshima Is., Yakkachei River, holotype and paratypes ♂ of *P. amamibifurca*, 18.iii .1989, M. Sasa & S. Hattori (NMST, holotype: No. A 179: 21, paratypes: Nos 179: 22–27). Material from China, Germany, Italy, and USA also has been examined.

Diagnostic characters

Antenna without apical strong seta. Antepronotal lobes reduced medially, 2 acrostichals, no supraalars. Postcubitus not forked, R_{4+5} ending well proximal to apex of M_{3+4}. Anal point small and triangular, superior volsella absent, inferior volsella with accessory lobe placed well posterior on gonocoxite, gonostylus bilobed. Female without posterolateral projection on gonocoxite, tergite IX divided by median line only, seminal capsule ovoid and relatively dark. Pupa with stronger anterior and posterior shagreen on tergites, with nose on wing sheath, without setae on anal segment, tergite IX with longitudinal ridge carrying 2–3 rows of strong points, genital sac with spinules in both sexes. Larvae with 3 inner teeth on mandible, 4 pairs of lateral teeth on mentum; posterior parapods with 8 claws, 15–18 μm long; antennal blade longer than basal segment, about as long as the latter is wide.

Description

All stages of the species will be redescribed in a world-wide revision of *Pseudosmittia* (in prep.).



FIGURES 10–13. *Pseudosmittia* spp., male imagines. 10–11. *P. littoralis* (Tokunaga), wing (10), hypopygium (11), both from Tokunaga (1936). 12. *P. mathildae* Albu (holotype of *P. amamibifurca* Sasa), hypopygium. 13. *P. nishiharaensis* Sasa *et* Hasegawa (holotype), hypopygium.

Remarks

Pseudosmittia itachibifurca may represent a different species since the AR was described as 0.64–0.84 and the gonostylus as lacking a megaseta. However, non-Japanese specimens show an AR of 0.42–0.60, and a variation of 0.29–0.84 is not unusual in other species of *Pseudosmittia.* As shown by Yamamoto (2004: 88) the megaseta is present.

Pseudosmittia amamibifurca could be regarded as a subspecies since the AR is lower than in other populations and the type locality (Nansei Archipelago, in the Oceanic (Indo-Pacific Region) represents the only record from outside the Holarctic Region.

Pseudosmittia mathildae differs from most members of the genus in having a bifurcate gonostylus. For this reason, some past assignments on the basis of the male imago alone

have resulted in generic misplacement (see the list of synonyms above). However, the immature stages show the species is an atypical member of *Pseudosmittia.*

Ecology and distribution

The larvae from the USA are from moist banks along rivers and streams and the larva mentioned by Strenzke as *Pseudosmittia* sp. B, which is most likely the larva of *P. mathildae,* was collected from water-saturated peat in a bog. The species is known from Austria, southern Germany, northern Italy, Romania, China, Japan including the Nansei Archipelago, and in the USA from Alabama, Georgia and South Carolina. One of the samples from China, Guangdong, is from well within the Oriental Region.

Pseudosmittia nishiharaensis **Sasa *et* Hasegawa**
(Fig. 13)

Pseudosmittia nishiharaensis Sasa *et* Hasegawa, 1988: 247; Yamamoto (2004: 89).
Pseudosmittia linguata Caspers *et* Reiss, 1989: 128; Sæther and Ferrington (2003: 5).
Pseudosmittia yakymenea Sasa *et* Suzuki, 2000a: 92; Yamamoto (2004: 90). Syn. n.
Pseudosmittia yakyneoa Sasa *et* Suzuki, 2000a: 93; Yamamoto (2004: 90). Syn. n.

Material examined

JAPAN: Ryukyus, Okinawa Pref., Miyako Island, Nishihara, holotype ♂, 3.ii.1982, M. Sasa & H. Hasegawa (NMST, No. A 65:22); Ryukyus, Okinawa Pref., Miyako, Ikema, and Okinawa (Kochinda, Yara Bridge, Kadena-cho) Islands, paratypes 11 ♂, 2 doubtful ♀, including 2 misidentified ♂, 11.xii.1981, 28.i.1982, 3.ii.1982, M. Sasa & H. Hasegawa (NMST, Nos A 65: 13 (misidentified *P. ikemaensis* = *P. topei*), 19–21, 24, 83–84); Kagoshima Pref., Osumi Islands, Yakushima Island, Miyanoura, Issogawa, holotype ♂ of *P. yakymenea,* holotype ♂ of *P. yakyneoa,* 23.iii.1999, H. Suzuki (NMST, holotype of *P. yakymenea:* No. 382: 27, holotype of *P. yakyneoa:* No. 382: 28). In addition material from China, Italy, Thailand, and Turkey has been examined.

Diagnostic characters

The presence of a strong apical antennal seta combined with a forked postcubitus, AR of 0.9–1.4, and the apically truncate and up-curved gonostylus separate this species from other members of the genus.

Description

The species will be redescribed in a world-wide revision of *Pseudosmittia* (in prep.).

Remarks

Sasa and Hasegawa (1988), Caspers and Reiss (1989) and Sasa and Suzuki (2000a) overlooked the postcubital forking which is indistinct and difficult to distinguish in most specimens. The anal point in Sasa and Suzuki (2000a) is wrongly drawn.

Distribution

The species is known from Italy, Turkey, China, Japan (including Indo-Pacific areas), and Thailand.

***Pseudosmittia oxoniana* (Edwards)**
(Fig. 14)

Camptocladius oxonianus Edwards, 1922: 204.
Spaniotoma (Smittia) recta Edwards, 1929: 362; Sæther and Ferrington (2003: 4).
Pseudosmittia schachti Casper *et* Reiss, 1989: 130, pro parte (paratype not holotype).
Pseudosmittia kurobeokasia Sasa *et* Okazawa, 1992a: 57; Yamamoto (2004: 89). Syn. n.
Pseudosmittia togarisea Sasa *et* Okazawa, 1992b: 160; Sæther and Ferrington (2003: 4); Yamamoto (2004: 78) as *Prosmittia.* Syn. n.
Pseudosmittia hachijosecunda Sasa, 1994: 47; Yamamoto (2004: 87). Syn. n.
Pseudosmittia toyamaresea Sasa, 1996a: 39; Yamamoto (2004: 89). Syn. n.
Pseudosmittia yakyopea Sasa *et* Suzuki, 2000a: 94; Yamamoto (2004: 90). Syn. n.
Pseudosmittia yakypequea Sasa *et* Suzuki, 2000a: 94; Yamamoto (2004: 90). Syn. n.
Parakiefferiella hidakagehea Sasa *et* Suzuki, 2000b: 188; Yamamoto (2004: 87) as *Pseudosmittia.* Syn. n.
Parakiefferiella hidakaheia Sasa *et* Suzuki, 2000b: 189; Yamamoto (2004: 87) as *Pseudosmittia.* Syn. n.
Not *C. oxonianus* Edwards sensu Edwards (1937: 146), misidentification (= *P. ruttneri*).

Material examined

JAPAN: Tokyo Metro, Hachijyo Island, Tohmi Water Fall, holotype ♂ of *Pseudosmittia hachijosecunda,* 29.v.1994, M. Sasa (NMST, No. A 265: 68); Honshu, Toyama Pref., Kureha Hill, holotype ♂ of *Pseudosmittia toyamaresea,* 21.v.1994, M. Sasa (NMST, No. A 275: 96); Honshu, Toyama Pref., Kurobe, Unazuki Town, Keyakadaira and Aimota Bridge holotype ♂ and 5 ♂ paratypes of *P. kurobeokasia,* 21.v.1991, M. Sasa & T. Okazawa (NMST, Holotype: No. A 233: 71, paratypes: Nos 233: 72–76); Honshu, Toyama Pref., Toga-Mura, holotype ♂ of *P. togarisea,* 31.v.1990, Toyama Envir. Poll. Res. Centre (NMST, No. A 182: 69), paratype ♂ as holotype (NMST, No. A 189: 70); Kagoshima Pref., Osumi Islands, Yakushima Island, Miyanoura, holotype ♂ of *P. yakypeqea*, syntype ♂ of *P. yakyopea*, 23. & 28.iii.1999, H. Suzuki (NMST, Holotype of *P. yakypeqea:* No. 386: 25, syntype of *P. yakyopea:* No. 382: 46); Hokkaido, Hidaka, Shizunai River, holotype ♂ of *P. hidakagehea,* 26.ix.1998, H. Suzuki (NMST, No. 401: 25); Hokkaido, Hidaka, Shizunai River, holotype ♂ and 2 ♂ paratypes of *P. hidakaheia*, 26.ix.1998, H. Suzuki (NMST, Holotype: No. 401: 34, paratypes: Nos 401: 32, 33). In addition material

from England, France, Greece, The Netherlands, Norway (including Bear Island), Turkey, Wales, Morocco, China, Canada, Greenland, and USA has been examined.

Diagnostic characters

The imagines differ from other *Pseudosmittia* by having the longest inner verticals ranging from 40–60 μm (absent or short and inconspicuous in nearly all other members of the genus). The male imago differs from other members of the genus by having an AR of 0.40–0.71, a more or less pronounced outer heel on the gonostylus, and the accessory lobe of the inferior volsella not free at the apex. The female imago differs from other known members of the genus by lacking non-marginal setae on the costa between FR and the apex of R_{4+5} and having long, fine microtrichia on the seminal capsules. The pupa is characterized by possessing frontal setae and frontal warts and wrinkles, spinules or tubercles on the frontal apotome. The tentatively associated larva differs from other *Pseudosmittia* by having anterior parapods with about 20 larger claws, 9 claws on posterior parapods, mandible with 4 inner teeth and mentum with 4 pairs of lateral teeth.

Description

The species will be redescribed in a world-wide revision of *Pseudosmittia* (in prep.).

Remarks

Pseudosmittia togarisea was described as lacking acrostichals (Sasa & Okazawa 1992b: 160), which lead Yamamoto (2004: 78) to place the species in *Prosmittia.* No acrostichals could be observed on the holotype, but the area where they should be is obscured by a fold. Furthermore, although the inner vertical seta itself is lost its remaining base shows that the seta is strong, i.e. a distinguishing feature of *P. oxoniana.*

Sæther and Ferrington (2003: 4) placed *P. kurobeokasia* as a synonym of *P. ruttneri* based in part on the absence of inner verticals. However, at least some of the type specimens have a long inner vertical, resulting in synonomy with *P. oxoniana* instead. Some other specimens appear to be lacking an inner vertical, but the preparations are not clear enough to state this with certainty.

Ecology and distribution

The species is truly aquatic, probably living in algal growths on stones. It is known from Austria, France, Great Britain, Greece, The Netherlands, Norway (including Bear Island), Sweden, Turkey, China, Japan (including Pacific areas), the Northwest Territories of Canada, Greenland, and USA (South Dakota).

***Pseudosmittia togadistalis* Sasa, Watanabe *et* Arakawa**

(Figs. 15–17)

Pseudosmittia togadistalis Sasa, Watanabe *et* Arakawa, 1992: 233; Yamamoto (2004: 89).

Material examined

JAPAN: Honshu, Toyama Pref., Toga-Mura, Yachidani, holotype ♂, 8.xii.1992, M. Watanabe & R. Arakawa (NMST, No. A 191: 95). Paratypes ♂, ♀, as holotype (NMST, Nos A 191: 76, 96).

Diagnostic characters

The hook-like apical projection of the phallapodeme ending in 2–3 distinct, sharp teeth will separate the species from all other species in the genus.

Description

Male (n = 2). Total length 2.17–2.29 mm. Wing length 1.23–1.25 mm. Total length/ wing length 1.77–1.83. Wing length/length of profemur 3.43–3.44. Coloration brownish black.

Head (Sasa *et al.* 1992: fig. 3a). AR 0.49–0.51. Terminal flagellomere 221–231 μm long. Temporal setae 4, consisting of 1 inner vertical and 3 outer verticals. Clypeus with 4 setae. Tentorium 120 μm long, 30–34 μm wide. Stipes 105–124 μm long, 38 μm wide. Palpomere lengths (in μm): 26, 34, 75–79, 71, 98–105; third palpomere with 1 lanceolate sensillum clavatum.

Thorax (Sasa *et al.* 1992: fig. 3b, c). Antepronotal lobes slightly narrowed medially, antepronotum with 1 lateral seta. Dorsocentrals 5–6, acrostichals 2, prealars 3, supraalar seta absent. Scutellum with 2 setae.

Wing (Fig. 15; Sasa *et al.* 1992: fig. 3d). VR 1.33–1.34. Anal lobe weak, not projecting. Costa not extended. R_{4+5} ending distal to apex of M_{3+4}; Cu_1 sinuate. Brachiolum with seta, other veins apparently bare.

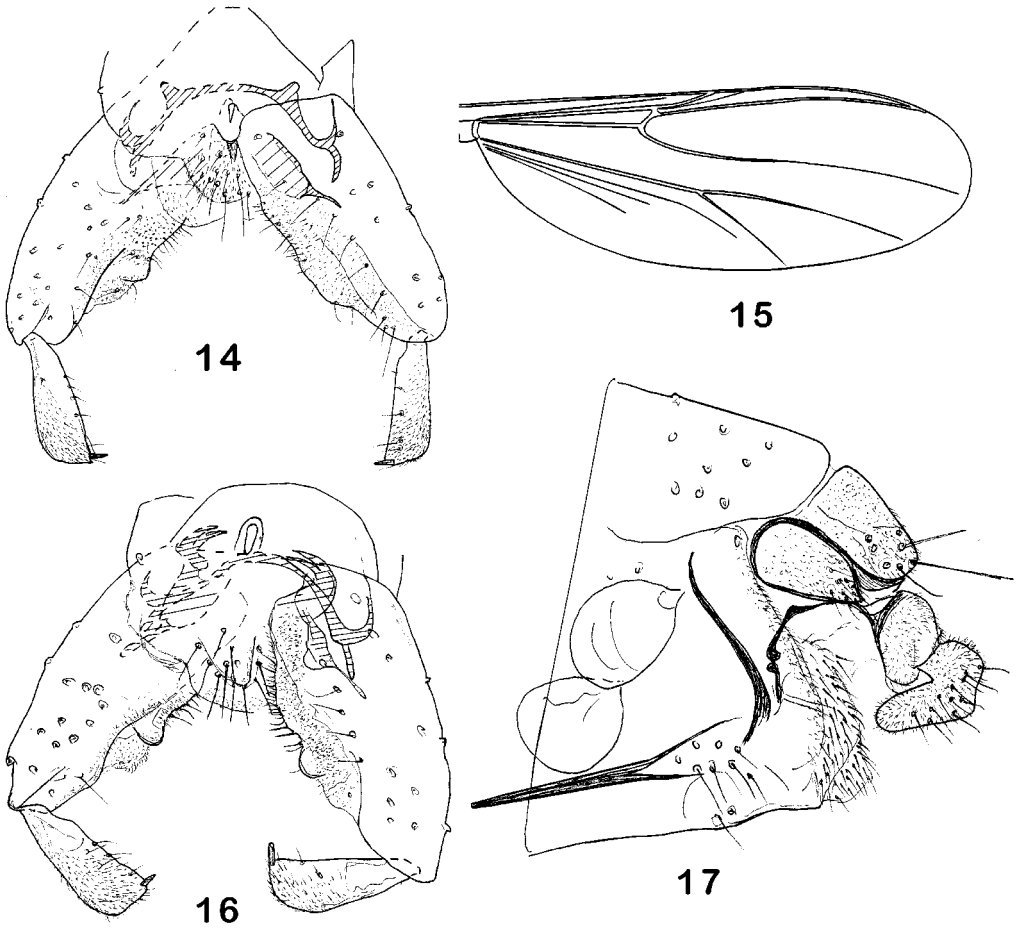
Legs. Spur of fore tibia 30 μm long, spurs of middle tibia 17–19 μm and 17 μm long, of hind tibia 38–41 μm and 19 μm long (Sasa *et al.* 1992: fig. 3e–g). Width at apex of fore tibia 30 μm, of middle tibia 26–30 μm, of hind tibia 34 μm. Comb of 11 setae, 19–30 μm long. Lengths (in μm) and proportions of legs as in Table 4.

TABLE 4. Lengths (in μm) and proportions of legs of *Pseudosmittia togadistalis* Sasa, Watanabe *et* Arakawa, male (n = 2).

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV
p_1	397–406	505–524	222–232	132–151	99–104	52	43–47	0.43–0.44	3.00–3.44	4.02–4.13
p_2	473–482	520–529	232–241	118–128	85–90	47–52	43–47	0.45–0.46	4.02–4.11	4.20–4.11
p_3	473–491	520–548	274–288	132–151	128–142	57–61	47	0.53	3.31–3.48	3.61–3.62

Hypopygium (Fig. 16; Sasa *et al.* 1992: fig. 3i, j). Anal point 19–24 μm long, 12–14 μm wide at base, triangular and rounded, apparently without setae; tergite IX with 16–18 setae; laterosternite IX with 6–7 setae. Phallapodeme 78 μm long, with conspicuous

28–31μm long apical hook with 2–3 teeth 19–24 μm long; transverse sternapodeme without oral projection. Virga apparently consisting of a very weak median spine, about 17–19 μm long, no lateral spinules observed. Gonocoxite 156–166 μm long; superior volsella barely indicated; inferior volsella reaching to 0.57–0.60 gonocoxite length, accessory lobe weakly developed and reaching to 0.70–0.71 gonocoxite length. Gonostylus 66–71 μm long; megaseta 9–11 μm long. HR 2.33–2.36, HV 3.06–3.47.



FIGURES 14–17. *Pseudosmittia* spp., imagines. 14. *P. oxoniana* (Edwards) (paratype of *P. kurobeokasia* Sasa *et* Okazawa), hypopygium. 15–17. *P. togadistalis* Sasa, Watanabe *et* Arakawa, wing (15), hypopygium (holotype) (16), female genitalia (17).

Female (n = 1). Total length 1.51 mm. Wing length 1.03 mm. Total length/wing length 1.47. Wing length/length of profemur 3.52. Coloration brown, paler than male.

Head (Sasa *et al.* 1992: fig. 3k). AR 0.44. Lengths (in μm) of flagellomeres: 60, 38, 38, 45, 83. Temporal setae 4, including 1 inner and 3 outer verticals. Clypeus with 6 setae. Tentorium 98 μm long, width not measurable. Stipes not measurable. Palpomere lengths (in μm): 23, 30, 68, 64, 86; third palpomere with 1 scalpellate sensillum clavatum. Coronal suture complete.

Thorax. Antepronotum with 1 seta. Dorsocentrals 4, acrostichals 2, prealars 3, no supraalar seta. Scutellum with 2 setae.

Wing. VR 1.40. Anal lobe weak. Costa not extended. R_{4+5} ending distal of apex of M_{3+4}; Cu_1 slightly curved. Costa between FR and apex of R_{4+5} with 9 non-marginal setae. Brachiolum with 1 seta, R with 5 setae, apparently no other setae on veins.

Legs. Spur of fore tibia 23 µm long, spurs of middle tibia both 15 µm long, of hind tibia 34 µm and 15 µm long. Width at apex of fore and middle tibiae 24–26 µm each, of hind tibia 34 µm. Comb of 11 setae, shortest setae 19–30 µm long. Lengths (in µm) and proportions of legs as in Table 5.

TABLE 5. Lengths (in µm) and proportions of legs of *Pseudosmittia togadistalis* Sasa, Watanabe *et* Arakawa, female (n = 1).

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV
p_1	293	369	161	85	76	38	33	0.44	3.55	4.12
p_2	359	402	170	85	66	33	33	0.42	4.26	4.47
p_3	369	387	194	90	95	38	33	0.50	3.72	3.90

Abdomen. Tergite I without setae, T II–VII each with about 6-9 setae, T IX with 15 setae. Sternite I, II and perhaps III bare, S IV–VII each with 4–7 setae, S VIII with 20 setae.

Genitalia (Fig. 17). Gonocoxite IX with 7 setae. Tergite IX apparently divided, with altogether 7 setae. Cercus as in Sasa *et al.* (1992: fig. 3m). Seminal capsule (Sasa *et al.* 1992: fig. 3l, m) dark, ovoid; 64 µm long, 50 µm wide; microtrichia not observed. Notum 88 µm long.

Distribution

The species is known only from the type locality in Japan.

***Pseudosmittia tokaraneoa* Sasa *et* Suzuki**

(Figs. 18, 19)

Pseudosmittia tokaraneoa Sasa *et* Suzuki, 1995: 278; Yamamoto (2004: 89).
Pseudosmittia famikelea Sasa, 1996a: 60; Yamamoto (2004: 87). Syn. n.

Material examined

JAPAN: Kagoshima Pref., Tokara Islands, Kuchinoshima, holotype ♂, 10.v.1994, H. Suzuki (NMST, No. A 287: 42); paratypes 2 ♂ as holotype (NMST, No. A 287: 43, 44); Honshu, Toyama Pref., Kureha Hill, holotype of *P. famikelea* ♂, 24.viii.1993, (NMST, No. A 254: 81); paratype ♂ of *P. famikelea*, as holotype (NMST, No. A 254: 82)

Diagnostic characters

The nearly cuneate wing with postcubital fork, weak inferior volsella, curved gonostylus and very long U-shaped virga separate the male imago from all other *Pseudosmittia.*

Description

Male (n = 3–4, unless otherwise stated). Total length not measurable (1.54–1.66 mm in Sasa & Suzuki 1995; Sasa 1996a). Wing length 0.78–0.83, 0.81 mm (5). Wing length/ length of profemur 3.19–3.32, 3.27. Coloration according to Sasa (1996a) largely yellow with scutal stripes and postnotum brown.

Head (Sasa & Suzuki 1995: fig. 18a; Sasa 1996a: fig. 50a). AR 0.73–0.81, 0.73. Tentorium 90–98 μm long, 11–19 μm wide. Stipes not measurable. Palpomere lengths (in μm): 11–19, 14; 19–23, 21; 23–34, 29; 30–38, 33; 45–53, 48; third palpomere apparently with 1 lanceolate sensillum clavatum.

Thorax (Sasa & Suzuki 1995: fig. 18b, c; Sasa 1996a: fig. 50b, c). Antepronotal lobes narrowed medially, antepronotal setae not observed. Dorsocentrals 4–5, 5; acrostichals 2; prealars 2; supraalar seta absent. Scutellum with 2 setae.

Wing (Fig. 18; Sasa & Suzuki 1995: fig. 18d; Sasa 1996a: fig. 50d). Wing nearly cuneiform with postcubital fork. VR_1 1.76–1.81, 1.79; VR_2 1.27–1.44, 1.41. Costa not extended. R_{4+5} ending above apex of slightly curved Cu_1. Brachiolum with 1 seta, other veins apparently bare.

Legs. Spur of fore tibia 23–26, 25 μm long; spurs of middle tibia 11–15 μm and 11 μm long; of hind tibia 23–26 μm and 11–15 μm long (Sasa & Suzuki 1995: fig. 18e–g; Sasa 1996a: fig. 50e–g). Width at apex of fore tibia 19–21, 20 μm; of middle tibia 19–23 μm; of hind tibia 26–30, 28 μm. Comb of about 10–11 setae, 15–30 μm long. Lengths (in μm) and proportions of legs as in Table 6.

TABLE 6. Lengths (in μm) and proportions of legs of *Pseudosmittia tokaraneoa* Sasa *et* Suzuki, male (n = 3–4).

	fe	ti	ta_1	ta_2	ta_3	ta_4
p_1	246–250, 248	298–312, 303	165–175	66–76	57–66	28–43
p_2	312–340	340–350	161	76–80	57–66	28–33
p_3	302–312, 307	364–369, 354	161–175, 169	85–95, 90	85–90, 88	33–38, 34

	ta_5	LR	BV	SV	BR
p_1	28	0.53–0.59	3.53–3.73	3.15–3.37	1.7–2.4 (2)
p_2	28	0.46–0.47	4.14	4.11–4.24	2.6–2.9 (2)
p_3	28–33, 29	0.47–0.49, 0.48	3.40–3.53, 3.45	3.89–4.00, 3.94	2.8–3.7

Hypopygium (Fig. 19; Sasa & Suzuki 1995: fig. 18i; Sasa 1996a: fig. 50a): Anal point triangular with rounded apex, 14–21, 17 μm long; 14–26, 22 μm wide at base; with 8–10, 9 setae, no further setae on tergite IX; laterosternite IX apparently with 3 setae. Phallapodeme 52–76, 61 μm long; transverse sternapodeme 52–66, 59 μm long, with oral projection barely indicated. Virga consisting of a very large U-shaped spine, 62–86, 69 μm long. Gonocoxite 109–123, 115 μm (5) long; superior volsella absent; inferior volsella very low, reaching to 0.62–0.70, 0.70 (5) gonocoxite length, accessory lobe weakly developed. Gonostylus curved; 57–63, 61 μm (5) long; crista dorsalis conspicuous, apical, rounded, about as high as megaseta; megaseta 7–11, 9 μm (5) long. HR 1.84–1.96, 1.90 (5).

Remarks

According to Yamamoto (2004: 89) there is no anal point on the holotype of *P. tokaraneoa*. However, the anal point, although difficult to observe, is present in all type specimens. Sasa & Suzuki (1995) interpreted the virga as consisting of several spines. In fact it is a strong U-shaped spine as illustrated by Sasa (1996a) for *P. famikelea.*

Distribution

The species is known only from Tokara Islands and Honshu, Japan.

Pseudosmittia topei **Lehmann**

(Fig. 20; Sasa & Hasegawa 1988: fig. 5; Sasa & Suzuki 1993: fig. 9)

Pseudosmittia topei Lehmann, 1979: 46.
Pseudosmittia ikemaensis Sasa *et* Hasegawa, 1988: 244; Yamamoto (2004: 87). Syn. n.
Pseudosmittia amamiagina Sasa *et* Suzuki, 1993: 116; Yamamoto (2004: 87). Syn. n.

Material examined

JAPAN: Ryukyus, Okinawa Pref., Miyako, Ikema Island, holotype ♂ of *P. ikemaensis*, 3.ii.1982, M. Sasa & H. Hasegawa (NMST, No. A 65: 12); paratypes 16 ♂, as holotype (NMST, Nos A 56: 9, 14; A 65: 10, 11, 27, 29), paratype ♂ of *P. nishiharaensis* (misidentified), as holotype (NMST, No. A 65: 13); Nansei Arcipelago, Kagoshima Pref., Amami-Oshima Island, Agina, holotype ♂ of *P. amaiagina*, 31.viii.1991, S. Hattori *et al.* (NMST, No. A 226: 61), paratype ♂, as holotype (NMST, No. A 226: 62).

Diagnostic characters

The male imago is separable from other species by having a narrowly triangular anal point covered with microtrichia, bluntly triangular inferior volsella, slightly sinuate Cu_1 and usually no postcubital fork (forked in the holotype of *P. ikemaensis* and a few other specimens). The species differs from the West Palaearctic *P. brevifurcata* (Edwards, 1926)

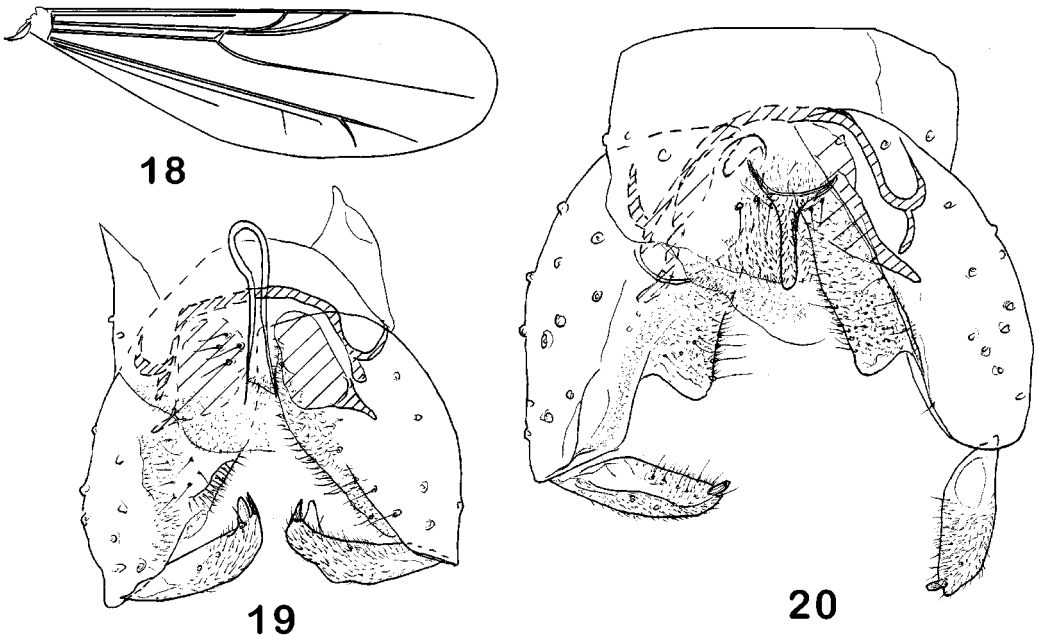
by having only 2–4 spatulate sensilla clavata and apparently no sensillum capitatum. *P. brevifurcata* has 7–12 sensilla clavata in a more or less distinct sensillum capitatum.

Description

The species will be redescribed in a world-wide revision of *Pseudosmittia* (in prep.).

Remarks

The wing length of *P. ikemaensis* is 1.10–1.27 mm, the antennal ratio 0.95–1.31, and LR_3 0.65–0.68, whereas in *P. amamiagina* the wing length is 0.84–0.86 mm, the AR 1.04 and LR_3 0.60–0.63. However, in the same sample from Ankasa in Ghana one specimen has an AR of 0.53 and a wing length of 0.76 mm, while another has an AR of 1.09 and a wing length of 0.96 mm showing the possibility of a large variation even within a single population.



FIGURES 18–20. *Pseudosmittia* spp., male imagines. 18–19. *P. tokaraneoa* Sasa *et* Suzuki, wing (18), hypopygium (19). 20. *P. topei* Lehmann (paratype of *P. ikemaensis* Sasa *et* Hasegawa), hypopygium.

Distribution

The species is known from the Congo, Ghana, Tanzania and from the Japanese islands of Ikema in Okinawa and Amami in the Nansei Archipelago, Japan.

Species expected to be found in Japan

Pseudosmittia aizaiensis Wang, 1990, *P. nanseni* (Kieffer, 1926), *P. trilobata* (Edwards, 1929) and *P. ruttneri* Strenzke *et* Thienemann, 1942, occur in China and/or Mongolia and the Russian Far East. The known distribution of *P. azaiensis* is small and *P. ruttneri* may be replaced by its sister species, *P. kisotriangulata* in Japan. *Pseudosmittia nanseni* and *P. trilobata*, however, are widespread and very likely to be found in mainland Japan.

The Oriental or Pacific archipelagos of Japan also are likely to contain some of the more widespread species found in the Indo-Pacific and Oriental regions including *P. guineensis* (Kieffer), *P. triangula* (Tokunaga) and *P. brachydicrana* (Edwards) and perhaps also some of the species more limited in distribution described by Tokunaga (1964) from Micronesia and surrounding areas.

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