国立公害研究所研究報告　第43号
Research Report from the National Institute for Environmental Studies, Japan, No. 43, 1983

R—43—'83

Studies on chironomid midges of the Tama River

Part 5. An observation on the distribution of Chironominae along the main stream in June, with description of 15 new species

Manabu SASA

Part 6. Description of species of the subfamily Orthocladiinae recovered from the main stream in the June survey

Manabu SASA

Part 7. Additional species collected in winter from the main stream

Manabu SASA and Kazuyo ICHIMORI

NIES

THE NATIONAL INSTITUTE FOR ENVIRONMENTAL STUDIES

環境庁　国立公害研究所

Studies on chironomid midges of the Tama River

Part 5. An observation on the distribution of Chironominae along the main stream in June, with description of 15 new species

Manabu SASA

Part 6. Description of species of the subfamily Orthocladiinae recovered from the main stream in the June survey

Manabu SASA

Part 7. Additional species collected in winter from the main stream

Manabu SASA and *Kazuyo ICHIMORI*

The National Institute for Environmental Studies

March, 1983

* This study was supported by Grants in Aid of Scientific Research, Ministry of Education, by the Toyota Foundation, and by Tokyu Kankyojoka Foundation.

Studies on chironomid midges of the Tama River

CONTENTS

Part 5

An observation on the distribution of Chironominae along the main stream in June, with description of 15 new species

Manabu SASA[1)]

1) Former Director, National Institute for Environmental Studies. Present Address: Toyama Medical and Pharmaceutical University, Toyama-shi, 930-01

CONTENTS

INTRODUCTION

The River Tama chosen as a target of our studies on the density and distribution of chironomids in relation to the degree of pollution is a typical medium-sized river in Japan, with a length of 123 km from its farthest watershed to the rivermouth, and a basin of some 1,240 km^2 covering more than half of the Large Tokyo Metropolitan Area. Because this river is most closely situated to the City of Tokyo and is a principal source of supply of water to this big city, comprehensive studies have been made on the physical, chemical and biological characteristics of this river by large numbers of workers, as reviewed in a report by Ogura *et al.* (1981)*.

This study is a continuation of a series of investigations on chironomid midges of Japan initiated by the author and his colaborators in the National Institute for Environmental Studies, comprising No. 11 of this series. A series of reports were made on the chironomid fauna of Minamiasakawa, a tributary of this river, by Sasa et al. (1980, 1981). The present study is intended to see whether the information obtained from a tributary is applicable to the main stream of the River Tama, and to larger rivers in Japan. Altogether 10 collection sites were chosen along the main stream and were named Station A, B to J, as shown in Figure 1. Two or three samples of bottom sediments, i.e. mud, sand, stones or fallen leaves, were collected at these stations, each about half a kilogram in weight, and were brought to laboratory of Teikyo University School of Medicine, where they were transferred to plastic containers in order to recover adult midges and pupal exuviae according to the method same as described in the previous papers (Sasa, 1979, 1980, 1981). Collection of samples was carried out in two occasions, on 12 June 1981 by M. Sasa and A. Shirasaka, from Stations A to F, and on 28 June 1981 by M. Sasa, Y. Eshita, O. Arakawa and T. Yanagibashi from Stations F to J.

As a result of this survey, a total of 55 species of the family Chironomidae were confirmed as inhabiting in the main stream system of the River Tama, which included 30 species of the subfamily Chironominae, 20 species of the subfamily Orthocladiinae, and 5 species of the subfamily Tanypodinae. The numbers of males and females recovered from samples collected at each station are shown in Table 1. In the present paper, biological and taxonomical accounts are made on species belonging to the subfamily Chironominae, and that on other subfamilies will be presented in subsequent papers.

Of 22 species of the tribe Chironomini recorded in the present survey, 11 were reported by Sasa (1981a, b) from Minamiasakawa River or elsewhere from Japan, and the rest 11 are new species. Of 8 species of the tribe Tanytarsini, 4 were recorded from Minamiasakawa, and the other 4 are described as new species. Altogether 20 species of Orthocladiinae were recovered in this survey, among which 13 were identified as being the same as those reported from Minamiasakawa, 5 are considered as new species, and another 2 as new forms to be identified in future studies.

---

*Ogura, N. (1981, ed.): Impact of human activities on the ecosystem dynamics of the Tama watershed. Kankyokagaku Tokubetsukenkyu, Tamagawa-han, No. 3 (B74-R12-4), 263 pp.

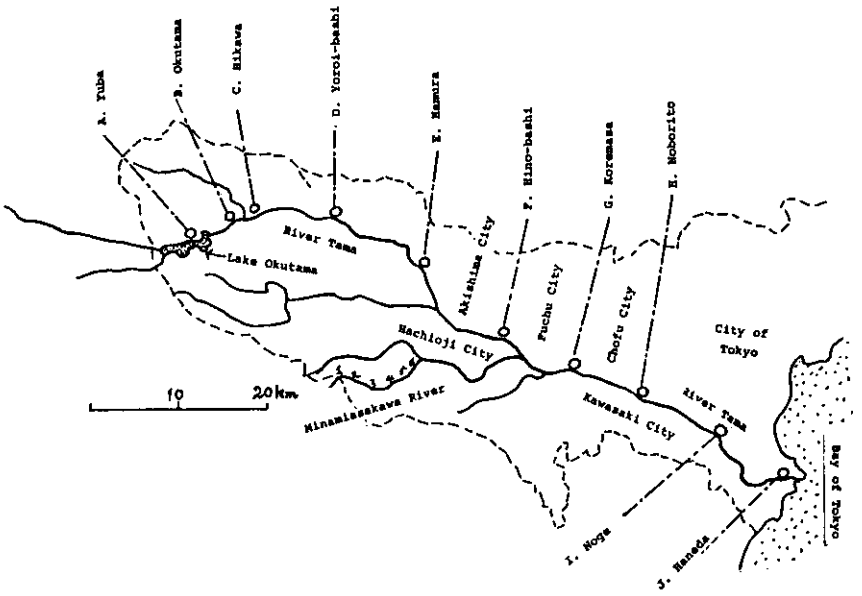


Fig. I Map of the River Tama and its main tributaries, showing collection sites of chironomid samples

---------- border of the Tokyo Metropolitan area

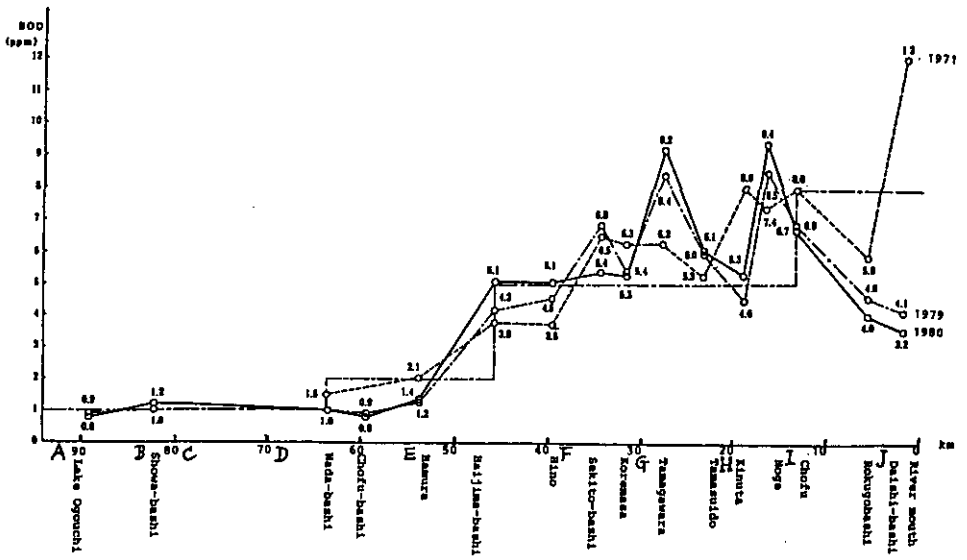


Fig. II BOD values of the Tama River water at different collection sites.
(Annual average values of monthly data for years 1971, 1979 and 1980)
A to J: Collection sites of chironomid samples in the present study

Data quoted from "Water quality of Tokyo Metropolitan area" 1980
Compiled by Bureau of Environmental Conservation, Tokyo-to

COLLECTION SITES AND DISTRIBUTION OF SPECIES

Altogether 10 collection sites named here as Stations A to J were chosen along the main stream of the River Tama, as shown in Fig. I. The distance between the first and the last station is about 100 km, and the average distance between two neighbouring stations is about 10 km. Two samples, each composed of about 0.5 kg of bottom sands, small stones, muds or fallen leaves, were collected at each station, brought to the laboratory, and were cultured for about two months in plastic containers to recover adults and pupal exuviae. The species and the numbers of males and females collected by this method at each collection site are shown in Table 1.

Station A (Yuba) is a very small stream running between rocks on the northern slope of Lake Okutama, and the bottom samples collected were mainly fallen leaves. There is no house above the collection site, and thus the water is completely free from sewage pollution. As many as 20 species and a total of more than one thousand adults were reared from here.

Stations B (Okutama) and C (Hikawa) were chosen along the main stream of Tama where large amounts of water discharged from Lake Okutama through Ogouchi Dam is flowing. The riverbed is mainly sand and stones, and the water is almost unpolluted, with an annual average BOD value of about 1 ppm (Fig. II). Several small streams containing sewage waters from nearby villages are flowing into the river, and some sewage inhabiting chironomids, such as *Chironomus yoshimatsui,* were found in the bottom of these streams. The numbers of species recovered were 25 from Station B (highest among 10 stations) and 17 from Station C, though the numbers of adult specimens reared were much smaller than that of Station A.

Stations D (Yoroi-bashi) and E (Hamura) are located further downstream where the river flows through a narrow valley. The quality of water is still very clean and BOD values are about 1.0 ppm. The species belonging to Chironomini (other than *Chironomus*) and Orthocladiinae (other than *Cricotopus*) becomes much reduced as compared with the upper streams, and some species representing medium degrees of pollution, such as *Polypedilum tamagoryoense* (#20) and *Paratrichocladius rufiventris* (#34) appear at these points.

The relatively clean water originated from Lake Okutama is then almost completely diverted into a canal as a source of water supply to the city of Tokyo at Station E, Hamura, and the main stream of Tama further down is represented by a mixture of the natural rain or underground water and sewage discharges from the surrounding cities. The quality of water as measured by BOD value becomes rapidly polluted to near 10 ppm towards Station G, Koremasa, as shown in Fig. II. Since sewage treatment plants were constructed in further downstream areas on both sides of the river, some improvements in the quality of water has been observed in the lower parts of the river, as shown in Fig. II.

A remarkable change in the chironomid fauna has been observed in the present survey at Stations F (Hino) to I (Noge), where large numbers of *Chironomus yoshimatsui* and other species associated with polluted waters were collected, as shown in Table 1.

At Station J near mouth of the river where the bottom sand is exposed to brackish water, no chironomid larvae could be found in the bottom samples, and no adults were collected by sweeping nearby bushes.

DESCRIPTION OF SPECIES

(1) *Chironomus yoshimatsui* (Martin et Sublette, 1972)

This species was found to be widely distributed, usually in high population densities, in the bottom sediments of this river at Station F, Hino Bridge, and all the way along downstreams, where the river is moderately or highly polluted with sewage water. A total of 229 males and 245 females emerged from samples collected at F, Hino, 76 males and 94 females from G, Koremasa, 253 males and 289 females from H, Noborito, and 457 males and 557 females from I, Noge. Morphological characters of male, female, pupa and larva were described by Sasa (1978, p. 23).

(2) *Chironomus circumdatus* (Kieffer, 1916)

Four males and 16 females were recovered from a sample collected at Station H, Noborito; 2 females emerged also from a sewage ditch running into Tama River at Station D, under Yoroi Bridge. Description of adults, pupa and larva is in Sasa, 1978, p. 11.

(3) *Kimius hoonsooi* (Ree, 1981)

A male (A 67:16) was found among chironomid adults collected by sweeping bushes on the bank at Station H, Noborito, where the river water is highly polluted. A male and a female were reared from a sample collected at the same station (A 67:17). Morphology of this species was described also by Sasa and Hasegawa (1983) with specimens collected in the Ryukyu Islands.

(4) *Paracladopelma tamahikawai*, sp. nov.

Materials studied: A single male, emerged 17 June 1981, from a bottom sediment collected at Station C, Hikawa (Specimen No. A 67:23B).

Male. Color largely greenish yellow. Antennal shaft and hairs brown, ground color of scutum yellow, stripes raddish brown, scutellum yellow, postnotum brown, abdominal tergites I–VI greenish yellow, VII to hypopygium brown; all femora yellow, tibiae brownish yellow, tarsi brownish yellow or brown. Body length 3.85 mm, wing length 1.77 mm.

Frontal tubercles present but small, 15 microns long, 6 microns wide and 30 microns apart from each other (Fig. 1-A). Antenna with 11 flagellar segments, AR 1.41. Eyes with a long dorsomedial projection, ER 0.27. Supraorbital setae 15 and 16. Clypeal setae 17. Palpi 4 segmented, 45, 106, 151 and 207 microns long.

Antepronotum well developed, lateral setae 3 and 4. Scutum with 13 dorsomedian setae, 7 and 7 dorsolateral setae, and 3 pre-alar setae on each side. Scutellum with 11 setae. Wing unmarked, r-m not pigmented. R 2+3 separated from both R 1 and R 4+5, ending nearly midway between the two veins. fCu much beyond r-m (49%

and 54% of wing length). Squama with only 2 fringe setae. Legs not ringed, LR1 2.04, LR2 0.62, LR3 0.68. Tarsus V of front leg 0.35 times the length of front tibia. Tarsi without long beards. Pulvilli and empodium well developed. Terminal scale of front tibia with rounded margin (Fig. 1-B).

Hypopygium in Fig. 1-C and Plate IV-19. Ninth tergite with rather angulate posterior margin, without long setae in the middle. Anal point apically expanded and constricted near base. Dorsal appendages pad-like, with truncated posterior margin and angulated and pointed caudolateral corner, almost entirely covered with microtrichiae, and with 8 or 6 short setae arising along the posterior margin (Fig. 1-D). Ventral appendages and inner margin of gonocoxite in Fig. 1-E. Ventral appendages broad and with rounded posterior margin, covered with microtrichiae. Gonostylus long and slender, almost the same width up to near apex, with concave inner margin and convex outer margin, apically rounded, and with several short setae along the inner margin (Fig. 1-C, D).

Discussion. This species is identified as belonging to the genus *Paracladopelma* Harnisch, since both dorsal and ventral appendages are short, small and pubescent, and gonostylus is long, slender, curved and without long setae along the inner margin. Other morphological characters also fit well with those of the previously known species of this genus. The shape and structure of dorsal and ventral appendages of the present species are somewhat similar to that of *P. camptolabis* Kieffer 1913 as redescribed by Edwards (1929), but it is a blackish species with much larger wing length of 2.5–2.8 mm. He also stated that his group D of subgenus *Chironomus,* which include *camptolabis,* has no frontal tubercles, which are present in our specimen.

(5) *Paracladopelma tamanipparai,* sp. nov.

Materials studied: A single male, emerged on the same day from the same sample as the male of the preceding species, at Station C, Hikawa (Specimen No. A 67: 23A).

Male. Body coloration similar to the previous species; antennal shaft and hairs brown, ground color of scutum greenish yellow, stripes reddish brown, scutellum yellow, postnotum brown, abdominal tergites greenish yellow, hypopygium brown; halters yellow; legs not ringed, femora yellow, front tibia brown, other tibiae and tarsi brownish yellow. Body length 3.75 mm, wing length 1.65 mm.

Frontal tubercles present but minute, 8 microns long, 6 microns wide and 34 microns apart from each other (Fig. 1-G). Antenna with 11 flagellar segments, AR 1.67; antennal hairs long, those on the 10th segment 0.58 times as long as the antennal shaft. Eyes with a long dorsomedial projection, ER 0.28. Supraorbital setae 20 and 24, clypeal setae 18. Palp 4 segmented, 21, 84, 76, 122 microns.

Pronotum well developed, lateral setae 2 on each side. Scutum with 14 dorsomedian setae, 12 dorsolateral setae on each side, and 5 pre-alar setae on each side. Scutellum with 20 setae. Squama with 12 fringe setae. Wings unmarked, r-m pale. R 2+3 separated from R 1 and R 4+5. fCu much beyond r-m (56% and 51% of wing length, respectively). Terminal scale of front tibia with rounded apex (Fig. 1-H). Terminal combs of middle and hind tibiae are fused with each other, and each with a short spur (Fig. 1-I). LR1 2.04, LR2 0.58, LR3 0.64. Front tarsus V 0.27 times as long as front tibia. Tarsi without long beards. Pulvilli and empodium well developed.

Hypopygium in Fig. 1-J and Plate I-2. Ninth tergite with rounded posterior margin, without long setae in the middle, and with 6 short setae at the base of anal point. Anal point short, apically expanded and constricted at middle. Band of ninth tergite united in the middle. Dorsal appendage elongate, finger-like and with concave outer margin, 86 microns long and 27 microns wide in the middle, highly pubescent on both surface, with a conical, bare process and a short seta on the dorsal surface near apex, and a short seta on the ventral surface at about middle (Fig. 1-K). Ventral appendage low, roughly rectangular, highly pubescent and without long setae (Fig. 1-L). Gonostylus elongate and slender, with concave inner margin, and a row of short setae along the inner margin (Fig. 1-J).

Discussion. This species is also tentatively classified as a member of genus *Paracladopelma* Harnisch, since both dorsal and ventral appendages are pubescent, ventral appendage devoid of long setae, dorsal appendage bears a few (two in this species) short setae, and gonostylus is extremely slender and elongate. The shape of anal point is similar to the preceding species and quite different from the previously known species of this genus. The present species is quite different from all the previously known members of this genus in that dorsal appendage is elongate and finger-like, and with a conical bare process near apex. This species has again a pair of small frontal tubercles, which were reported by Edwards (1929, p.387) as being absent from the previously known species of this group.

(6) *Cryptotendipes tamacutus*, sp. nov.

Materials studied: A single male, emerged 26 June from a sample collected at Station B, Okutama. Specimen No. 67:21.

Male. Body length 5.10 mm, wing length 2.10 mm. Body coloration largely brown. Antennal hairs and shaft brown; ground color of scutum yellow, scutal stripes brown, scutellum yellow, postnotum brown, abdominal tergites yellowish brown; hypopygium dark brown; halteres yellow; front femur largely yellow and apically brown, front tibia and all tarsal segments dark brown; in middle and hind legs, femora, tibiae, basal 2/3 of tarsus I, and basal 1/2 of tarsus II yellow, the rest parts of tarsi brown.

Antenna with 11 flagellar segments, AR 2.20. Frontal tubercles present but minute, 12 microns long and 7 microns wide, 70 microns apart from each other (Fig. 2-A). Supraorbital setae 14 and 16, clypeal setae 14.

Antepronotum with 6 and 7 lateral setae. Scutum with 16 dorsomedian setae, 10 dorsolateral setae on each side, and 6 pre-alar setae on each side. Scutellum with 22 setae. Wing in Fig. 2-B. Squama with 9 or 10 fringe setae. Wing membrane unmarked, coarsely granular and slightly purple under transmitted light. R 2+3 separated from R 1. fCu much beyond r-m (51% and 45% of wing length, respectively). Front tibia and tarsi almost black and conspicuously darker than front femur and all the segments of middle and hind legs. Terminal scale of front tibia short, broad and with rounded apex (Fig. 2-C). Each of the two terminal combs of middle and hind tibiae with a short spur (Fig. 2-D). LR1 1.88, LR2 0.67, LR3 0.65 (LR2 is unusually large, while LR3 is unusually small). Front tarsus V 0.31 times as long as front tibia. Hairs on tarsi relatively short, BR1 2.6, BR2 3.6, BR3 4.1. Middle and hind tarsi I with 16 sensilla chaeta. Pulvilli and empodium well developed (Fig. 2-E).

Hypopygium in Fig. 2-F. Ninth tergite with almost straight posterior margins

on both sides and forms a sharp angle towards base of anal point, with two rows of setae along a pair of ridges connected to base of anal point. Anal point long, slender and slightly expanded in the middle. Dorsal appendages small and finger-like, with a small apical tooth, and bear 2 or 3 terminal setae arising from distinct pits, and numerous microtrichiae on the inner side. Ventral appendages absent, and inner margins of gonocoxites are united in the middle forming a blunt angle (Fig. 2-G). Gonostylus fused with gonocoxite, long, slender, widest at about basal 1/3, and with slightly concave inner margin, with numerous short setae along inner margin.

Discussion. This species is obviously a member of the *Cryptochironomus-Harnishia* complex, or group E of subgenus *Chironomus* of Edwards (1929, p.387), since both combs of middle and hind tibiae with a short spur, pulvilli are large and distinct, and both dorsal and ventral appendages are highly reduced. According to the key compiled by Saether (1977) and Pinder (1978), it falls in genus *Cryptotendipes* Lenz, since dorsal appendages are rod-like and bear 2 or 3 apical setae, ventral appendages are absent, gonostylus are not swollen basally and without apical tooth, and ninth tergite without processes next to anal point. According to the key to known males of this genus prepared by Saether (1977, p.97), the present species falls in *C. pseudotener* (Goetghebuer), but the shape of its gonostylus illustrated by this author and also by Pinder (1978) is quite different from that of the present species.

(7) *Microtendipes tamaogouti*, sp. nov.

Materials studied: 15 males and 41 females emerged from samples collected at Station A, Yuba; 14 males and 19 females emerged also from samples collected at Station B, Okutama; 10 males and 8 females among them were mounted in gum-chloral (Nos. A 67:51–62).

Male. Body coloration peculiar to this species. Antennal shaft brown, hairs yellowish brown; ground color of scutum brown, scutal stripes dark brown, scutellum brown, postnotum dark brown; abdominal tergites I–VI yellow, VII to hypopygium brown; wing unmarked, r-m pale; halteres yellow. In the front leg, femur is largely yellow and with apical dark ring, basal half of tibia brown, distal half yellow and with a narrow dark apical ring, tarsus I to V entirely yellow; in the middle and hind legs, femur is largely yellow and with narrow apical dark ring, tibia yellow but with narrow basal and apical dark rings, tarsi entirely yellow. Wing without dark marks, but with a large, faint cloud in the middle, covering r-m and fCu area. Standard measurement data in Table 2-A.

Frontal tubercles absent. Antenna with 13 flagellar segments, AR 2.0; antennal hairs long, AHR about 0.6. Supraorbital and clypeal setae more numerous than in *M. britteni*. Of 10 specimens examined, dorsomedian setae are absent in 5, two in 1, six in 2, and eight in 2 specimens (these were absent in all *M. britteni* specimens examined). Wing in Fig. 4-A, anal lobe almost rectangular, R 2+3 running close to R 1, fCu only slightly beyond r-m. LR1 low, about 1.3 in average. Terminal scale of front tibia very short and with rounded margin (Fig. 3-A). One terminal comb of middle and hind tibiae with a spur, the other comb without spur (Fig. 3-C). Tarsi without long beards, BR 1 about 2.2 in average. Pulvilli moderate in size (Fig. 3-D).

Hypopygium in Fig. 3-E. Ninth tergite with rounded posterior margin, bands separated in the middle. Anal point long, slender and parallel-sided. Dorsal appendage

with a slightly expanded base bearing 2 or 3 long inner setae, and a finger-like process with rounded apex and bearing 4 setae in the middle on the dorsal surface. Ventral appendage relatively short and stout, with some 25 recurved setae and without long apical seta (Fig. 3-F). Gonostylus widest at about middle and with concave inner margin, with a row of short setae along the inner margin.

Female. Body coloration similar to that of male, but differs from it in that abdominal tergites I to VI are largely brown, each with narrow pale band along the posterior margin, and front tibia is entirely dark brown, not paler in the middle. Antenna composed of 6 segments, as in Fig. 3-H (according to Edwards, 1929, female antenna of all British *Microtendipes* has 7 segments). Spermathecae in Fig. 3-J. Cercus with angulate posterior margin (Fig. 3-I).

Pupa (described with a pupal skin associated directly with a male specimen, No. A 67:59). Length of abdomen 4.7 mm. Thoracic respiratory organs composed of 8 tubes of subequal length and with a common mouth, each tube about 0.45 mm in length, one of them about 4 times as wide as the others (Fig. 4-B), drown from a specimen in alcohol. Distribution of spines, spinules and hairs on abdominal tergites in Fig. 4-C, D. Tergite II with a proximal band of spines in 2 to 4 rows (II-a), a broad spinose area in the center (II-b, -c), and a transverse row of recurved spines, 62 in a single row. Tergites III and IV also with a transverse row of proximal spinose area (-a), a broad central spinose area (-b, -c), and a caudal band of small recurved spines in 5–7 rows (-d). Tergite V with the proximal spinose band (V-a) and the broad central spinose area (V-b, -c), but without the caudal band of recurved spines. Tergite VI with a band of small spines near oral margin (VI-a). Tergite VII without spines and spinules, VIII with a central spinose area (VIII-b), and a caudal band of small, sharply pointed spines (VIII-d). Caudolateral scales of abdominal segment VIII composed of 4 large spines (Fig. 4-E). Chaetotaxy of lateral hairs on abdominal segments II to VIII is: sss, sss, sss, LLL, LLLL, LLLL, LLLL, as in Fig. 4-C. Anal fins fringed with 44 and 42 L-hairs.

Discussion. This is a typical member of genus *Microtendipes*, since male antenna is 14 segmented, frontal tubercles are absent, pronotum much reduced, front tibia without spur, middle and hind tibial combs are very unequal and one has a long spur but the other without spur, wings are unmarked and R 2+3 is almost fused with R 1, dorsal appendages of male hypopygium are plate-like and bear several setae in the middle, and ventral appendages are without long apical seta. Among the known species of this genus, it is most closely related to *M. pedellus* (De Geer) in body coloration and in the structure of male hypopygium. However, the present species differs from it in that setae on the dorsal surface of dorsal appendages are 4 (usually 7 or 8 in *pedellus*), those on the base of dorsal appendages are 3 in this species (1 in *pedellus*), bands of ninth tergite are separated in the middle (united in the middle, Pinder, 1978, Fig. 159B), and anal point is long, slender and parallel-sided (widest at base and tapering towards apex in *pedellus*). The present species is also similar in body coloration and structure of hypopygium to *M. diffinis* (Edwards), but again differs from it in the number of basal setae of dorsal appendage, in the shape of bands and of the posterior margin of ninth tergite.

(8) *Microtendipes britteni* (Edwards, 1929)

Materials studied: A male and a female emerged from a sample from Station B, Okutama; two males and two females from a sample from Station C, Hikawa.

Discussion. This species was recorded and described by male, female and pupa by Sasa (1980) from Stations No. 2 and No. 3 of Minamiasakawa River at a survey in August 1979. In the present survey, it was again recovered from the upstream and relatively unpolluted parts of the river. Morphologically, it can be easily differentiated from the preceding species by the shape of anal point (triangular and with pointed apex in the present species), in the shape of dorsal appendages (abruptly curved and apically pointed), and of gonostylus (widest at about middle and with pointed apex). Standard measurement date in Table 2-B. The values of AR and LR are similar to the preceding species, but the numbers of supraorbital setae, clypeal setae, dorsolateral setae and scutal setae are more or less smaller in the present species. Dorsomedian setae are absent in all of the specimens examined.

(9) *Paratendipes tamayubai*, sp. nov.

Materials studied: 80 males and 37 females emerged from Station A, Yuba; 4 males and a female from Station B, Okutama; 9 males, 9 females and a pupal skin were mounted on slides (No. A 67:01–12).

Male. Body coloration almost uniformly dark brown, excepting front tarsus I, which is largely white; antennal hairs brown, scutum almost uniformly shining black (slightly brownish), stripes hardly distinguishable, scutellum and postnotum dark brown, halteres pale brown; wing unmarked; front tarsus I white, other leg segments brown; abdominal tergites brown (I and II slightly paler than the subsequent segments).

Standard measurement data in Table 2-C. Antenna with 13 flagellar segments, AR 1.35–1.57 (1.49 in average of 9), antennal hairs long, AHR 0.50 or higher. Frontal tubercles absent. The numbers of various setae on head and scutum relatively small. Antepronotum well developed, with 2–6 lateral setae on each side. Scutellum with 8–14 setae in a single row. Squama fringed with 7–10 setae. Wing unmarked, r-m pale; R 2+3 separated from both R 1 and R 4+5; fCu much beyond r-m (at 53% and 48% of wing length, respectively). Front tarsus I about 1.4 times, and front tarsus V about 0.25 times as long as front tibia. Terminal scale of front tibia narrow and sharply pointed apically (Fig. 5-B). Both combs of middle and hind tibiae contiguous and each with a short spur (Fig. 5-C). Tarsi without long beards, BR1 1.8, BR2 3.2, and BR3 3.6 in the averages. Pulvilli absent (a characteristic of this genus; Fig. 5-D).

Hypopygium in Fig. 5-E. Ninth tergite without long bristles in the middle, band of ninth tergite separated in the middle. Anal point long, slender, parallel-sided, and with rounded apex. Dorsal appendages bottle-shaped, apically bent like a hook, bear 2 or 3 bristles on the inner margin and 2–4 bristles on the lateral margin (Fig. 5-F). Ventral appendages bear some 25 relatively short recurved setae on the apical portion. Accessory ventral appendages (Appendages 2-a) arise from base of the ventral appendages and bear numerous sharply pointed hairs (Fig. 5-G). Gonostylus slender, slightly curved inwards, rounded apically, and with several short setae along inner margin (Fig. 5-E).

Female. Coloration as in male, body almost uniformly dark brown, excepting front tarsus I, which is remarkably paler than tibia and tarsi II to V. Antenna composed

of a pedicel and 6 flagellar segments (Fig. 5-H). Spermathecae about 100 microns long and 60 microns wide (Fig. 5-I). Cercus with rounded posterior margin, about 100 microns wide and 85 microns long (Fig. 5-J).

Pupa. Length of abdomen 5.48 mm. Thoracic respiratory organs divided into 6 tubes of subequal length, each about 0.62 mm (Fig. 6-A). Skin of abdomen generally stronger in brownish color than that of *Microtendipes ogouti*. Distribution of hairs, spines and spinules on abdominal tergites in Fig. 6-B, C. Tergites II to VI with a large central spinose area composed of the oral band of large spines (-a), middle spinose areas of small spines (-b, -c), which are all continuous and not separated like in some other species. In addition, tergites II has a caudal band of large recurved spines, 48 in a single transverse row (II-d); tergites III and IV with a caudal band of small recurved spines in multiple rows. (III-d, IV-d). Tergites VII and VIII with a pair of spinulous areas (VII-a, VIII-a). Caudolateral scales of segment VIII simple, with a sharply pointed apical spine (Fig. 6-D). Abdominal segments II, III and IV with 3 pairs of short and simple lateral hairs, the first and the second hairs are closely set; V and VI with 3 pairs, VII and VIII with 4 pairs of long and filamentous hairs. Anal fins with 64 and 68 filamentous hairs. Anal segment without spinulous areas (Fig. 6-C).

Remarks. Pupa of this species differs from that of *Microtendipes ogouti* in that color of the skin is generally darker, the spinose areas -a and -b on abdominal segments II to VI are continuous (separated in *ogouti*), VI has a large spinose area, VII and VIII with a pair of spinulous areas but without the caudal rows of sharply pointed spines. Thoracic respiratory organs are branched into 6 tubes in place of 8 in *ogouti*, and caudolateral scales on VIII are simple in the present species.

Discussion. A large number of adults of this species were recovered from bottom sediments (mainly dead leaves) of a small mountain stream in the uppermost part of the River Tama. Morphological characters of adults are typical of genus *Paratendipes* as defined by Edwards (1929, p.395), in that male antenna is 14 segmented, that of female 7 segmented, frontal tubercles are absent, appendages 1 of male hypopygium are hook-like, 2 normal, 2a present, front tibia with a short spur, tibial combs are fused and each with a short spur, pulvilli absent, and wings are bare. Among the known species of this genus, the present species is very closely related to *P. albimanus* (Meigen) of Europe in the structure of male hypopygium, body coloration, and values of AR and LR. However, when this species is compared with *P. albimanus* described or illustrated by Edwards (1929) and Pinder (1978), differences are recognised in the shape and structure of dorsal appendages (in this species it is basally broader, apically more abruptly constricted, and bear 2–4 setae on the lateral margin which are absent in Pinder's illustration), and in the shape of gonostylus (inner margin is concave and apically rounded in the present species, inner margin is almost straight and apically pointed in *P. albimanus*).

(10) *Pentapedilum tamahamurai*, sp. nov.

Materials studied: A single male, emerged 26 June 1981 from a sample collected at Station E, Hamura, specimen No. A 67:46.

Male. Antennal hair and shaft brown, ground color of scutum brown, scutal stripes dark brown, scutellum brown, postnotum dark brown, abdominal tergites brown;

leg segments almost uniformly yellow.

Body length 4.04 mm, wing length 2.13 mm. Head without frontal tubercles. Antenna with 13 flagellar segments, AR 0.98. Antennal hairs long, AHR 0.45. Eyes with long dorsomedial projection, ER 0.26. Supraorbital setae 12 on both sides. Clypeal setae 12. Antepronotum without lateral setae. Scutum with 18 dorsomedian setae, 11 and 12 dorsolateral setae, and 5 pre-alar setae on both sides. Scutellum with 15 setae. Fringe setae of squama 5 on both sides. Wing membrane with numerous macrotrichiae (Fig. 7-A). R 2+3 running close to R 1. fCu much beyond r-m. Front tibia with three long subapical seta (246, 238, 148 microns long), the longest one arising from the terminal scale, which has narrow and sharply pointed apex (Fig. 7-B). In middle tibia, one terminal comb with a spur and the other without spur (Fig. 7-C). In hind tibia, both combs with a spur (Fig. 7-D). LR1 1.32, LR2 0.60, LR3 0.80; front tarsus V relatively short, 0.20 times the length of front tibia. BR1 1.9, BR2 5.7, BR3 7.3. Pulvilli moderate in size.

Hypopygium in Fig. 7-E. Anal point long, slender and almost parallel-sided. Dorsal appendages composed of a relatively narrow and setigerous base bearing 4 or 5 long basal setae, and a bare and slightly incurved process bearing a long lateral seta at about apical 1/4 (Fig. 7-F). Ventral appendages long, narrow and with rather pointed apex, bear a long apical seta, and 9 stout and recurved setae arising from the apical 1/4 of the shaft (Fig. 7-G). Gonostylus expanded in the middle, with a longitudinal ridge on the dorsal surface, and numerous rather short setae on the inner surface (Fig. 7-E).

Discussion. This species is a typical member of genus *Pentapedilum* Kieffer, since the wing bears numerous macrotichiae on the membrane and otherwise shares basic structural characteristics with members of genus *Polypedilum* in the strict sense. Five species of *Pentapedilum* have been recorded from Japan, *tuberculatum* (Tokunaga, 1940), *sordens* (v.d. Wulp) of Tokunaga (1938), *kasumiense* Sasa, 1979, *shirokanense* Sasa, 1979, and *sakishimaense* Sasa et Hasegawa, 1983; the present species differs from all of them in the structure of dorsal and ventral appendages. Among the species known from Europe, the present species is closest to *uncinatum* Goetghebuer in that lateral seta of dorsal appendages arise at about distal 1/3, but differs from it in the structure of ventral appendages, anal point, and gonostylus. Especially characteristic to this species is that the recurved setae of ventral appendages arise from distal 1/4 of the shaft, and that gonostylus are stout, wide, and bears numerous short setae on the inner surface.

(11) *Polypedilum unifascium* (Tokunaga, 1938)

Materials studied: 36 males and 26 females emerged from a small stream at Station A, Yuba; a female was recovered from Station B, Okutama; a male from Station D, Yoroi Bridge; a male from Station F, Hino; a female from Station G, Koremasa. Males from Yoroi and Hino as well as 10 males from Yuba were dissected and mounted (Specimens Nos. A 67:71–78).

Remarks. This species was described as new by Tokunaga (1938) by females collected at Yamashina, Kyoto. Male, female and pupa were collected and described by Sasa (1980) from Minamiasakawa River, a tributary of Tama River. In both rivers, this species was found restricted to the uppermost parts in the mountains where the

water is least polluted. Standard measurement data of the present population from the River Tama is in Table 2-M.

(12) *Polypedilum tsukubaense* (Sasa, 1979)

Materials studied: 98 males and 78 females emerged from bottom sediments (mainly dead leaves) collected from a small stream at Station A (Yuba, uppermost part of the collection sites); 7 males and 3 females emerged also from Station B, and a female emerged from Station C. 12 males and 6 females were dissected and mounted on slides (Nos. A 68:21–32).

Male. Body length 2.93–3.64 mm (3.26 mm in average of 12). Wing length 1.62–1.82 mm (1.72 mm). A relatively small species. Body coloration almost uniformly yellow; antennal shaft brown, hairs yellowish brown, eyes and tibial combs dark brown; ground color of scutum yellow, scutal stripes slightly brownish but hardly distinguishable, scutellum, postnotum and abdominal tergites yellow; halteres pale yellow; leg segments all yellow; wing unmarked, r-m pale. Standard measurement data in Table 2-N.

Antenna with 13 flagellar segments, AR 1.38–1.69 (1.51 in average of 12), antennal hairs relatively long, AHR 0.47–0.58 (0.50). Frontal tubercles absent. Numbers of hairs on head (so, cl) and thorax (dm, dl, sa, sc) relatively small, lateral pronotals absent. Wing membrane without dark marks and clouds, slightly purplish when seen by transmitted light; R 2+3 almost fused with R 1, ending much closer to end of R1 than end of R 4+5; fCu much beyond r-m (at 56% and 47% of wing length, respectively Fig. 7-H). LR 1 relatively high (1.75–1.97; 1.86 in average); tip of front tibia with rounded scale (Fig. 7-I), middle and hind tibiae with two terminal combs, one with a long spur and the other without spur (Fig. 7-J); front tarsus V relatively long, 0.30–0.34 (0.32 in average) of the length of front tibia; pulvilli well developed.

Hypopygium in Fig. 7-K. 8th abdominal tergite basally constructed in the middle and roughly triangular (a characteristic of genus *polypedilum* s. str.). Anal point narrow, slender, parallel-sided and with rounded apex. Dorsal appendages slender and only slightly curved inwards, apically expanded like a knob, with a long lateral seta arising beyond middle and two (rarely one) long inner setae arising from about middle (Fig. 7-L). Ventral appendages long and slender, with a long apical seta, and 10 relatively long and stout recurved setae arising on the lateral side and at the level between 3/5 and 4/5 from the base, leaving apical 1/5 devoid of recurved setae (Fig. 7-M). Gonostylus widest at about middle, with pointed apex, and bear some 7 relatively short setae on the ventral side along the inner margin (Fig. 7-N).

Remarks. This species was collected and described first by Sasa (1979) from a mountain stream of Mount Tsukuba, Ibaraki, by the name of *Microtendipes tsukubaensis.* The second group of specimens were collected from the uppermost part of Minamiasakawa River and described by Sasa (1981) by the name of *Polypedilum kobotokense,* but this is here considered as a synonym of *tsukubaense,* and the differences in the shape of anal point and gonostylus pointed out in the latter paper for differentiating characters between the two populations are now regarded as within the range of individual variations. This species is characteristic in body coloration (body almost entirely pale yellow), in the possession of inner setae of dorsal appendages (2 or 3 arising from about middle of the horn-like process), and that of recurved setae on ventral

appendage (arising from distal half leaving the apical portion free from recurved setae).

(13) *Polypedilum takaonense* (Sasa, 1980)

Two males were recovered from a sample collected at Station A, Yuba. They were first sorted by stereo-microscope from other specimens together with those of *Polypedilum tsukubaense* as a group with body coloration almost entirely yellow, and could be differentiated only after mounted in gum-chloral and the hypopygium was examined under compound microscope (Specimens No. A 68:36, 37).

This species was described first by Sasa (1980) by a male and a female collected at Station 1, the uppermost site of Minamiasakawa River. Standard measurement data of three males so far recovered are in Table 2-P. This species is similar in general appearance to *P. tsukubaense* and difficult to be separated from it in adult stage, but both species differ in AR (smaller in *takaoense*), and most remarkably in the shape and structure of dorsal and ventral appendages of male hypopygium, as shown in Figs. 8-A to E and 7-K to N.

(14) *Polypedilum tamaharaki*, sp. nov.

Materials studied: A total of 21 males and 41 females emerged from bottom samples collected at Station A; 12 males and 15 females emerged also from samples collected at Station B; 10 males and 10 females among them were dissected and mounted for morphological study (No. 68:01–14).

Male. Body coloration peculiar to this species and easily distinguishable from other coexisting chironomids. Antennal hairs yellowish brown, scutum, scutellum and postnotum almost uniformly shining black (slightly brownish), abdominal tergites I–VI are greenish yellow or brownish yellow (remarkably paler than the thorax), but VII, VIII and hypopygium are dark brown; wing unmarked, r-m darker than other veins; front femur and front tibia black, front tarsi I to V uniformly yellow; middle and hind femora and tibiae dark brown, tarsi yellow and without dark rings.

Data of standard measurements in Table 2-Q. Antenna with 13 flagellar segments, AR relatively small (0.78–0.89), antennal hairs long, AHR 0.41–0.48. Frontal tubercles and lateral pronotal setae absent. Head, scutum, scutellum and squama with relatively large numbers of setae. Wing unmarked, R 2+3 running close to R1, fCu much beyond r-m (Fig. 9-L). LR1 1.49–1.65, tarsus V of front leg relatively long, TR1 0.30 in average. Tarsi with beards of medium length, BR1 3.0, BR2 4.1 and BR3 4.4 in average. Terminal scale of front tibia long and with sharply pointed apex (Fig. 8-F). One comb of middle and hind tibiae with a long spur, the other without spur (Fig. 8-G).

Hypopygium in Fig. 8-H. Anal point long, slender, parallel-sided and with rather truncate apex. Dorsal appendages composed of a flat and setigerous base bearing 3 or 4 long inner setae, and an apical horn-like process with a long lateral seta at about middle. Ventral appendages well developed, bear a long apical seta, and some 20 stout recurved setae arising from distal 2/3 of the shaft (Fig. 8-I). Gonostylus widest at about middle, with a long apical seta, and 4 or 5 long setae along the inner margin.

Female. Body coloration as in male, excepting that abdomen is also entirely

dark brown. Antenna composed of a pedicellum and 6 flagellar segments, segment I with a short neck, II to V with a long neck, and VI with 3 long subapical setae (Fig. 8-J). Spermathecae in Fig. 8-K. Cercus in Fig. 8-L.

Discussion. Male of this species is characteristic in that thorax is largely black while abdominal tergites I to VI are greenish or brownish yellow. In the female, abdomen is also entirely dark brown and there exist remarkable sexual dimorphism in the body coloration. This kind of body coloration is somewhat similar to that of *Microtendipes tamaogouti* which was collected also at the same station. Among the European species of this genus, such a coloration in male with black scutum and greenish yellow abdomen is seen in *polypedilum acutum* Kieffer and *P. pedestre* (Meigen). According to Pinder (1978, p.138), the latter is the same as a species described by Edwards (1929, p.400) by the name of *Chironomus* (*Microtendipes*) *fuscipennis* Meigen. In the present species, anal tergite is not rounded but roughly triangular and is similar to that of *pedestre*, but anal point is parallel-sided and with rounded apex and thus closer to that of *acutum*; dorsal appendage is apically bent like a hook in the present species and differs from the both European species; AR in the present species is 0.78–0.89 and is smaller than over 1.0 in *pedestre* and 1.5 in *acutum* according to Edwards (1929). Female of the present species is unusual as a member of *Polypedilum* in that antenna is 7 segmented (including pedicel, Fig. 8-J), which is a character seen also in the female of *Chironomus fuscipennis* of Edwards (1929).

(15) ***Polypedilum tamanigrum*, sp. nov.**

Materials studied: 159 males and 160 females emerged from samples from Station A; 35 males and 56 females from Station B, and 16 males and 20 females from Station C. 15 males, 10 females and 6 pupal exuviae were mounted on slides. (Specimens No. A 68:51–76). Holotype, a male, No. A 68:51; the others on slides are designated as paratypes.

Male. A small species with body length of 2.50–3.17 mm and wing length of 1.43–1.70 mm. Standard measurement data in Table 2-R. Body coloration largely dark brown. Antennal shaft dark brown, hairs brown; ground color of scutum dark brown, stripes dark brown and pruinose, scutellum brown, postnotum dark brown, abdominal tergites almost uniformly dark brown; wing unmarked, halteres largely yellow, with knob brown; leg segments yellow, tarsal segments II to V brownish yellow.

Frontal tubercles absent. Antenna with 13 flagellar segments, AR 0.65–0.79; antennal hairs long, AHR 0.40–0.55 (Plate III-13). Wing without dark marks, r-m pale; R 2+3 almost fused with R 1; fCu much distal of r-m, situated at 52% and 43% levels of the wing length, respectively. LR1 relatively high, 1.79–1.96; front tarsus V relatively long, TR1 0.30 in average; tarsi with relatively long beards, BR1 3.2, BR2 4.5 and BR3 6.6 in average.

Hypopygium in Fig. 9-D. Anal point long, slender and apically tapering. Dorsal appendages composed of a flat and setigerous base bearing 2 long inner setae, and a horn-like bare process bearing a long lateral seta at about middle (Fig. 9-E). Ventral appendages narrow and long, bear a long apical seta and 8 recurved setae arising from apical 1/4 (Fig. 9-F). Gonostylus widest at about middle, inner margin almost straight, with a long apical seta, and 3 or 4 very long setae along the inner margin (Fig. 9-D).

Female. Coloration as in male. Antenna 6 segmented, segment II, III and

IV with a neck but V without neck, last segment with two long subapical seta (Fig. 9-G). Spermathecae in Fig. 9-J. Cercus in Fig. 9-K. Terminal scale of front tibia narrow and apically pointed (Fig. 9-H). Terminal combs of hind and middle tibiae with one spur (Fig. 9-I).

Pupa. Length of abdomen 2.92 mm. Thoracic respiratory organs divided into 4 subequal tubes, each about 0.20 mm in length (Fig. 10-A). Distribution of hairs, spines and spinules on abdominal tergites in Fig. 10-B. Caudolateral scales of segment VIII simple large spines with one small spine along the outer margin and 2 or 3 small spines along the inner margin (Fig. 10-E). Anal fins with 27 long filamentous fringe hairs on each side (Fig. 10-C).

Discussion. Among the known species of this genus, the present species is considered as being most closely related to *Polypedilum albicorne* (Meigen), since wing is unmarked, abdomen is uniformly dark, gonostylus is long and slender, and dorsal appendage bears a long lateral seta arising in distal half. However, in the present species, LR is about 1.9 and much larger than 1.4 of *albicorne* (Edwards, 1929, p.403), AR is small, legs with long beards (no tarsal beard in *albocorne*), inner margin of dorsal appendage is concave (almost straight in *albicorne*), gonostylus is widest at about apical 1/3 and with rounded apex. Among species described by Tokunaga from Japan, the present species is closest to *P. medivittatus* Tokunaga, but both are quite different in AR (1.9 in *medivittatus*).

(16) *Polypedilum tamasemusi*, sp. nov.

Materials studies: 6 males and 5 females emerged from samples collected at Station A, Yuba; all mounted on slides. Holotype: No. A 68:81. Paratypes: A 68: 82–86.

Male. A rather small species with the body length of 2.53–3.00 mm and wing length of 1.53–1.73 mm. Standard measurement data in Table 2–5. Body coloration largely dark brown, scutellum brown; postnotum dark brown, abdominal tergites almost uniformly dark brown. legs yellow, paler than thorax and abdomen, and without dark rings; wing unmarked.

Head in Fig. 11-A. Frontal tubercles absent. Antenna with 13 flagellar segments, AR 0.95–1.00, antennal hairs long, AHR about 0.5. Terminal scale of front tibia rather flat and broad, with angulate apex (Fig. 11-F). Terminal combs of middle and hind tibiae with only one spur. LR1 1.61–1.69. Tarsi with relatively long beards, BR1 3.7, BR2 6.0 and BR3 7.2 in average. Wing in Fig. 11-D, without dark or cloudy marks. Vein R 2+3 running close to and almost fused with R1, fCu much distal of r-m, situated at 52% and 45% of wing length, respectively.

Hypopygium in Fig. 11-G. Ninth tergite with some 15 long setae in the middle in longitudinal rows. Anal point long, slender, almost parallel-sided or slightly wider at base than at apex, with rounded or truncate tip. Dorsal appendage composed of a lateral setigerous portion, and a bare medial beak-like process; the former bears a long apical seta, and a long basal seta (Fig. 11-H). Ventral appendage long and almost parallel-sided, bears a long apical seta and some 10 short recurved setae (Fig. 11-I). Gonostylus widest at about middle, apically pointed, with a relatively long apical spur, and a row of 4 long setae along inner margin (Fig. 11-G).

Female. Body coloration same as in male, thorax and abdomen almost uniform-

ly dark brown, legs yellow. Head in Fig. 11-B, palp composed of 5 segments. Antenna with 5 flagellar segments, terminal segment with 4 long subapical setae (Fig. 11-C). Frontal tubercles absent. Spermathecae in Fig. 11-J. Cercus with angulate posterior margin (Fig. 11-K).

Discussion. This species is also a typical member of genus *Polypedilum* in the strict sense, and similar in body coloration and size to the preceding species, but differs from it in the structure of male hypopygium, especially in that of dorsal appendages. Among the known species of this group, the present species is closest in structure of hypopygium to *P. convictum*, since dorsal appendages are composed of a high basal portion bearing one long seta on the posterior lobe. However, the present species differs from *P. convictum* in body coloration (body entirely yellow in the latter according to Edwards, 1929), in AR (1.5–1.8 in *P. convictum*), in shape of posterior lobe of dorsal appendages (posteriorly produced in *convictum*, flat in the present species), in the shape of ventral appendages (apically constricted in *convictum*), and in the number of recurved setae on ventral appendages (about 20 in *convictum* according to Fig. 168 B of Pinder, 1978, about 10 in the present species). Among species known from Japan, this species is closely related to *P. ureshinoense* (Sasa), but both differ in the number of setae on the posterior lobe of dorsal appendages, in AR (about 1.7 in *ureshinoense*), and in larval habitat (*ureshinoense* is found in polluted streams, while the present species is from clean mountain stream).

17) *Polypedium tamahosohige*, sp. nov.

Materials studied: 4 males and 2 females emerged from a sample of Station B, Okutama. A male emerged from Station C, Hikawa. All dissected and mounted (Specimen No. A 68:41–45).

Male. A small species with body length of 2.90–3.27 mm and wing length of 1.50–1.67 mm. Standard measurement data in Table 2-T. Body coloration largely dark brown; antennal shaft dark brown, hairs brown, scutum almost uniformly dark brown, scutellum brown, postnotum dark brown, abdominal tergites dark brown; halteres yellow, wing unmarked; legs yellow, paler than scutum and abdomen.

Head in Fig. 12-A. Frontal tubercles absent. Antenna with 13 flagellar segments, AR small, 0.40–0.47, antennal hairs arising from distal half of the shaft are unusually short, AHR 0.17–0.19 (a distinguishing character of this species under low magnifications). Numbers of so, cl, dm and dl significantly larger than in the preceding two species. Palpi composed of five flagellar segments. Antenna in Plate III-14.

Wing (Fig. 12-C) without dark marks and clouds, r-m not pigmented; R 2+3 closely set to R 1 and almost fused with it along the entire length; fCu much beyond r-m, at levels of 55% and 46% of the wing length. Terminal scale of front tibia narrow, curved and elongate, with pointed apex (Fig. 12-E). Terminal combs of middle and hind tibiae typical of *Polypedilum*, one has a long spur and the other without spur (Fig. 12-F). LR1 1.68–1.73, TR1 0.30. Tarsi with relatively long bears, BR1 3.3, BR2 4.2 and BR3 6.2 in average . Pulvilli well developed.

Hypopygium in Fig. 12-G. Anal point long, slender, slightly tapering towards apex but with truncate end. Dorsal appendages rectangularly curved inwards, tapering towards apex, bear 3 long basal setae and a long lateral seta arising from basal 1/3 (Fig. 12-H). Ventral appendage long, bears a long apical seta and some 11 long and

recurved setae from apical 1/3 (Fig. 12-I). Gonostylus long and slender, widest at about middle, apically pointed, and bear 4 long setae along inner margin (Fig. 12-G).

Female. Body length 2.33, 2.60 mm; wing length 1.63, 1.67 mm. so 14–17; cl 24, 28; dm 20, 23; dl 29–30; all larger in numbers than those of females of the preceding two species. LR1 1.64, 1.65. Frontal tubercles absent. Antenna 6 segmented, last segment with 4 long subapical setae (Fig. 12-B). Spermathecae Fig. 12-G. Cercus Fig. 12-K, longer than the preceding species and with almost straight dorsal and ventral margins.

Discussion. This species is similar in body coloration to the preceding two species, but could be differentiated under stereomicroscope by that antennal hairs arising from distal half of antenna are conspicuously shorter (AHR only about 0.17). The shape of dorsal appendage and the position at which lateral seta arise are also characteristic to this species. In the female, this species could be separated from those of the preceding species by that numbers of so, cl, dm and dl are significantly larger. Among the European species of *Polypedilum,* the present species is closest to *P. arundinetum* (Goetghebuer) in the structure of dorsal appendages, but in the latter gonostylus is much wider and bears more numerous inner setae, AR is about 1.5 and much larger, ventral appendages are stouter, and anal point is broader at base.

(18) *Polypedilum tamagohanum*, sp. nov.

Materials studied: 2 males and 3 females emerged from a sample collected at Station 2, 11 males and 6 females from Station 3, June 1981. 8 males and 5 females among them are mounted on slides. Holotype: A 67:81. Paratypes: A 67:82–89.

Male. Body length 3.95–4.32 mm (4.24 mm in average of 8). Wing length 2.12–2.35 (2.22 mm). Body coloration largely dark brown. Front femur dark brown, tibia and tarsi yellow. Middle and hind femora dark brown, tibiae brown, tarsi yellow. Wing with five dark marks, as in Fig. 13-A. Halteres brown. Standard measurement data in Table 2-U.

Frontal tubercles absent. Antenna with 13 flagellar segments, AR 1.27–1.33 (1.31). Wing venation in Fig. 13-A. R 2+3 separated from R 1, though ending closer to end of R 1 than to end of R 4+5. fCu only slightly beyond r-m. Wing membrane dotted with fine granules. Front tibia with a long, curved and apically pointed terminal scale (Fig. 13-C). One terminal comb of middle and hind tibiae with a long spur, the other comb without spur. LR1 1.53 in average, TR1 0.26 in average, smaller than in most other *Polypedilum* species. Tarsi with relatively long beards. Pulvilli well developed.

Hypopygium in Fig. 13-D. Posterior margin of ninth tergite only slightly convex in the middle portion. Anal point long, slender, parallel-sided and with rounded apex. Dorsal appendages composed of a large setigerous base bearing 2 or 3 long inner setae, and a horn-like apical process rectangularly curved inwards and bearing a long lateral seta (Fig. 13-E). Ventral appendages tapering towards apex, bear a long apical seta, and only 8 recurved setae arising from apical half of the shaft (Fig. 13-F). Gonostylus short, stout, widest at about middle, and with almost straight inner margin.

Female. Coloration as in male, and can easily be differentiated from other species by the wing with five dark marks (Fig. 13-B). Antenna (Fig. 13-G) 6 segmented, segments II to V each with a neck (segment V without neck in the preceding 3

species), terminal segment with 3 subapical setae. Spermathecae Fig. 13-H. Cercus Fig. 13-I.

Discussion. This species is characteristic in having 5 dark marks on wing, and thus it is most closely related to *P. laetum* (Meigen) of Europe, but differs from it in the shape of dark marks on wing and in the shape and structure of dorsal appendages, ventral appendages and gonostylus.

(19) *Polypedilum asakawaense* Sasa, 1980

2 males emerged from Station B, Okutama, 3 males and 2 females emerged from Station C, Hikawa, both relatively unpolluted parts of the main stream of the River Tama. Morphology of male, female and pupa was described by Sasa (1980, p.34). Large numbers of males and females were recovered from samples collected March 1982 at Station B, C, D, F and H of the same river. Standard measurement data in Table 2-V.

(20) *Polypedilum tamagoryoense* Sasa, 1980

Materials studied: The numbers of adults recovered were 4 males and a female from Station D, 2 males from E, 3 males and a female from F, and 2 males from H, all from the more polluted parts of the river; 4 pupal exuviae associated with 2 males and 2 females, and a larval skin associated with pupa and male were also collected (specemens No. A 67:31–43). This species was described by Sasa (1980, p.36) based on 2 males and a famale collected at Station 5, Tamagoryo of Minamiasakawa River; the male was fully described, but the female remained undescribed because the specimen was imperfect, and only the wing, thorax, spermathecae and cercus were illustrated in this report.

Male. Standard measurement data of 9 mounted specimens in Table 2-W. Large species with body length of 4.40–5.50 mm (4.49 mm in average) and wing length of 2.15–2.53 mm (2.30 mm). Body coloration almost uniformly black. AR 1.59–1.78 (1.76). This species is unusual as a member of *Polypedilum* in that antepronotum has 3–6 lateral hairs (they are absent in all other species of this genus from this river, see Table 2). Tarsi with relatively long beards, BR1 3.8, BR2 6.0, BR3 6.3 in average. Pulvilli well developed. Wing membrane with cloudy marks, as illustrated in Plate 44-A of Sasa (1980, p.101). Hypopygium all black. Anal point long, slender and tapering towards apex. Dorsal appendage with a long lateral hair arising from about apical 1/3, with a relatively narrow base bearing 1 or 2 long setae (basal setae were absent in the type specimen, but present in all specimens collected this time). Shape of gonostylus characteristic to this species, elongate oval and with rounded apex.

Female. Two specimens mounted in gum-chloral were available for this study. Body length 4.24, 4.52 mm, wing length 2.48, 2.52 mm. Coloration almost uniformly black as in male. Head in Fig. 14-A. Eyes with long and narrow dorsomedial projection, ER 0.15, 0.20. Supraorbital setae 12, 12 in one specimen and 14, 14 in another. Clypeal setae 38 in both specimens. Antenna with 5 flagellar segments, segments II to IV with a neck, last segment with 3 long subterminal setae (Fig. 14-B). Antepronotum with 3 or 4 lateral setae on each side (unusual as a member of *Poly-*

pedilum). Dorsomedian setae 20, 16; dorsolateral setae 42, 42 and 53, 46; supra-alar-setae 9, 10 and 14, 15, all very numerous. Scutellum with 24 or 33 setae. Squama with 19, 19 and 15, 16 fringe setae. Terminal scale of front tibia wide and with rounded apex (Fig. 14-C). One terminal comb of middle and hind tibiae with a spur, the other without spur (Fig. 14-D); however, in one middle tibia of specimen No. A 76:40 both combs with a short spur. LR1 1.53, 1.67, LR2 0.56, 0.53, LR3 0.70, 0.77. Front tarsus V 0.27, 0.30 times as long as front tibia. Tarsi with relatively long beards, BR1 2.6, BR2 3.0, 3.9, BR3 3.3, 4.6. Pulvilli well developed (Fig. 14-E). Cercus in Fig. 14-G, spermathecae Fig. 14-F.

Pupa. Length of abdomen 5.20, 5.58, 5.80 mm. Thoracic respiratory organs divided into 6 long and 2 short tubes (Fig. 15-A). Spines and hairs on abdominal tergites in Fig. 15-B, C. Tergite II to VI with an oral transverse band of large spines (-a), the largest spines located in the middle being 22 microns long, and a middle spinose area of small spines roughly arranged like a figure "V" (-b, -c). In addition, tergite II has an uniserial row of 55–68 large recurved spines along the caudal margin (II-d), and tergites III and IV with a band of small recurved spines in 3 or 4 rows along the caudal margin. Tergite VII and VIII with a pair of spinulous areas near oral margin. Caudolateral scales of segment VIII composed of a sharply pointed principal spine, and 2 to 4 small accessory spines along the outer and inner margins (Fig. 15-D, E). Lateral hairs on abdominal segments II to VIII are sss, sss, sss, LLL, LLL, LLLL, LLLL. Anal fins with 29–40 (34.7 in average of 6) long, filamentous fring hairs.

Larva. (description with a larval skin associated with male pupal skin and a male). Antenna 5 segmented (70, 20, 18, 12,6 microns), arising from a large base (Fig. 14-H). Labrum in Fig. 14-I. Labial plate with 16 (8 pairs) of teeth, the central pair longest and widest, the second pair from the middle conspicuously shorter and narrower than the first and the third pairs, paralabial plates almost fan-shaped (Fig. 14-J). Mandibles with 5 cutting teeth (Fig. 14-K). Premandibles with two apical blades. Claws on anterior pseudopods narrow and simple (Fig. 14-M). Preanal hair tufts with 7 hairs on each side, arising from low base bearing two hairs (Fig. 14-N). Claws on posterior pseudopods 16 on both sides, shape as usual (Fig. 14-P).

(21) *Polypedilum ureshinoense* (Sasa, 1979)

3 males and a female were found among adults emerged from Station F, Hino. The same species was recorded also from Station 6 and 5 of Minamiasakawa River by Sasa (1980). These populations are somewhat different in the structure and shape of dorsal appendages from that of the type specimens, which were collected from a sewage ditch in Ureshino, Nagasaki. Standard measurement data in Table 2-X.

(22) *Polypedilum nubifer* (Skuse, 1889)

A male and a female emerged from Station H, Noborito. As discussed by Sasa and Sublette (1980), this is a species widely distributed throughout the Pacific Region from Australia to South and East Asia. In Japan, it has been found commonly in eutrophicated ponds and sewage ditches from Ibaraki to Okinawa.

(23) *Rheotanytarsus kyotoensis* (Tokunaga, 1936)

Two males emerged from Station H, Noborito, a relatively polluted part of the river (specimen No. 69:74, 75). This species was described first with male and female by Tokynaga (1936, p.346) from Shimogamo and Kamigamo, Kyoto, and was reported as being very abundant in slow stream. Large numbers of males and females were collected at Station 5, Tamagoryo of Minamiasakawa River, and its adult, pupa and larva were described and illustrated by Sasa (1980, p.19). This is apparently a species whose larvae are inhabiting in relatively eutrophicated parts of rivers. Males are characterised especially by the structure of appendage 2-a, which is divided apically into two lobes somewhat like a boxing glove.

(24) *Tanytarsus tamaoctavus* Sasa, 1980

A male was recovered from a sample of Station E, Hamura (No. A 69:73). This species was described by Sasa (1980, p.23) from Station No. 1 and No. 3 of Minamiasakawa River, and is characteristic especially in the structure of appendage 1-a,which is large and highly twisted.

(25) *Tanytarsus tamanonus* Sasa, 1980

Materials studied: A male, 3 females and 2 pupal skin casts associated with the females were recovered from a sample collected at Station C, Hikawa. They were all mounted on slides (No. A 69:71, 72). The male was identified as that of *tamanonus* described by Sasa (1980) from Station 3 of Minamiasakawa, by the characteristic structure of hypopygium and distribution of macrotrichiae on wing membrane. The femaes were judges as belonging to the same species as the male mainly by the structure of the wing.

Male. Small midge, with the body length of 1.84 mm in the present specimen and 1.67 mm in the type specimen, and wing length of 1.07 mm, 1.00 mm, respectively, Body coloration almost entirely pale yellow, scutal stripes brown. Antenna with only 10 flagellar segments, AR small, 0.43, 0.64. Antennal hairs relatively long, AHR 0.40. Eyes reniform and without dorsomedial projection, ER 1.26, 1.60. Frontal tubercles large and conical, as illustrated in Fig. 26-C of Sasa (1980, p.83). Supraorbitals 9 on each side, clypeals 16, pronotum without setae, dorsomedians 10, dorsolaterals 6 or 7, supra-alar 1 on each side, scutellum with 6 setae, squama bare.

Wing with macrotrichiae only between R 4+5 and M, and between M and Cu 1 (Fig. 15-A). Other morphological characters as described by Sasa (1980, p.25) with the type specimen.

Female. Small midge with the wing length of 1.02, 1.00, 0.98 mm. Head in Fig. 16-A. Antenna short, with only 4 flagellar segments (Fig. 16-B). Eyes reniform, without dorsomedial projection, ER 0.79–0.99 (0.87 in average). Supraorbital setae 4 on each side. Clypeal setae 11–13 (12.0). Pronotum without setae. Dorsomedian setae 9 or 10, dorsolateral setae 7–10 (8.2), pre-alar setae 1 on each side, scutellum with 4 or 5 setae. Squama without setae. Wing in Fig. 15-B. Macrotrichiae are restricted mainly to the distal parts of cells between R 4+5 and M, M and Cu 1, and Cu 1

and Cu 2, and on veins R, R 1, R 4+5, M, Cu, Cu 1, Cu 2 and An. Veins R 1 and R 4+5 are closely set and almost parallel, R 2+3 hardly discernible. fCu much beyond r-m. LR1 1.58–1.61, LR2 0.44–0.47, LR3 0.53–0.54. Terminal scale of front tibia long, narrow and sharply pointed (Fig. 15-C). Terminal combs of middle and hind tibiae are separated from each other and both with a long spur. Pulvilli absent.

Pupa (based on two exuviae associated with females). Length of abdomen 1.35, 1.48 mm. Thoracic respiratory organs missing from both specimens. Distribution of spines and hairs on abdominal tergites in Fig. 16-G, anal segment in Fig. 16-H. Tergites II to VI each with a pair of transverse spinose areas, which are narrowly separated in the middle forming an ill-defined spine patches. In addition, tergite II has a band of large recurved spines along the posterior margin, composed of 62 spines in one specimen and 80 spines in another, the longest spine about 7 microns long. Other tergites without spine band along the posterior margin. Eighth segment with a pair of mulberry-shaped scales on the ventral surface on posterior margin, which probably correspond to caudolateral scales (not located in the lateral corner as in other species, Fig. 16-H). Anal fins short and narrow, and with 1, 2 or 3 terminal spines (Fig. 16-H).

Discussion. This species was described by Sasa (1980, p.25) based on a single male collected from Station 3 of Minamiasakawa River. Another male, 3 females and 2 pupal exuviae were recovered from Station C, also a relatively unpolluted part of river. The male is characteristic in the structure of hypopygium, in antenna composed of only 10 flagellar segments, and the wing with relatively small numbers of macrotrichiae arising mainly from distal half.

(26) *Tanytarsus tamaundecimus* Sasa, 1980

A male was recovered from Station C, Hikawa; 5 males and a female emerged from Station D, Yoroibashi. This species was recorded and described by Sasa (1980, p.27) from Station 3 of Minamiasakawa River, and seems to be associated with slightly polluted parts of rivers. Standard measurement data of the present specimens are in Table 2-G.

(27) *Tanytarsus tamaduodecimus*, sp. nov.

Materials studied: 5 males, and 2 females of presumably of this species, were collected from a sample of Station C, Hikawa.

Male. Body coloration largely greenish yellow; antennal shaft and hairs brown, ground color of scutum yellow, stripes yellowish brown, scutellum yellow, postnotum brownish yellow, legs yellow, halteres pale yellow; abdominal tergites greenish yellow, hypopygium brown. Standard measurement data in Table 2-H.

Frontal tubercles minute, 6 microns high, 4 microns wide, and 32 microns apart from each other (Fig. 17-B). Antenna with 13 flagellar segments, AR 0.55–0.64 (significantly smaller than 0.88–1.00 of *T. tamaundecimus*); antennal hairs well developed, AHR 0.36–0.50. Palp 4 segmented as usual. Clypeal hairs 11 in all of 5 specimens examined (fewer than 14–20 of *T. tamaundecimus*). Pronotum without lateral hairs. Wings with macrotrichiae more densely on the distal portion than in the middle and proximal parts (Fig. 17-D). R 2+3 separated from R 1 and R 4+5. R 4+5 ending

slightly distal of tip of Cu 1. fCu much beyond r-m. LR1 2.24–2.55, TR1 0.33–0.38. *Tarsi with relatively long beards, BR1 2.8–3.1, BR2 4.1–8.4, BR3 4.1–6.0.* Terminal scale of front tibia long, narrow and with pointed apex (Fig. 17-G). Both combs of middle tibia usually with a spur (Fig. 17-H), occasionally one comb with a spur and the other without spur. In hind tibia, one comb with a spur and the other without spur (Fig. 17-I). Pulvilli absent (Fig. 17-J).

Hypopygium in Fig. 17-N. Bands of ninth tergite separated in the middle. Ninth tergite with 10–14 short setae in the middle at base of anal point. Anal point roughly triangular, broad at base and with pointed apex, with 5–7 spine groups between lateral ridges and several short lateral setae on both sides. (Fig. 17-R). Appendage 1 roughly half-egg-shaped and with concave inner margin, bears 5 short setae along the lateral margin on the dorsal surface and 3 short setae near inner corner (Fig. 17-P). Appendage 1-a long, extending about half of its length beyond inner margin of appendage 1, and with rounded apex (Fig. 17-O). Appendage 2 short and stout, almost the same width along its total length, with only 7 recurved setae dorsally and 2 short and distally directed setae ventrally (Fig. 17-Q). Appendage 2-a very short, directed medially and bears several short and simple setae (Fig. 17-Q). Gonocoxite widest at about basal 1/3, gradually tapering towards apex (Fig. 17-N).

Female. Two specimens from Station C were tentatively identified as those of this species, because they emerged from the same sample as the males and only one of the combs of hind tibiae had a spur. Antenna with only 4 flagellar segments (Fig. 17-A). Cercus and spermathecae in Figs. 17-S, T.

Discussion. Male of this species is somewhat similar in the structure of hypopygium to *Tanytarsus tamaundecimus* Sasa, but can be clearly differentiated by that in the latter anal point is apically rounded, appendage 1 is egg-shaped, appendage 1-a is curved and with pointed apex, wing length is larger, and AR value is significantly higher. The present species is also similar to *T. tamaseptimus* Sasa in the shape of anal point and in that one comb of hind tibia is without spur, but it is also different from the present new species in that setae on anal point is much longer, appendage 1-a is absent, appendages 2 and 2-a are both longer and more slender, and antenna has only 10 flagellar segments. Among *Tanytarsus* species known from Europe, the present species is similar in shape of anal point, appendage 1 and anal tergite bands to *Tanytarsus niger* Anderson (ref. Pinder 1978, Fig. 185-A), but both differ in the numbers of setae on ninth tergite (only 2 in *niger*), and in the shape of appendage 2 (apically expanded in *niger*).

(28) *Tanytarsus tamakutibasi*, sp. nov.

Materials studied: A male, emerged from Station B, Okutama; 5 males and 3 females emerged from Station D, Yoroibashi; 3 males and 2 females emerged from Station E, Hamura. All identified after dissected and mounted. Holotype: a male, emerged 16 June from D (No. A 69:03); the other specimens are designated as paratypes (Specimens No. A 69:01–11).

Male. Small species with body length of 2.50–3.10 mm and wing length of 1.37–1.65 mm. Body coloration largely greenish yellow; antennal shaft and hairs brown, ground color of scutum yellow, stripes yellowish brown, scutellum yellow, postnotum brownish yellow, halteres yellow; legs uniformly yellow excepting tibial combs, which are dark brown; abdomen greenish yellow. Standard measurement data

in Table 2-I.

Frontal tubercles prominent, 46 microns long, 13 microns wide and 30 microns apart from each other in the type specimen (Fig. 18-B). Antenna with 13 flagellar segments as usual, AR 1.00 in average. Wing (Fig. 18-E) with numerous macrotrichiae on distal 2/3. R 2+3 separated both from R 1 and R 4+5. Cu 1 ending proximal to end of R 4+5. fCu much beyond r-m. Anal vein ending before fCu. LR1 relatively high, 2.48–2.88. Front tarsus V relatively long, 0.37 times the length of front tibia in average. Terminal scale of front tibia narrow and sharply pointed (Fig. 18-G). Terminal combs of middle and hind tibiae separated and both with a long spur (Fig. 18-H). Front tarsus I with short beards, BR1 2.4–2.8. Pulvilli small.

Hypopygium in Fig. 18-J. Bands of ninth tergite widely separated. Ninth tergite with a pair of long, strong and straight setae reaching beyond base of anal point. Anal point long, expanded near apex and with a terminal process with rounded apex, bear 4 or 6 spine groups in the expanded portion and 10 or more short lateral setae (Fig. 18-K). Appendage 1 with rounded outer margin and concave inner margin, bear 9 short setae on the dorsal surface and a strong seta ventrally at base (Fig. 18-M). Appendage 1-a long, extending beyond inner margin of appendage 1 and with expanded and rounded apex (Fig. 18-L). Appendage 2 with 9 or 10 short recurved setae on the dorsal side and 3 or 4 posteriorly directed setae on the ventral side of its apical portion (Fig. 18-N). Appendage 2-a short and with several simple setae (Fig. 18-N). Gonostylus long, slender and almost parallel-sided (Fig. 18-J).

Female. Body length 2.15–2.50 mm (2.34 in average of 6), wing length 1.50–2.00 mm (1.72 mm). Coloration as in male, largely greenish yellow, with brownish yellow scutal stripes. Head in Fig. 18-A. Frontal tubercles prominent, almost cylindrical and with rounded apex, 13 microns high, 8 microns in diameter, and 50 microns apart from each other (Fig. 18-C). Antenna with only 4 flagelar segments (Fig. 18-D). Wing more hairy than in male. (Fig. 18-F). Terminal scale of front tibia short, narrow and with pointed apex, like in male. Terminal combs of middle and hind tibiae separated and both with a long spur, also like in male. Spermathecae in Fig. 18-P. Cercus in Fig. 18-Q.

Discussion. Male of this species is characeristic in the structure of hypopygium, especially the presence of a pair of strong setae on ninth tergite, and the shape of anal point, appendages 1, 1-a, 2, 2-a, and gonostylus. It is therefore somewhat similar to *Tanytarsus innarensis* Brundin, 1947, but both differs in the numbers of setae on ninth tergite (several in the latter), and in the shape and structure of anal point, appendages 1, and 2-a.

(29) *Tanytarsus tamagotoi*, sp. nov.

Materials studied: 2 males and a female, emerged from Station B; 4 males and 2 females emerged from Station D. All dissected and mounted (No. A 69:51–56).

Male. Body length 2.64–2.90 mm (2.75 mm in average), wing length 1.42–1.50 mm (1.47 mm). Body coloration largely yellow; antennal shaft and hairs brown, eyes dark brown; scutal stripes only slightly darker than ground color of scutum; legs yellow, terminal combs of middle and hind tibiae dark brown.

Standard measurement data in Table 2-J. Frontal tubercles present but minute, about 2.6 microns long and 2.4 microns in diameter, 48 microns apart from each other

(Fig. 19-B). Antenna with 13 flagellar segments, AR 0.83–0.87, smaller than other coexisting *Tanytarsus*. Lateral pronotals absent, supra-alar setae only 1 (rarely 2), scutellum with only 2–5 setae. Squama bare. Wing in Fig. 19-D, macrotrichiae distributed more densely on the apical and posterior regions than on the proximal half. R 2+3 separated from R 1, fCu much beyond r-m, anal vein not reaching to fCu. LR1 relatively high, 2.44–2.68; front tarsus V relatively long, TR1 0.39. Terminal scale of front tarsus with sharply pointed apex. Both combs of middle and hind tibiae with a long spur. Pulvilli absent (Fig. 19-H).

Hypopygium in Fig. 19-I. Bands of ninth tergite separated in the middle. Anal point broadest at base and with rounded apex, with a pair of lateral ridges, several lateral setae, and about 5 spine groups and numerous microtrichiae between the ridges (Fig. 19-J). Appendage 1 roughly oval and with rounded inner margin, with a small hook-like process medially, and with 4 setae on the dorsal surface along the posterior margin, 2 setae on the inner margin both arising from a tubercle, and a long seta at base; appendage 1-a long and with rounded apex, extending much beyond inner margin of appendage 1 (Fig. 19-K, L). Appendage 2 long, stout and not expanded apically, with 12 recurved setae on the ventral side and 4 or 5 straight setae on the ventral side near apical margin; appendage 2-a relatively short, with numerous narrow and pointed setae (Fig. 19-M). Gonostylus widest at about basal 1/3 and not abruptly narrowed near apex, with slightly concave inner margin (Fig. 19-I).

Female. Body coloration as in male. Antenna with only 4 flagellar segments (Fig. 19-A). Frontal tubercles minute (Fig. 19-C). Wing more hairly than in male (Fig. 19-E). Cercus in Fig. 19-P, spermathecae in Fig. 19-N.

Discussion. This species is a typical member of genus *Tanytarsus* in the strict sense, and seems to belong to the *eminulus* group of Reiss and Fittkau (1971), since anal point has several dark spine groups between the lateral ridges and is covered by numerous microtrichiae, anal tergite bands are separated in the middle, appendage 1-a is large and extends beyond inner margin of appendage 1, and appendage 2-a is relatively short and bears simple setae. However, the present species differs from previously known species of this group in the characteristic shape and structure of appendages 1 and 1-a. The low value of AR (0.83–0.87) and high value of LR1 (2.44–2.68) are also characteristic to this species.

The name of this new species is dedicated to Mr. Noboru Goto, President of the Tokyo Kankyo Joka Foundation.

(30) *Paratanytarsus tamanegi*, sp. nov.

Materials studied: A male and 3 females emerged from Station B, Okutama; 4 males emerged from Station D, Yoroibashi; 23 males and 18 females emerged from Station E, Hamura; a male emerged from Station F, Hino. They were all identified after dissected and mounted; specimens No. A 69:21–50. Pupal skins directly associated with specimens No. 69:23 (male) and No. 69:36 (female) were also recovered and mounted.

Male. Body length 3.30–4.35 mm, wing length 1.60–2.20 mm, significantly larger than other associated *Tanytarsus* species. Body coloration largely greenish yellow. Standard measurement data in Table 2-K.

Frontal tubercles minute, 4 microns high, 7 microns in diameter, and 22 microns

apart from each other (Fig. 20-B). Antenna with 13 flagellar segments, AR 1.23 in average. Antennal hairs long, AHR 0.49 in average. Pronotum without lateral setae. Scutum with 11–17 dorsomedian, 7–12 dorsolateral, and 1 or 2 pre-alar setae. Scutellum with 6 setae. Wing (Fig. 20-D) with numerous macrotrichiae on almost the entire surface; R 1 and R 4+5 closely running, R 2+3 separated from both and ending at about middle of the ends of the two veins; Cu 1 ending much proximal of R 4+5; r-m short and nearly parallel to the wing axis; fCu almost under r-m. LR1 1.68 in average, much are larger than other *Tanytarsus*spp. (Table 2). Terminal scale of front tibiae relatively short, narrow and sharply pointed (Fig. 20-F). Terminal combs of middle and hind tibiae contiguous, with 1 or 2 short spurs (a characteristic of this genus, Fig. 20-G, H). Pulvilli small, empodium small (Fig. 20-I).
G, H). Pulvilli small, empodium small (Fig. 20-I).

Hypopygium in Fig. 20-J. Bands of ninth tergite narrowly separated in the middle. Ninth tergite with 2 pairs of short setae in the middle arising along a U-shaped ridge. Anal point short and wide, basally expanded like "tamanegi" (onion bulb), with a pair of lateral ridges and a short seta at base (Figs. 20-K, L). Appendage 1 roughly triangular, with 9 setae on the dorsal surface along the inner margin, and a seta at base arising on ventral side (Figs. 20-M, N). Appendage 1-a knife-like, exceeding beyond inner margin of appendage 1 and with rounded apex (Fig. 20-M). Appendage 2 swollen apically, with some 20 recurved setae on the dorsal surface and 4 posteriorly directed setae on ventral surface, all arising from the distal expanded portion (Fig. 20-P, Q). Appendage 2-a bears numerous setae, those arising from basal half being simple, and those from distal half are more or less flattened (Fig. 20-P). Gonostylus widest near base (Fig. 20-J).

Female. Coloration as in male, almost uniformly greenish yellow. Antenna (Fig. 20-A) with 5 flagellar segments (female antena of coexisting *Tanytarsus* species consists usually of 4 flagellar segments, see Figs. 16-B, 17-A, 19-A). Frontal tubercles relatively large, roughly conical, 18 microns high, 15 microns in diameter, and 42 microns apart from each other (Fig. 20-C). Wing in Fig. 20-E, anal lobe flat, wing membrane more hairy than in male. Spermathecae in Fig. 20-R. Cercus in Fig. 20-S, posterior margin almost straight.

Pupa. Length of abdomen 365 microns. Thoracic respiratory organs absent. Distribution of hairs and spines on abdominal tergites in Figs. 21-A, B. Tergite II with a large central spinose area (II-a, b, c) all consisting of small spines or spinules, and an uniserial row of dark and recurved spines along the posterior margin (II-d) consisting of as many as 104 spines each about 12 microns long. Tergite III with a central spinose area (III-a, b), and a pair of caudal spine patches (III-c) consisting of 36 and 40 long spines. Tergite IV with an oral spine patch (IV-a) composed of numerous dark and short scale-like spines and 6 long spines, and a pair of lateral longitudinal spine patches each composed of about 60 long, dark spines. Tergite V also with an oral spine patch (V-a) in the middle, and a pair of small longitudinal spine patches (V-b). Tergite VI with an oral transverse spinose area (VI-a). Tergites VII, VIII and IX with a pair of oral spinulous areas. Caudolateral scales of segment VIII bear 10 or 12 comb-like spines along the posterior margin (Fig. 21-D, E). Lateral hairs on segments II to VIII consist of sss, sss, ssL, ssL, LLL, LLLL, LLLL. Anal fins each with 63 and 69 filamentous fringe hairs, and a long, flat and filamentous hair on the dorsal surface.

Discussion. This species is a member of genus *Paratanytarsus* Bause (=*Lundstroemia* Kieffer), since wing membrane with numerous macrotrichiae on almost entire

surface, squama bare, combs of middle and hind tibiae contiguous and with 1 or 2 short spurs, and appendage 2-a bears only short simple setae. Two species of this genus have been recorded by Tokunaga (1938) from Japan as members of subgenus *Lundstroemia* of genus *Tanytarsus,* of which the present species is more closely related to *telmatophilus* than to *tredecemarticulus* in the character of setae on appendage 2-a, but the present species differs even from the former in that anal point has short setae, appendage 2 is apically swollen, and tarsi bear long beards.

A parthenogenetic form of this genus was recorded also from Tsukuba by Sasa (1979, p.2) by the name of *Paratanytarsus parthenogeneticus* (Freeman, 1961). Female of the present species is similar in structure to those of the parthenogenetic strains, but both species differ in the structure of spine patches of pupal abdominal tergites; in pupa of the parthenogenetic species, the spine patch IV-a consist of only short spines (the present species has several long spines), tergite V without a pair of longitudinal lateral spine patches composed of long spines, and tergite VI without oral band of spinose areas such as seen in the present species.

Summary

A survey of chironomid midges breeding in the main stream of the River Tama was conducted in June 1981, according to the methods same as reported in the previous papers by Sasa (1980, 1981). Bottom samples on the riverbed were collected at 10 stations (A to J) from the uppermost mountain stream to the river mouth (Fig. I), at distances of about 10 kilometers between the neighbouring stations and for a total length of about 100 kilometers. The bottom samples containing chironomid larvae were brought to the laboratory, reared to adult midges in plastic containers, and identified mainly by the adult males.

As the results, a total of 4,287 adult chironomids were recovered by laboratory rearing of bottom samples collected at the ten stations, as shown in Table 1. By microscopic examination of the morphology of males, females and some pupae, they were classified into 30 species of the subfamily Chironominae, 20 species of the subfamily Orthocladiinae, and 5 species of the subfamily Tanypodinae. The present paper deals with the distribution and taxonomy of members of the subfamily Chironominae.

Of 22 species of the tribe Chironomini collected in the present survey, 11 are described as new species, and another 11 were the species same as previously found from Minamiasakawa River, a tributary of the River Tama. Of 8 species of tribe Tanitarsini, 4 were new species and 4 were the same as found from the tributary. Distribution of these species was shown to be highly correlated with the degree of pollution with sewage waters, as shown in BOD values of the collection sites in Fig. II.

Table 1. Species and numbers of adult chironomids recovered from bottom samples collected at each survey stations along the River Tama, June 1981 (left: number of males; right: females)

Code No.	Species name	A Yuba		B Okutama		C Hikawa		D Yoroi		E Hamura		F Hino		G Koremas		H Noborito		I Noge	
1	*Chironomus yoshimatsui*											229	245	76	94	253	286	457	553
2	*Chironomus circumdatus*							0	2							4	16		
3	*Kimius hoonsooi*															1	1		
4	*Paracladopelma tamahikawai*					1	0												
5	*Paracladepelma tamanipparai*					1	0												
6	*Parachironomus tamacutus*			1	0														
7	*Microtendipes tamaogouti*	15	41	14	19														
8	*Microtendipes britteni*			1	1	2	2												
9	*Paratendipes tamayubai*	80	37	4	1														
10	*Pentapedilum tamahamurai*									1	0								
11	*Polypedilum unifascium*	36	26	0	1			0	1			1	0	0	1				
12	*Polypedilum tsukubaense*	96	78	7	3	0	1												
13	*Polypedilum takaoense*	2	0																
14	*Polypedilum tamaharaki*	21	41	12	15														
15	*Polypedilum tamanigrum*	159	160	35	56	16	20												
16	*Polypedilum tamasemusi*	6	5																
17	*Polypedilum tamahosohige*			3	2	1	1												
18	*Polypedilum tamaculatum*			2	3	11	6												
19	*Polypedilum asakawaense*			2	0	3	2												
20	*Polypedilum tamagoryoense*							4	1	2	0	3	1			2	0		
21	*Polypedilum ureshinoense*											3	1						
22	*Polypedilum nubifer*															1	1		
23	*Rheotanytarsus kyotoense*															2	0		
24	*Tanytarsus tamaoctavus*									1	0								
25	*Tanytarsus tamanonus*					1	3												
26	*Tanytarsus tamaundecimus*					1	0	5	1										
27	*Tanytarsus tamaduodecimus*					5	2												
28	*Tanytarsus tamakutibasi*			1	0			5	3	3	2								
29	*Tanytarsus tamagotoi*			2	1			4	2										
30	*Paratanytarsus tamanegi*			1	3			4	0	23	18	1	0						
Subtotal		415	388	85	105	42	37	22	10	30	20	237	247	76	95	263	304	457	553

Table 1. (continued)

Code No.	Species name	A Yuba		B Okutama		C Hikawa		D Yoroi		E Hamura		F Hino		G Koremasa		H Noborito		I Noge	
31	*Brillia japonica*	21	26	19	36														
32	*Orthocladius tamanitidus*			31	38	14	14												
33	*Paratrichocladius tamaater*	7	5	1	9	31	51												
34	*Paratrichocladius rufiventris*							2	3	1	1	7	18	4	6	6	3	19	13
35	*Cricotopus tamadigitatus*	25	35																
36	*Cricotopus metatibialis*	65	61	7	5			3	2										
37	*Cricotopus bicinctus*							2	0					2	1	2	0	20	13
38	*Cricotopus triannulatus*					4	3											3	6
39	*Cricotopus* sp. *"noge"*													2	2			11	3
40	*Cricotopus* sp. *"yoroi"*							2	1	1	2								
41	*Rheocricotopus tamabrevis*	1	0																
42	*Rheocricotopus tamahumeralis*											1	0	1	1				
43	*Nanocladius tamabicolor*													1	0	13	20	11	2
44	*Eukiefferiella tamaflavus*	7	21	5	14														
45	*Parakiefferiella tamatriangulatus*	2	0																
46	*Metriocnemus tamaokui*	1	0	1	0														
47	*Parametriocnemus stylatus*	2	2	1	0														
48	*Limnophyes tamakireides*	3	0																
49	*Limnophyes tamakiyoides*	1	0																
50	*Corynoneura* sp.	1	3	19	18														
51	*Pentaneura* nr. *alba*			1	4	15	8			1	0								
52	*Pentaneura* nr. *maculipennis*			9	17	27	14												
53	*Pentaneura* nr. *multifascia*			3	3	2	2												
54	*Procladius* nr. *crassinervis*											0	1						
55	*Tanypus* nr. *punctipennis*															2	1		
	Subtotal	136	153	97	144	93	92	9	6	3	3	8	19	10	10	23	24	64	37
	Grand Total	551	541	182	249	105	129	31	16	33	23	245	266	86	105	286	328	521	590
	No. of Species	20		25		17		11		8		8		7		10		6	

Table 2. Standard measurement data of adult males*

	A *Microtendipes tamaogouti* #7 (10)	B *Microtendipes britteni* #8 (3)	C *Paratendipes tamayubai* #9 (9)	D *Cryptochironomus tamayoroi* # (5)	E *Cryptochironomus* sp. hentona # (6)
BL (mm)	4.21–5.00 (4.59)	4.21–4.76 (4.46)	3.45–4.21 (3.75)	5.50–6.50 (5.90)	5.25–6.10 (5.55)
WL (mm)	2.19–2.45 (2.32)	2.31–2.59 (2.48)	1.55–1.80 (1.68)	2.55–2.80 (2.68)	2.25–2.60 (2.49)
AR	1.98–2.16 (2.07)	2.04–2.17 (2.10)	1.35–1.57 (1.47)	2.52–2.71 (2.60)	2.60–2.74 (2.66)
AHR	0.56–0.63 (0.60)	0.54–0.61 (0.58)	0.54–0.60 (0.57)	0.55–0.61 (0.57)	0.58–0.64 (0.61)
ER	0.91–0.29 (0.24)	0.24–0.28 (0.26)	0.28–0.34 (0.31)	0.23–0.35 (0.24)	0.24–0.29 (0.26)
SO	18–24 (20.5)	10–18 (16.8)	8–12 (10.4)	21–27 (23.1)	20–30 (24.0)
cl	28–42 (31.8)	20–22 (21.0)	14–22 (14.8)	14–20 (17.0)	16–17 (16.4)
pn	4–7 5.3	3–4 3.7	2–6 3.3	3–9 5.8	8–12 10.1
dm	0–8 (2.8)	0 (0)	7–10 (8.4)	12–16 (14.2)	15–19 (17.6)
dl	13–17 (14.9)	9–13 (11.6)	5–10 (6.8)	12–17 (14.0)	12–23 (14.7)
pa	4–5 (4.2)	3–4 (3.7)	2–4 (2.9)	6–9 (7.4)	4–6 (5.2)
sc	25–32 (28.0)	20–28 (23.7)	8–14 (10.4)	24–28 (25.6)	20–35 (26.8)
sq	12–15 (12.9)	14–18 (16–0)	7–10 (6.8)	13–16 (15.0)	16–21 (18.5)
LR1	1.25–1.34 (1.29)	1.28–1.37 (1.32)	1.31–1.49 (1.42)	1.61–1.63 (1.62)	1.65–1.78 (1.72)
LR2	0.65–0.68 (0.66)	0.64–0.66 (0.65)	0.57–0.61 (0.58)	0.62–0.67 (0.65)	0.65–0.70 (0.68)
LR3	0.74–0.79 (0.76)	0.73–0.76 (0.75)	0.62–0.66 (0.63)	0.65–0.70 (0.67)	0.67–0.70 (0.69)
TR1	0.24–0.26 (0.25)	0.23–0.24 (0.24)	0.24–0.26 (0.25)	0.25–0.26 (0.25)	0.24–0.26 (0.25)
BR1	2.0–2.3 (2.2)	2.0–2.5 (2.3)	1.5–2.0 (1.8)	1.8–2.2 2.1)	1.8–2.2 (2.1)
BR2	2.4–3.9 (3.2)	3.2–4.7 (4.1)	3.0–4.0 (3.2)	2.9–4.0 (3.4)	3.0–4.4 (3.8)
BR3	3.6–4.9 (4.4)	3.1–5.0 (4.3)	3.0–3.4 (3.6)	3.8–5.1 (4.5)	3.8–5.3 (4.9)

*Refer to p. 34 (Explanation of abbreviations and method of measurements)

F *Stictochironomus tamamontuki* # (12)	G *Tanytarsus tamaundecimus* #26 (6)	H *Tanytarsus tamaduodecimus* #27 (5)	I *Tanytarsus tamakutibasi* #28 (10)	J *Tanytarsus tamagotoi* #29 (6)	K *Paratanytarsus tamanegi* #30 (10)
5.70–6.85 (6.28)	2.80–3.70 (2.99)	2.45–2.62 (2.60)	2.50–3.10 (2.80)	2.54–2.90 (2.75)	3.30–4.35 (3.53)
2.45–3.30 (3.03)	1.40–1.55 (1.48)	1.15–1.25 (1.19)	1.37–1.65 (1.53)	1.42–1.50 (1.47)	1.60–2.20 (1.92)
1.43–1.83 (1.67)	0.88–1.00 (0.96)	0.55–0.64 (0.60)	0.89–1.09 (1.00)	0.83–0.87 (0.85)	1.08–1.38 (1.23)
0.48–0.61 (0.55)	0.46–0.47 (0.47)	0.40–0.50 (0.44)	0.42–0.53 (0.47)	0.38–0.50 (0.46)	0.46–0.57 (0.49)
0.28–0.41 (0.36)	0.55–0.70 (0.67)	0.78–1.05 (0.96)	0.59–0.72 (0.67)	0.41–0.61 (0.51)	0.33–0.61 (0.49)
12–20 (16.2)	8–10 (8.8)	8–10 (8.5)	8–10 (8.0)	8–10 (9.3)	10–13 (11.4)
24–36 (29.9)	14–20 (15.7)	11 (11.0)	11–16 (12.7)	12–16 (14.6)	12–19 (1.59)
0	0	0	0	0	0
12–20 (16.8)	11–12 (11.5)	10–12 (10.8)	10–14 (12.0)	7–15 (12.7)	11–17 (14.2)
10–17 (14.9)	7–9 (8.0)	7–8 (7.4)	6–9 (7.6)	6–9 (7.1)	7–12 (8.8)
5–7 (5.7)	1 (1.0)	1–2 (1.2)	1 (1.1)	1–2 (1.1)	1–2 (1.5)
21–40 (27.9)	4–5 (4.2)	2–4 (3.6)	4–6 (4.4)	2–5 (3.7)	6 (6.0)
16–25 (19.7)	0	0	0	0	0
1.05–1.21 (1.16)	2.49–2.82 (2.62)	2.24–2.56 (2.42)	2.48–2.88 (2.67)	2.44–2.68 (2.59)	1.59–1.73 (1.68)
0.55–0.60 (0.57)	0.57–0.64 (0.61)	0.57–0.61 (0.59)	0.59–0.63 (0.60)	0.56–0.60 (0.58)	0.62–0.67 (0.64)
0.70–0.77 (0.73)	0.69–0.73 (0.71)	0.68–0.71 (0.69)	0.70–0.76 (0.73)	0.71–0.74 (0.72)	0.73–0.77 (0.75)
0.22–0.23 (0.23)	0.35–0.40 (0.38)	0.33–0.38 (0.35)	0.34–0.40 (0.37)	0.36–0.42 (0.39)	0.23–0.26 (0.24)
2.5–2.8 (2.6)	2.2–3.4 (3.2)	2.8–3.1 (3.0)	2.4–2.8 (2.6)	2.2–3.5 (2.8)	3.1–4.7 (4.2)
2.5–4.0 (3.3)	5.9–7.9 (6.8)	4.1–8.4 (5.9)	5.0–7.1 (6.0)	5.3–5.6 (5.4)	6.3–7.1 (6.7)
3.8–6.0 (5.0)	5.2–6.7 (5.8)	4.1–6.0 (5.3)	5.2–7.2 (6.6)	5.8–6.7 (6.3)	6.4–7.4 (7.1)

Table 2.(continued)

	L *Polypedilum tamahinoense* # (12)	M *Polypedilum unifascium* #11 (12)	N *Polypedilum tsukubaense* #12 (12)	P *Polypedilum takaoense* #13 (3)	Q *Polypedilum tamaharaki* #14 (10)	R *Polypedilum tamanigrum* #15 (13)
BL (mm)	2.93–3.43 (3.18)	1.90–2.27 (2.07)	2.93–3.64 (3.26)	2.88–3.06 (2.98)	4.20–4.85 (4.50)	2.50–3.17 (2.78)
WL (mm)	1.57–1.70 (1.65)	1.03–1.31 (1.14)	1.62–1.82 (1.72)	1.62–1.67 (1.64)	2.25–2.52 (2.36)	1.43–1.70 (1.55)
AR	1.14–1.38 (1.26)	0.54–0.63 (0.58)	1.38–1.69 (1.51)	1.20–1.32 (1.26)	0.78–0.89 (0.83)	0.65–0.79 (0.69)
AHR	0.54–0.57 (0.49)	0.35–0.48 (0.42)	0.47–0.58 (0.50)	0.48–0.54 (0.51)	0.41–0.48 (0.45)	0.40–0.55 (0.48)
ER	0.14–0.24 (0.21)	0.18–0.24 (0.21)	0.13–0.32 (0.24)	0.28–0.32 (0.31)	0.17–0.24 (0.21)	0.14–0.25 (0.19)
so	10–11 (10.4)	8–14 (10.0)	8–14 (11.6)	11–12 (11.7)	18–26 (21.7)	8–11 (10.2)
cl	15–20 (18.2)	14–18 (16.3)	14–16 (15.0)	12–18 (13.3)	27–36 (31.3)	12–18 (15.0)
pn	0	0	0	0	0	0
dm	14–18 (15.4)	13–18 (15.2)	12–18 (14.8)	16–18 (17.3)	20–26 (22.9)	12–18 (15.0)
dl	11–17 (13.6)	10–16 (12.2)	10–15 (13.6)	12–18 (15.2)	20–30 (24.3)	13–22 (17.3)
pa	4–6 (4.8)	3–6 (4.4)	4–7 (4.8)	4 (4.0)	6-12 (8.1)	4–6 (5.0)
sc	10–16 (13.3)	6–14 (9.0)	15–20 (18.0)	12–16 (14.0)	31–37 (33.8)	10–23 (16.0)
sq	6–10 (7.6)	4–8 (5.4)	7–12 (8.1)	8–10 (9.0)	18–28 (22.4)	6–10 (8.1)
LR1	1.87–2.00 (1.93)	1.88–2.06 (1.95)	1.75–1.97 (1.86)	1.75–1.77 (1.76)	1.49–1.65 (1.56)	1.79–1.96 (1.85)
LR2	0.59–0.63 (0.61)	0.54–0.63 (0.57)	0.54–0.58 (0.56)	0.58–0.60 (0.59)	0.53–0.58 (0.56)	0.50–0.55 (0.52)
LR3	0.70–0.76 (0.73)	0.64–0.75 (0.71)	0.70–0.78 (0.73)	0.73–0.77 (0.75)	0.70–0.74 (0.73)	0.69–0.73 (0.71)
TR1	0.33–0.34 (0.34)	0.33–0.39 (0.36)	0.30–0.34 (0.32)	0.29–0.32 (0.30)	0.28–0.31 (0.30)	0.29–0.33 (0.31)
BR1	3.0–3.3 (3.2)	3.1–4.5 (3.6)	3.0–5.0 (3.8)	2.7–4.5 (3.4)	2.8–3.2 (3.0)	2.0–4.0 (3.2)
BR2	4.0–5.8 (4.9)	4.3–6.4 (5.4)	4.3–5.9 (5.3)	4.5–5.8 (5.0)	3.5–4.7 (4.1)	3.7–5.3 (4.6)
BR3	4.9–7.8 (6.2)	6.0–9.0 (7.3)	5.5–8.2 (6.4)	4.3–6.3 (5.2)	3.6–5.9 (4.4)	3.9–7.8 (6.6)

S *Polype-dilum tama-semusi* #16 (6)	T *Polype-dilum tama-hosohige* #17 (4)	U *Polype-dilum tama gohanum* #18 (8)	V *Polype-dilum asakawa ense* #19 (13)	W *Polype-dilum tama-goryoense* #20 (9)	X *Polype-dilum ureshino-ense* #21 (3)
2.53–3.00 (2.84)	2.90–3.27 (3.03)	3.95–4.52 (4.24)	4.10–5.40 (4.52)	4.40–5.50 (4.49)	3.65–3.75 (3.70)
1.53–1.73 (1.67)	1.50–1.67 (1.59)	2.12–2.35 (2.22)	2.10–2.80 (2.42)	2.15–2.53 (2.30)	1.73–1.77 (1.75)
0.95–1.00 (0.97)	0.40–0.47 (0.45)	1.27–1.33 (1.31)	1.85–2.03 (1.94)	1.59–1.88 (1.76)	1.34–1.65 (1.51)
0.45–0.52 (0.48)	0.17–0.19 (0.18)	0.50–0.58 (0.54)	0.45–0.53 (0.48)	0.51–0.57 (0.54)	0.49–0.54 (0.52)
0.19–0.26 (0.23)	0.23–0.29 (0.26)	0.20–0.31 (0.25)	0.09–0.22 (0.17)	0.18–0.27 (0.24)	0.16–0.23 (0.19)
10–13 (11.9)	15–17 (15.4)	13–17 (15.6)	10–14 (11.4)	10–14 (11.9)	12–16 (13.5)
15–16 (15.7)	20–22 (21.0)	18–23 (20.3)	20–40 (31.3)	25–32 (28.8)	18–20 (19.0)
0	0	0	0	3–6 (4.5)	0
14–17 (15.5)	22–28 (25.3)	19–22 (20.4)	10–16 (13.0)	18–24 (19.7)	16–18 (17.0)
14–20 (16.8)	25–32 (28.4)	14–22 (17.1)	11–15 (12.7)	17–30 (28.5)	18–20 (19.0)
4–6 (5.1)	5–9 (6.3)	6–8 (6.6)	3–5 (4.0)	8–14 (10.4)	4–6 (5.0)
10–12 (10.7)	18–23 (20.0)	21–28 (24.8)	12–21 (16.1)	18–25 (22.3)	14–20 (17.0)
7–11 (8.1)	14–17 (15.5)	14–17 (15.3)	10–20 (15.3)	12–19 (16.5)	8–10 (9.3)
1.61–1.69 (1.65)	1.68–1.73 (1.71)	1.48–1.59 (1.53)	1.51–1.70 (1.58)	1.42–1.59 (1.46)	1.63–1.69 (1.66)
0.53–0.57 (0.55)	0.51–0.53 (0.52)	0.62–0.67 (0.64)	0.58–0.63 (0.60)	0.54–0.58 (0.56)	0.50–0.55 (0.53)
0.68–0.76 (0.74)	0.72–0.74 (0.73)	0.76–0.79 (0.78)	0.73–0.78 (0.76)	0.73–0.77 (0.75)	0.64–0.70 (0.67)
0.28–0.32 (0.29)	0.30–0.31 (0.30)	0.24–0.28 (0.26)	0.29–0.33 (0.30)	0.28–0.32 (0.30)	0.28–0.30 (0.29)
3.0–4.3 (3.7)	3.0–3.6 (3.3)	2.8–4.6 (3.4)	2.2–3.1 (2.7)	3.4–4.7 (3.8)	2.9–3.2 (3.1)
4.9–7.0 (6.0)	3.9–4.5 (4.2)	4.4–6.0 (5.0)	3.8–4.8 (4.3)	4.4–7.3 (6.0)	5.3–5.6 (5.5)
5.6–8.6 (7.2)	5.2–6.7 (6.2)	5.1–7.3 (5.9)	6.0–7.3 (6.7)	5.2–7.7 (6.3)	6.0–7.5 (6.8)

Explanation of abbreviations and method of measurements

BL : body length, the combined length of thorax and abdomen, in mm

WL : wing length, from base of vein R to tip of wing, in mm

AR : antennal ratio, length of last segment divided by combined length of the preceding segments, not including pedicel

AHR : antennal hair ratio, length of a hair on preapical antennal segment divided by length of antennal shaft

ER : eye ratio, distance between eyes divided by height of eye

SO : number of supraorbital setae

cl : number of clypeal setae

pn : number of lateral antepronotal setae

dm : number of dorsomedian setae of scutum

dl : number of dorsolateral setae of scutum

pa : number of pre-alar setae

sc : number of scutal setae

sq : number of fringe setae of squama

LR1 : length of front tarsus I divided by length of front tibia

LR2 : length of middle tarsus I divided by length of middle tibia

LR3 : length of front tarsus V divided by length of front tibia

BR1 : length of longest fair on front tarsus I divided by diameter of front tarsus I at the base of the hair

BR2 : do, middle tarsus I

BR3 : do, hind tarsus I

EXPLANATION OF FIGURES

Fig. 1 ***Paracladopelma tamahikawae*, sp. nov.**

Male: **A.** frontal tubercles. **B.** tip of front tibia. **C.** tip of hind tibia. **D.** hypopygium, dorsal view. **E.** hypopygium, ventral view of dorsal appendages and gonostylus. **F.** inner margin of gonocoxite, and ventral appendages, ventral view.

***Paracladopelma tamanipparai*, sp. nov.**

Male: **G.** frontal tubercles. **H.** tip of front tibia. **I.** tip of hind tibia. **J.** hypopygium, dorsal view, and skeleton of ninth tergite. **K.** dorsal appendage, left side, dorsal view. **L.** ventral appendages, and left dorsal appendage, ventral view.

Fig. 2 ***Cryptotendipes tamacutus*, sp. nov.**

Male: **A.** frontal tubercles. **B.** wing. **C.** tip of front tibia. **D.** tip of hind tibia. **E.** middle tarsus V. **F.** hypopygium, dorsal view. **G.** hypopygium, ventral view.

Fig. 3 ***Microtendipes tamaogouti*, sp. nov.**

Male: **A.** tip of front tibia, lateral view. **B.** do, mesal view. **C.** tip of middle tibia. **D.** middle tarsus V. **E.** hypopygium, dorsal view. **F.** ventral appendage, dorsal view. **Female**: **G.** head. **H.** antenna. **I.** cercus. **J.** spermathecae.

Fig. 4 ***Microtendipes tamaogouti*, sp. nov.**

A. male wing. **Pupa**: **B.** thoracic respiratory organ. **C.** abdomen, dorsal view. **D.** spines on abdominal tergites. **E.** caudolateral scale of abdominal segment VIII.

Fig. 5 ***Paratendipes tamayubai*, sp. nov.**

Male: **A.** wing. **B.** tip of front tibia. **C.** tip of middle tibia. **D.** middle tarsus V. **E.** hypopygium, dorsal view. **F.** dorsal appendage. **G.** ventral appendages, dorsal view. **Female**: **H.** antenna. **I.** spermathecae. **J.** cercus.

Fig. 6 ***Paratendipes tamayubai*, sp. nov.**

Pupa: **A.** thoracic respiratory organ. **B.** abdominal tergites I–VII. **C.** tergites VIII and IX. **D.** caudolateral scale of segment VIII. **E.** spines on tergite II. **F.** spines on tergite III. **G.** spines on targite VI. **H.** spinules on tergite VIII.

Fig. 7 ***Pentapedilum tamahamurai*, sp. nov.**

Male: **A.** wing. **B.** tip of front tibia, showing terminal scale and long subterminal setae. **C.** tip of middle tibia. **D.** tip of hind tibia. **E.** hypopygium, dorsal view. **F.** dorsal appendage. **G.** ventral appendage, dorsal view.

***Polypedilum tsukubaense*, Sasa**

Male: **H.** wing. **I.** tip of front tibia. **J.** tip of hind tibia. **K.** hypopygium, dorsal view. **L.** dorsal appendage, ventral view. **M.** ventral appendage, dorsal view. **N.** gonostylus, ventral view.

Fig. 8 *Polypedilum takaoense* Sasa

Male: **A.** tip of front tibia. **B.** hypopygium, dorsal view. **C.** dorsal appendage, ventral view. **D.** ventral appendage, dorsal view. **E.** gonostylus, ventral view.

Polypedilum tamaharaki, sp. nov.

Male: **F.** tip of front tibia. **G.** tip of hind tibia. **H.** hypopygium, dorsal view. **I.** ventral appendage, dorsal view. **Female:** **J.** antenna. **K.** spermathecae. **L.** cercus.

Fig. 9 *Polypedilum tamanigrum*, sp. nov.

Male: **A.** tip of front tibia. **B.** tip of middle tibia, inner view. **C.** tip of middle tibia, lateral view. **D.** hypopygium, dorsal view. **E.** dorsal appendage. **F.** ventral appendage, dorsal view. **Female:** **G.** antenna. **H.** tip of front tibia. **I.** tip of hind tibia. **J.** spermathecae. **K.** cercus.

Polypedilum tamaharaki, sp. nov.

L. male wing.

Fig. 10 *Polypedilum tamanigrum*, sp. nov.

Pupa: **A.** thoracic respiratory organs, right and left side. **B.** abdominal tergites II to VI. **C.** abdominal tergites, VII to IX. **D.** spines on tergites II and III. **E.** caudolateral scale of abdominal segment VIII.

Fig. 11 *Polypedilum tamasemusi*, sp. nov.

A. head, male. **B.** head, female. **C.** antenna, female. **D.** wing, male. **E.** wing, female. **F.** tip of front tibia, male. **G.** male hypopygium, dorsal view. **H.** dorsal appendage. **I.** ventral appendage, dorsal view. **J.** spermathecae, female. **K.** cercus, female.

Fig. 12 *Polypedilum tamahosohige*, sp. nov.

A. head, male. **B.** antenna, female. **C.** wing, male. **D.** wing, female. **E.** tip of front tibia, male. **F.** tip of hind tibia, male. **G.** male hypopygium. **H.** dorsal appendage, dorsal view. **I.** ventral appendage, ventral view. **J.** spermathecae. **K.** cercus, female.

Fig. 13 *Polypedilum tamagohanum*, sp. nov.

A. wing, male. **B.** wing, female. **C.** tip of front tibia, male. **D.** hypopygium. **E.** dorsal appendage. **F.** ventral appendage. **G.** female antenna. **H.** spermathecae. **I.** cercus.

Fig. 14 *Polypedilum tamagoryoense* Sasa

Female: **A.** head. **B.** antenna. **C.** tip of front tibia. **D.** tip of hind tibia. **E.** hind tarsus V. **F.** spermathecase. **G.** cercus. **Larva:** **H.** antenna. **I.** labrum. **J.** labial plate and paralabial plate. **K.** mandible. **L.** premandible. **M.** claws of anterior pseudopod. **N.** base of preanal hair tuft. **P.** claws on posterior pseudopod.

Fig. 15 *Polypedilum tamagoryoense* Sasa

Pupa: **A.** thoracic respiratory organ. **B.** spines and hairs on abdominal tergites. **C.** claws on tergites II and III, enlarged. **D.** caudolateral scale of abdominal segment VIII, and base of 4th lateral hairs, right side. **E.** do, left side.

Tanytarsus tamanonus Sasa

F. wing, male. **G.** wing, female.

Fig. 16 *Tanytarsus tamanonus* Sasa

Female: **A.** head. **B.** antenna. **C.** tip of front tibia. **D.** tip of hind tibia. **E.** spermathecae. **F.** cersus. **Pupa**: **G.** abdominal tergites II to V. **H.** anal segment.

Fig. 17 *Tanytarsus tamaduodecimus*, **sp. nov.**

A. antenna, female. **B.** frontal tubercles, male. **C.** do, female. **D.** wing, male. **E.** do, female. **F.** scutum and scutellum, male. **G.** tip of front tibia. **H.** tip of middle tibia. **I.** tip of hind tibia, male. **J.** front tarsus V, male. **K.** tip of front tibia. **L.** tip of middle tibia. **M.** tip of hind tibia, female. **N.** male hypopygium. **O.** dorsal appendage, ventral view. **P.** do, dorsal view. **Q.** ventral appendage, dorsal view. **R.** anal point. **S.** spermathecae, female. **T.** cercus.

Fig. 18 *Tanytarsus tamakutibasi*, **sp. nov.**

A. head, female. **B.** frontal tubercles, male. **C.** do, female. **D.** antenna, female. **E.** wing, male. **F.** wing, female. **G.** tip of front tibia, male. **H.** tip of hind tibia, male. **I.** front tarsus V. **J.** male hypopygium. **K.** anal point. **L.** dorsal appendage, ventral view. **M.** dorsal appendage, dorsal view. **N.** ventral appendage, dorsal view. **P.** spermathecae. **Q.** cercus.

Fig. 19 *Tanytarsus tamagotoi*, **sp. nov.**

A. female antenna. **B.** frontal tubercles, male. **C.** do, female. **D.** wing, male. **E.** wing, female. **F.** tip of front tibia, male. **G.** tip of hind tibia, male. **H.** front tarsus V, male. **I.** male hypopygium. **J.** anal point. **K.** dorsal appendage, dorsal view. **L.** do, ventral view. **M.** ventral appendage, dorsal view. **N.** spermathecae, female. **P.** cercus.

Fig. 20 *Paratanytarsus tamanegi*, **sp. nov.**

A. female antenna. **B.** frontal tubercles, male. **C.** do, female. **D.** wing, male. **E.** wing, female. **F.** tip of front tibia, male. **G.** tip of middle tibia, male. **H.** tip of hind tibia, male. **I.** front tarsus V, male. **J.** hypopygium, male. **K.** anal point, ventral view. **L.** anal point, dorsal view. **M.** dorsal appendage, ventral view. **N.** do, dorsal view. **P.** ventral appendage, dorsal view. **Q.** do, ventral view. **R.** spermathecae, female. **S.** cercus, female.

Fig. 21 *Paratanytarsus tamanegi*, **sp. nov.**

Pupa: **A.** abdominal tergites I–V. **B.** tergites VI–IX. **C.** spines on tergites. **D.** caudolateral scale of abdominal segment VIII, right side. **E.** do, left side.

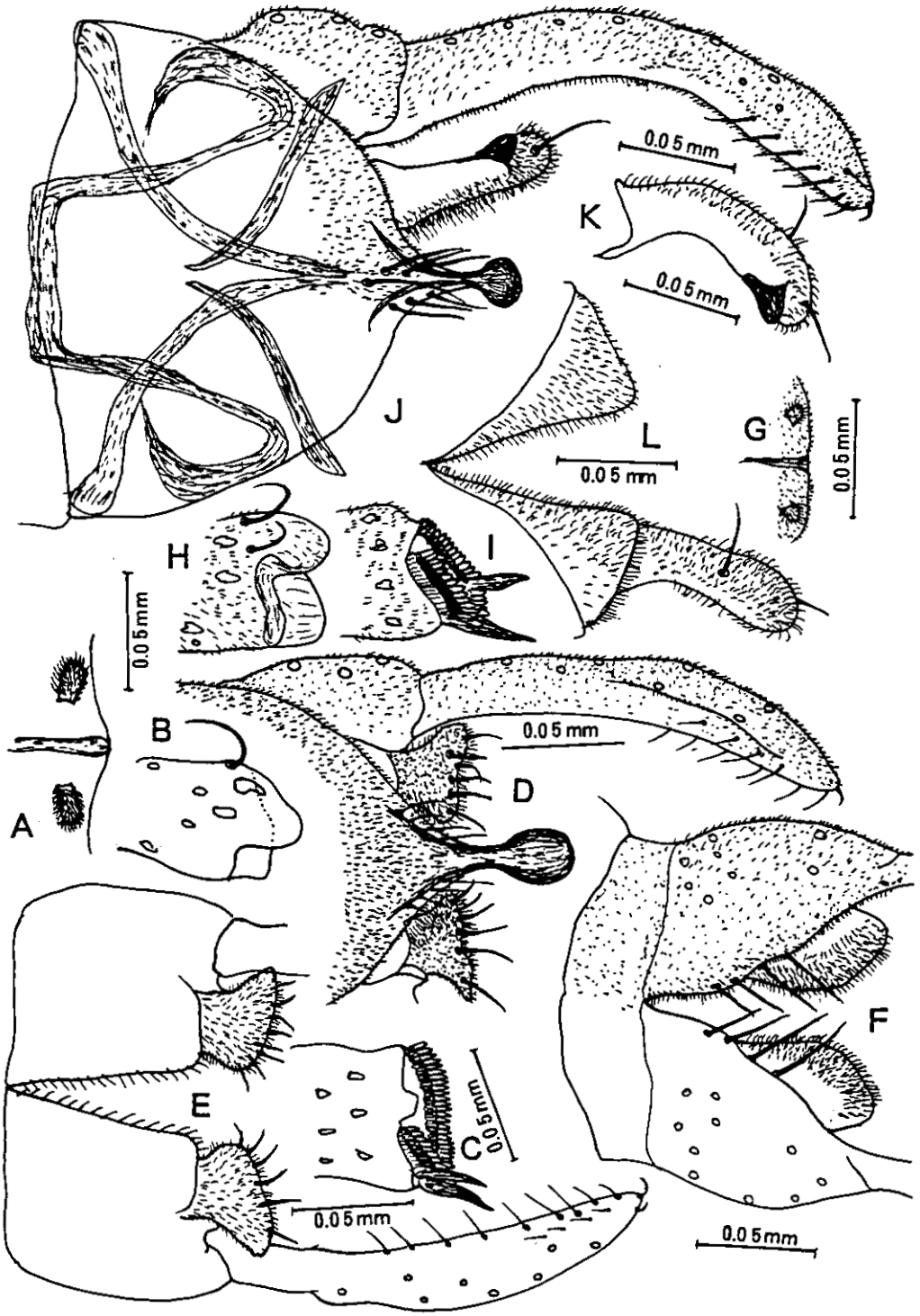


Fig. 1 *Paracladopelma tamahikawai*, sp. nov. (A–F)
Paracladopelma tamanipparai, sp. nov. (G–L)

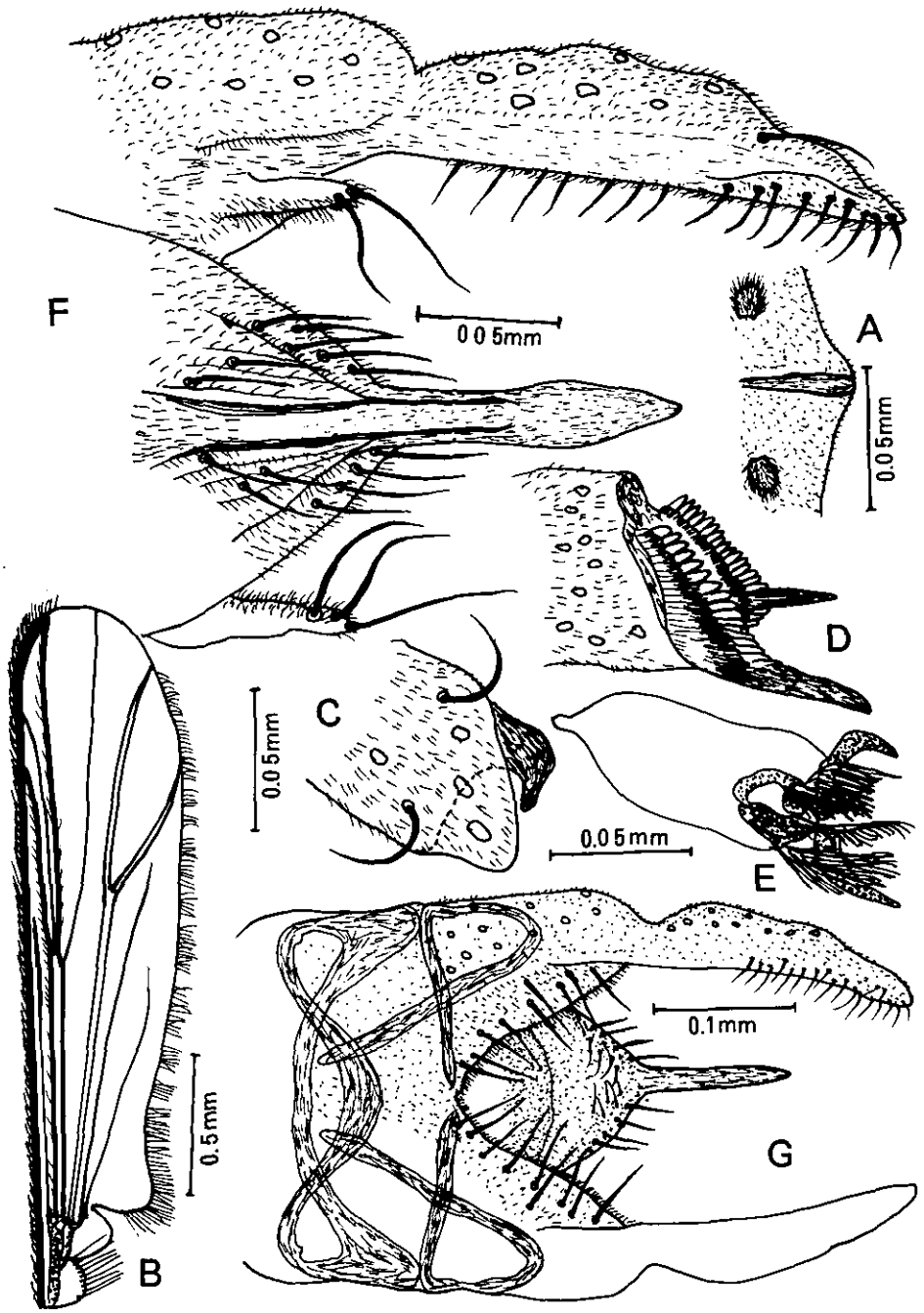


Fig. 2 *Cryptotendipes tamacutus*, sp. nov.

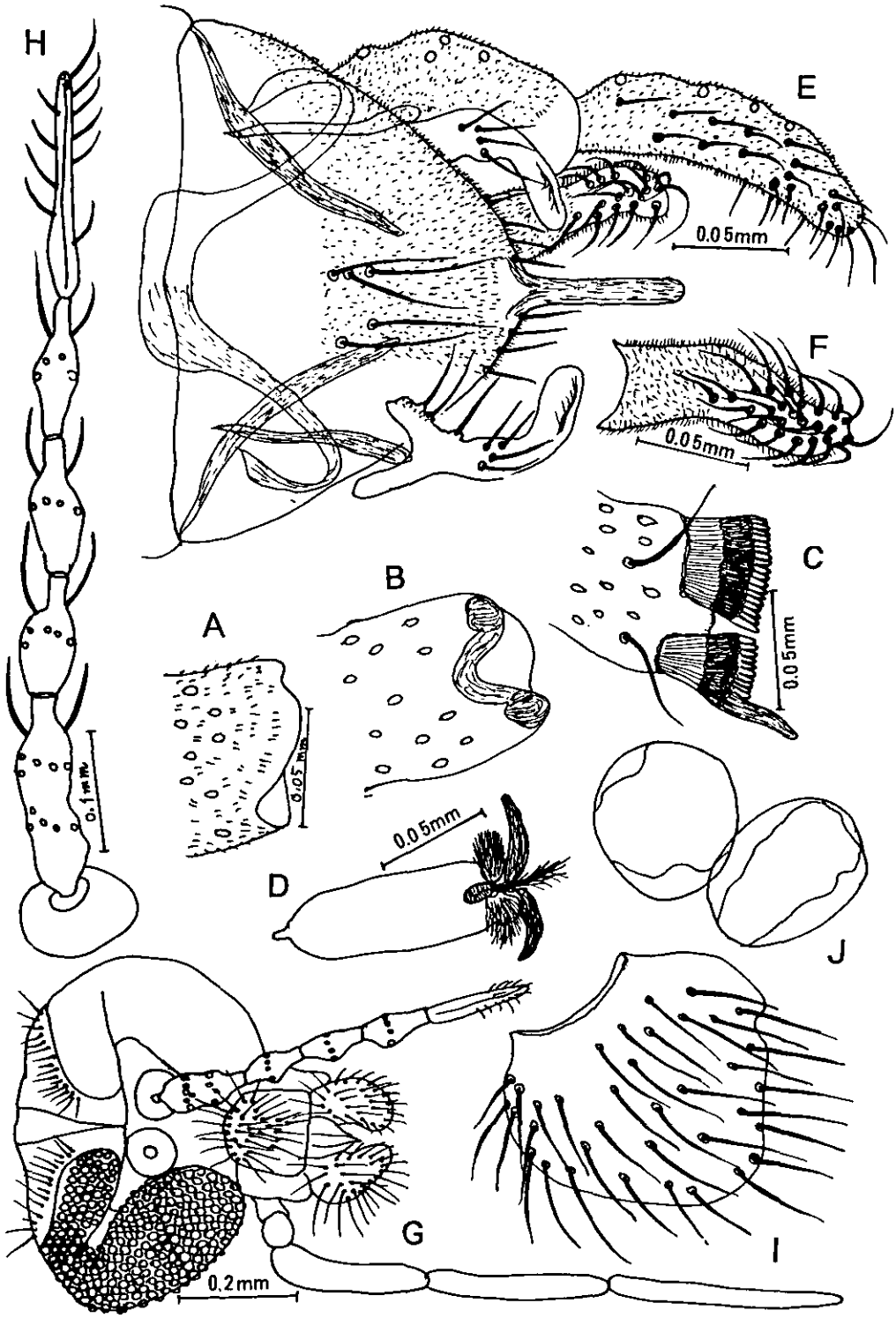


Fig. 3 *Microtendipes tamaogouti*, sp. nov.

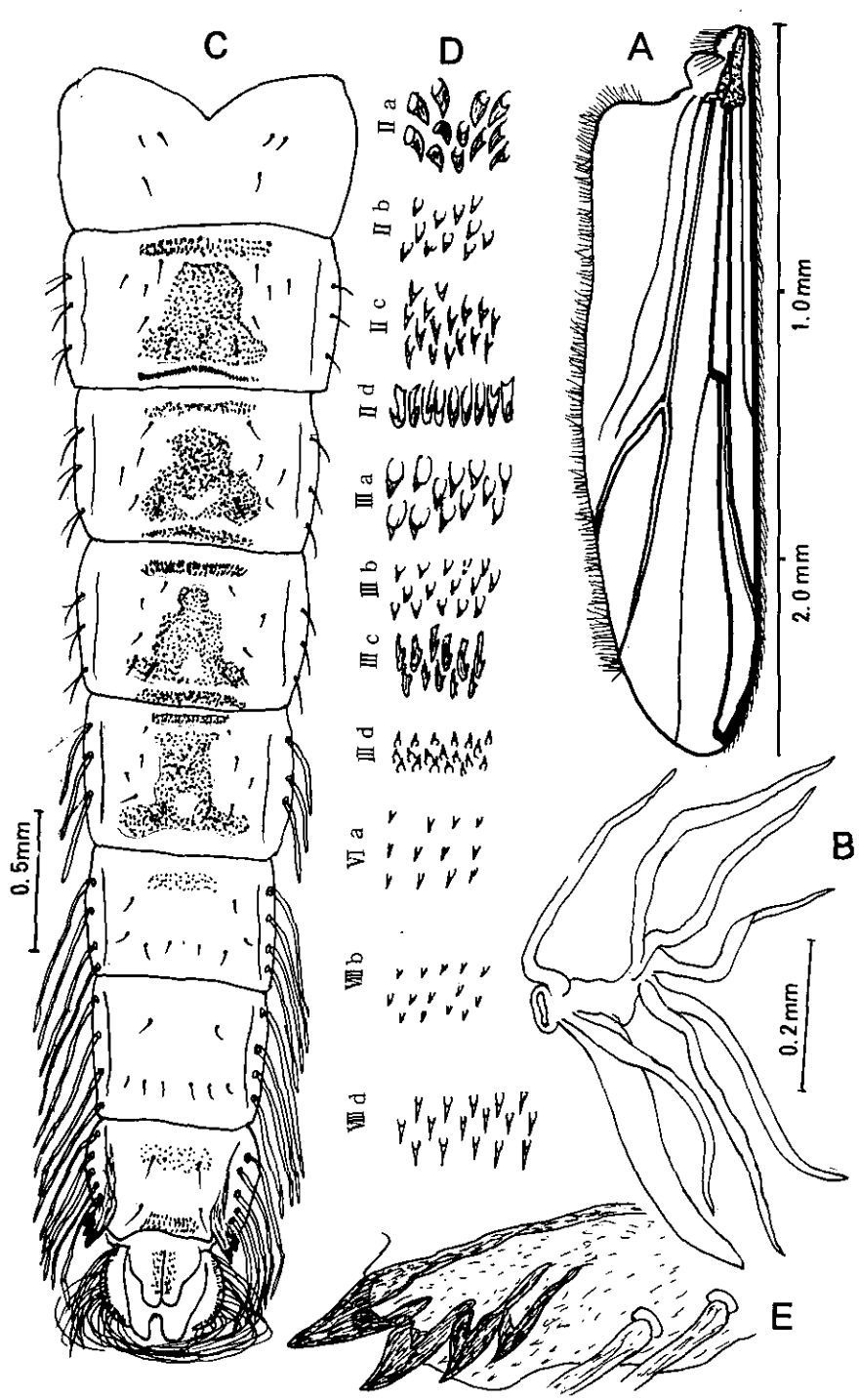


Fig. 4 *Microtendipes tamaogouti*, sp. nov.

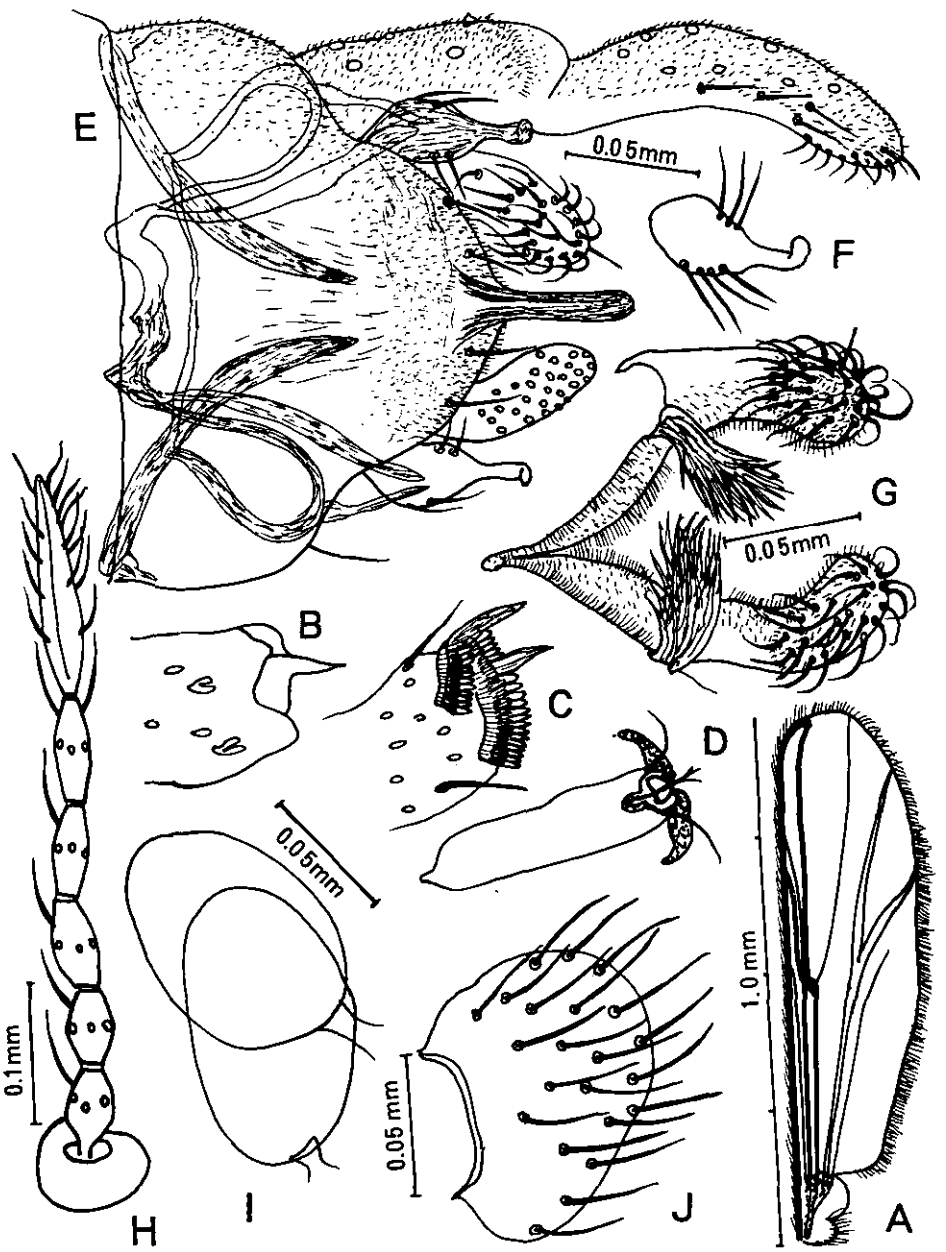


Fig. 5 ***Paratendipes tamayubai*, sp. nov.**

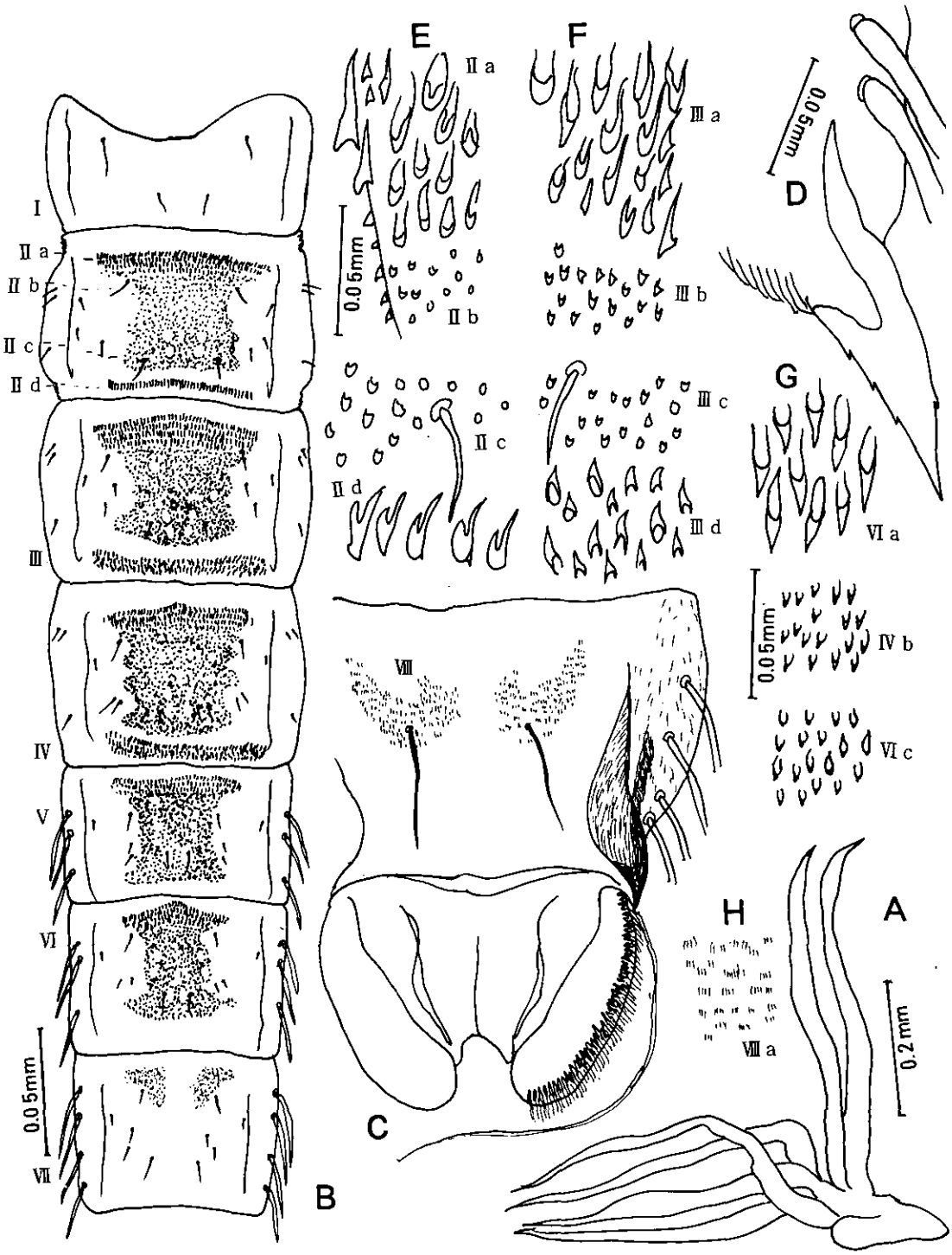


Fig. 6 *Paratendipes tamayubai*, sp. nov.

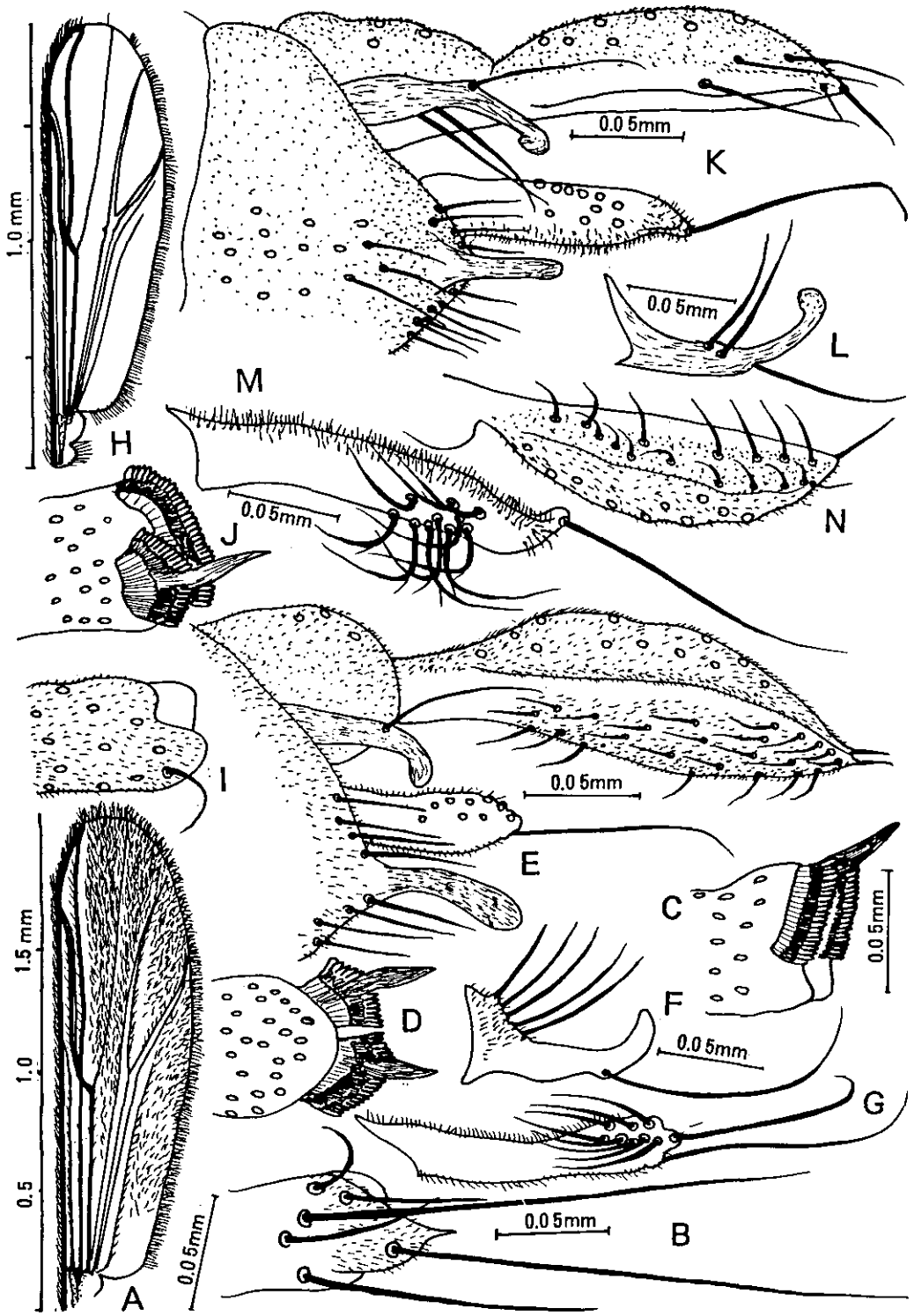


Fig. 7 *Pentapedilum tamahamurai*, sp. nov. (A–G)
Polypedilum tsukubaense, Sasa (H–N)

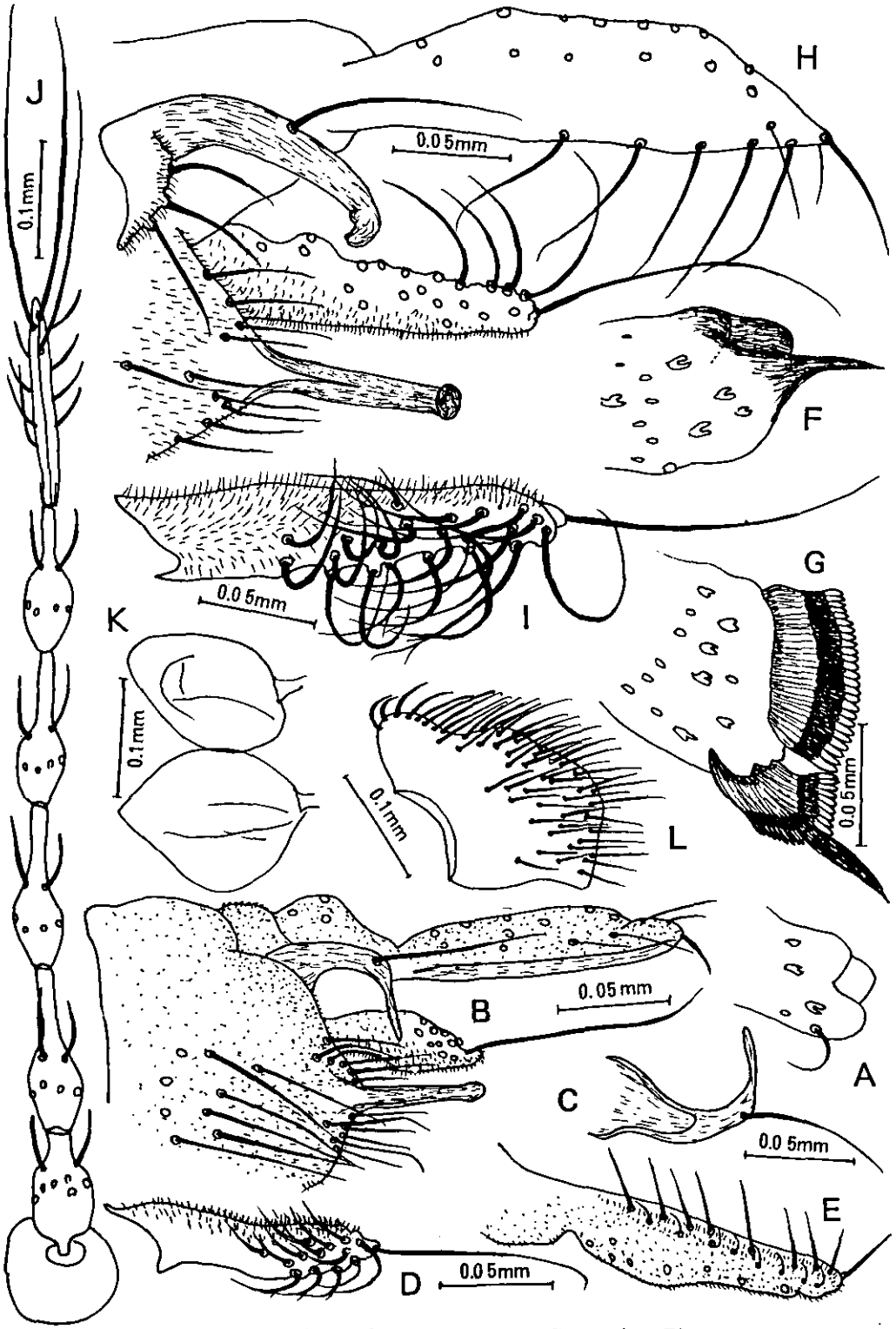


Fig. 8 *Polypedilum takaoense* Sasa (A–E)
Polypedilum tamaharaki, sp. nov. (F–L)

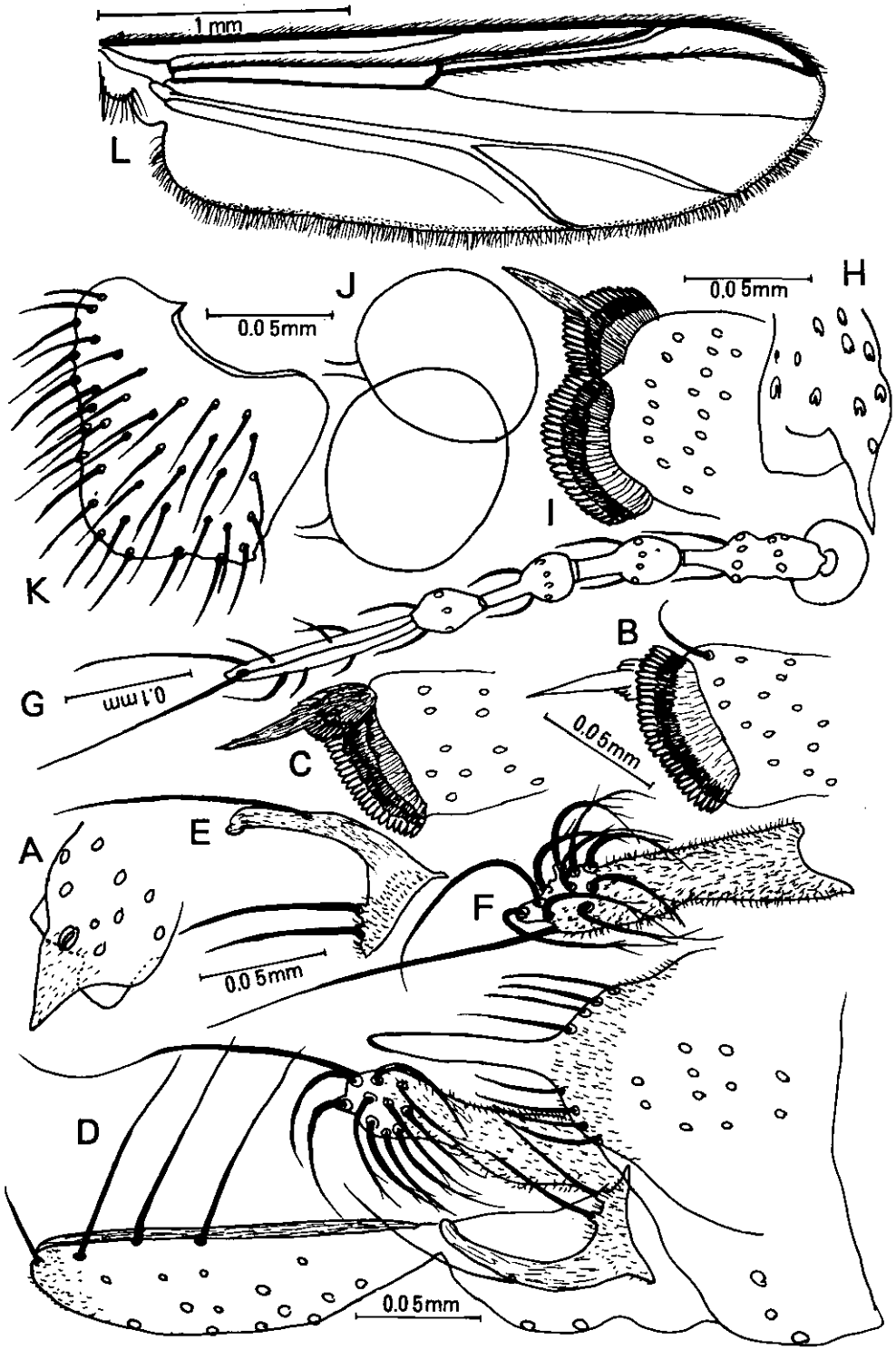


Fig. 9 *Polypedilum tamanigrum*, sp. nov. (A–I)
Polypedilum tamaharaki, sp. nov. (L)

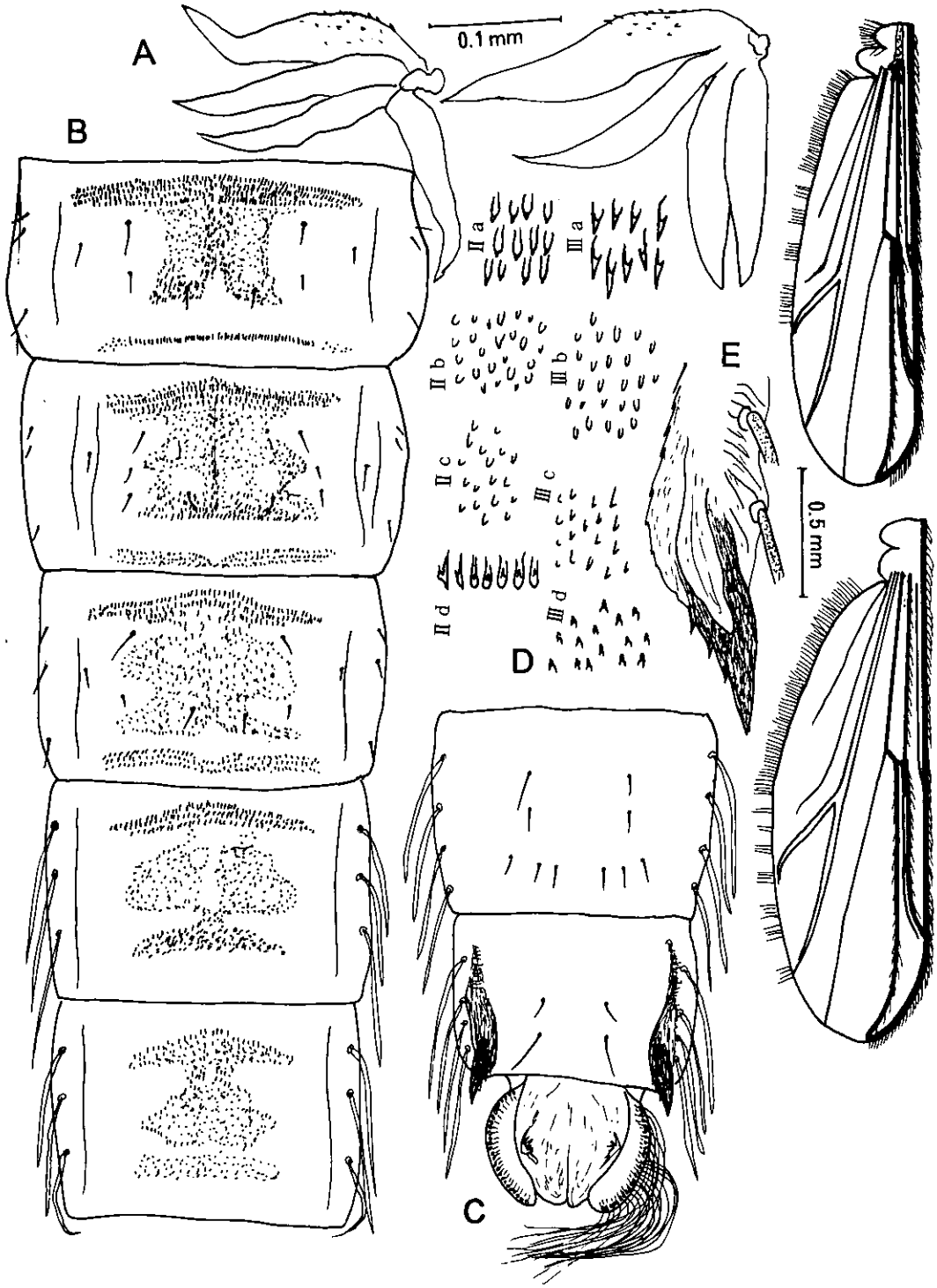


Fig. 10 *Polypedilum tamanigrum*, sp. nov.

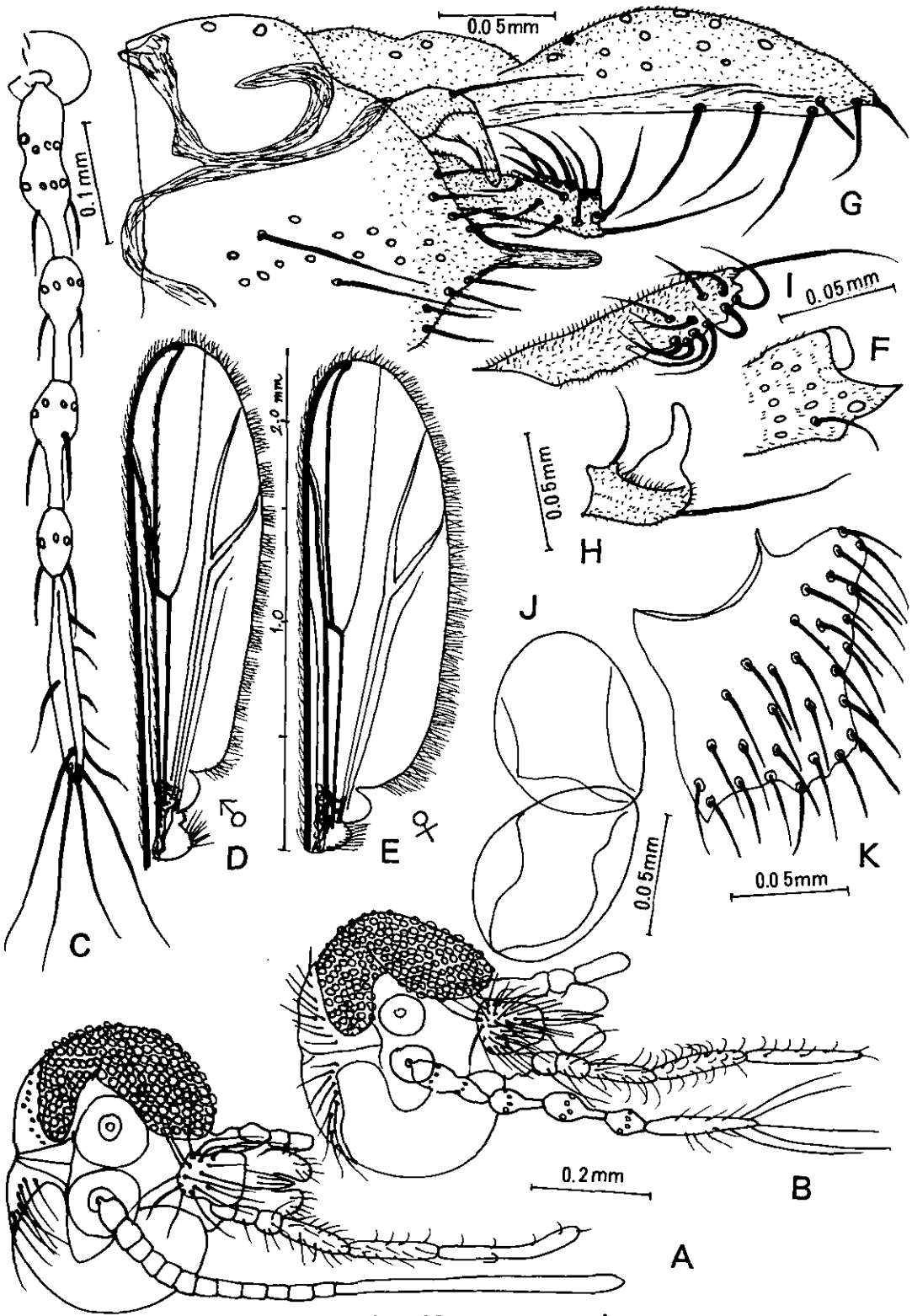


Fig. 11 *Polypedilum tamasemusi*, sp. nov.

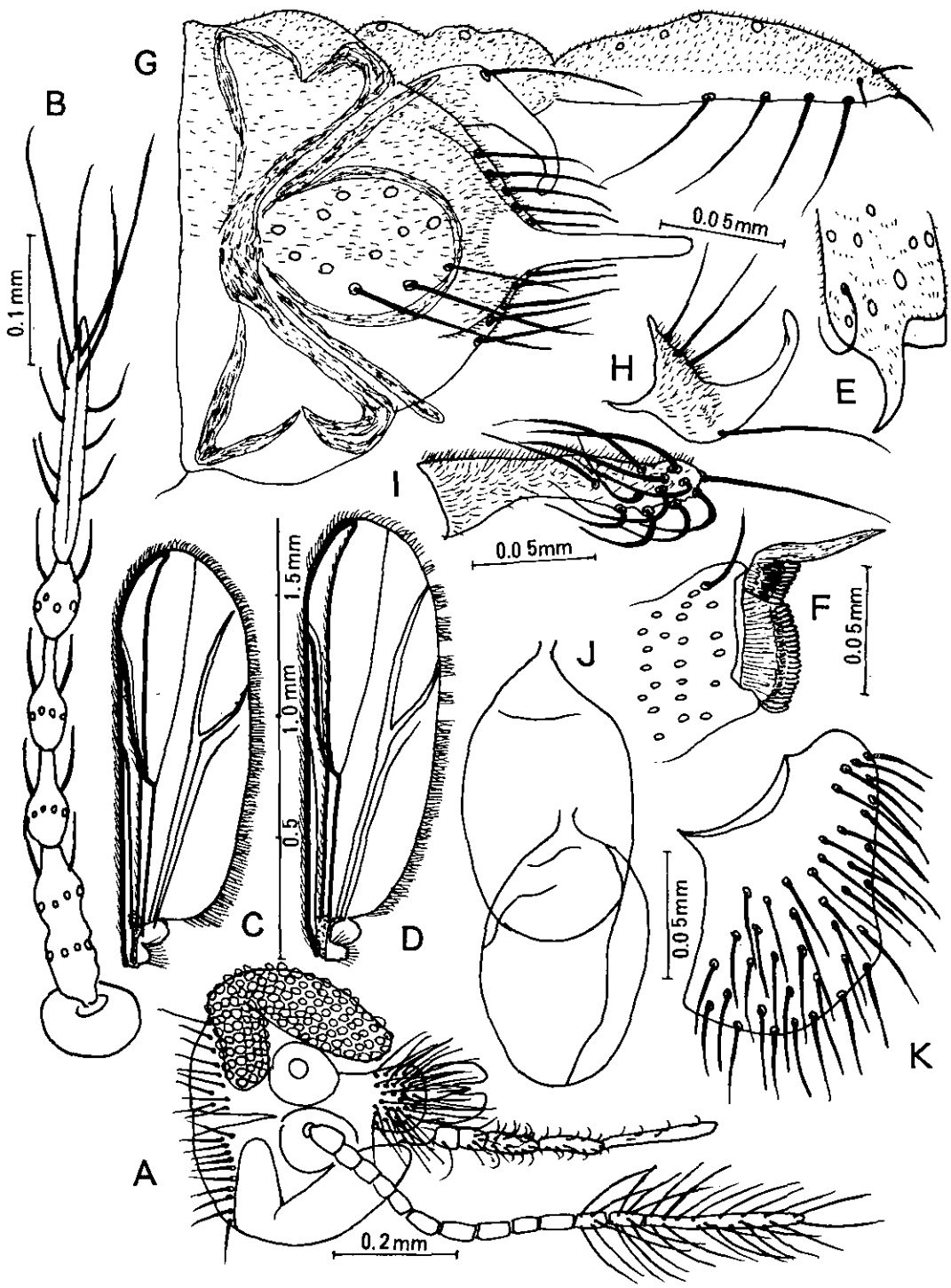


Fig. 12. *Polypedilum hosohige*, sp. nov.

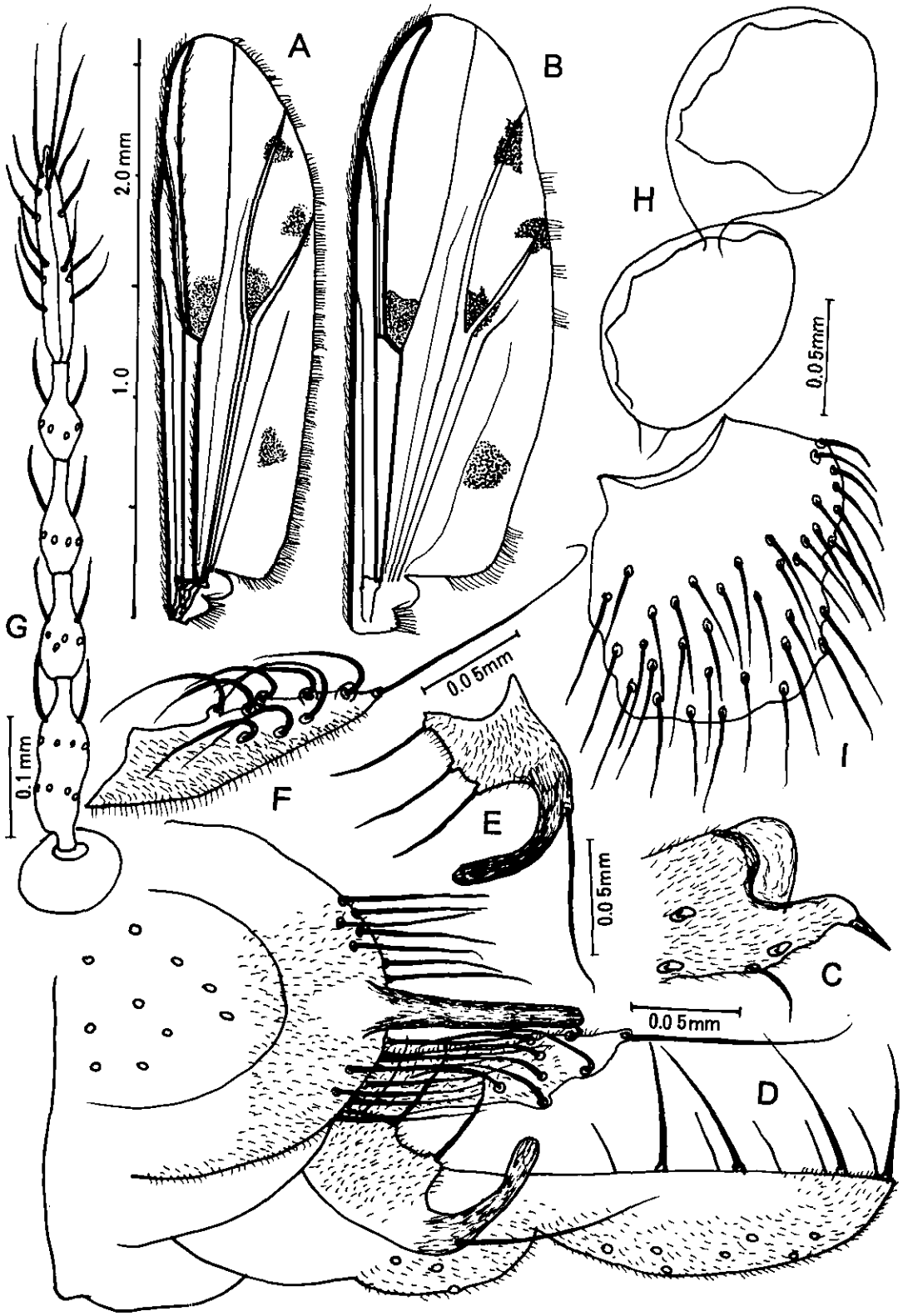


Fig. 13 *Polypedilum tamagohanum*, sp. nov.

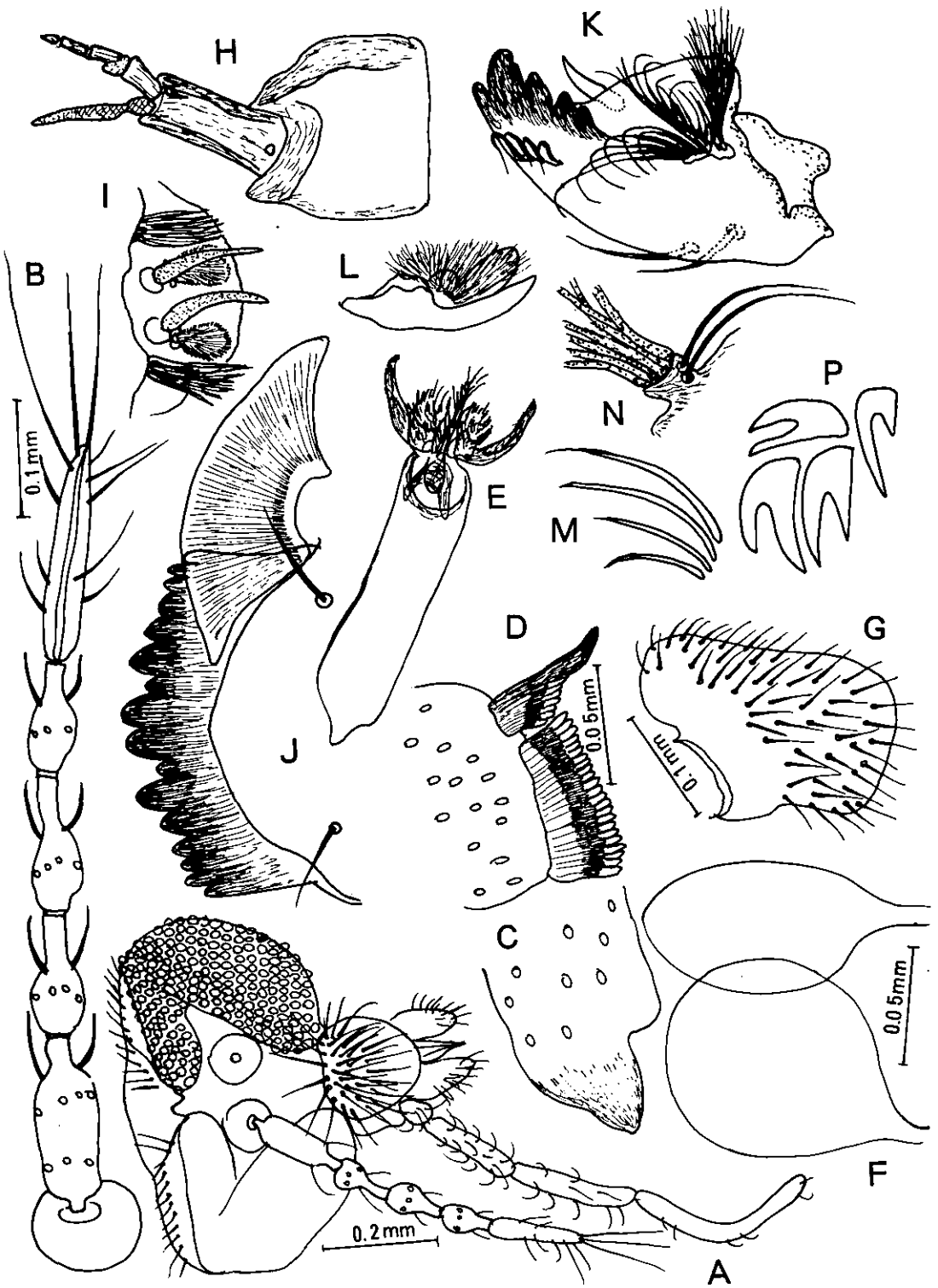


Fig. 14 *Polypedilum tamagoryoense* Sasa

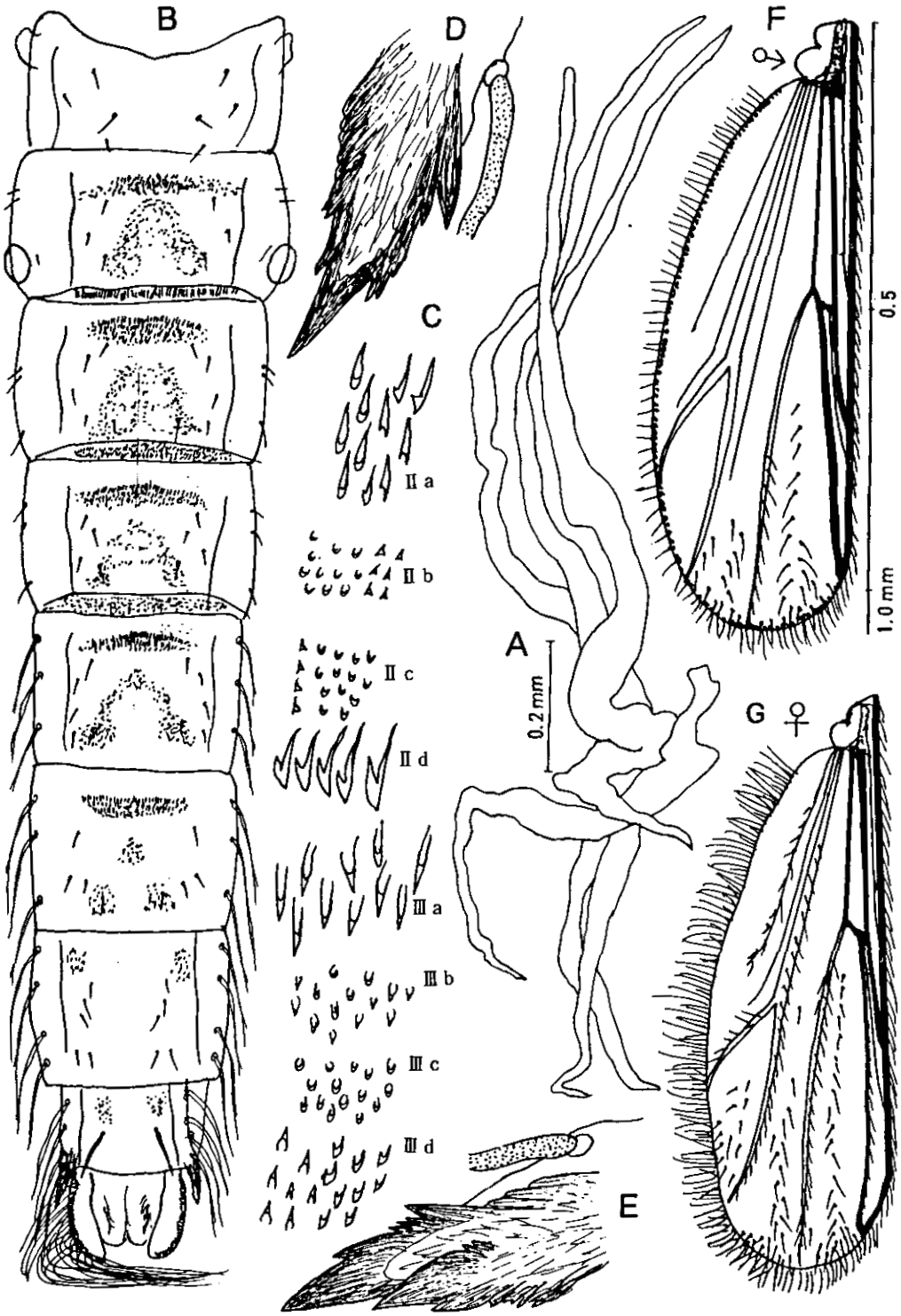


Fig. 15 *Polypedilum tamagoryoense* Sasa (A–E)
Tanytarsus tamanonus Sasa (F, G)

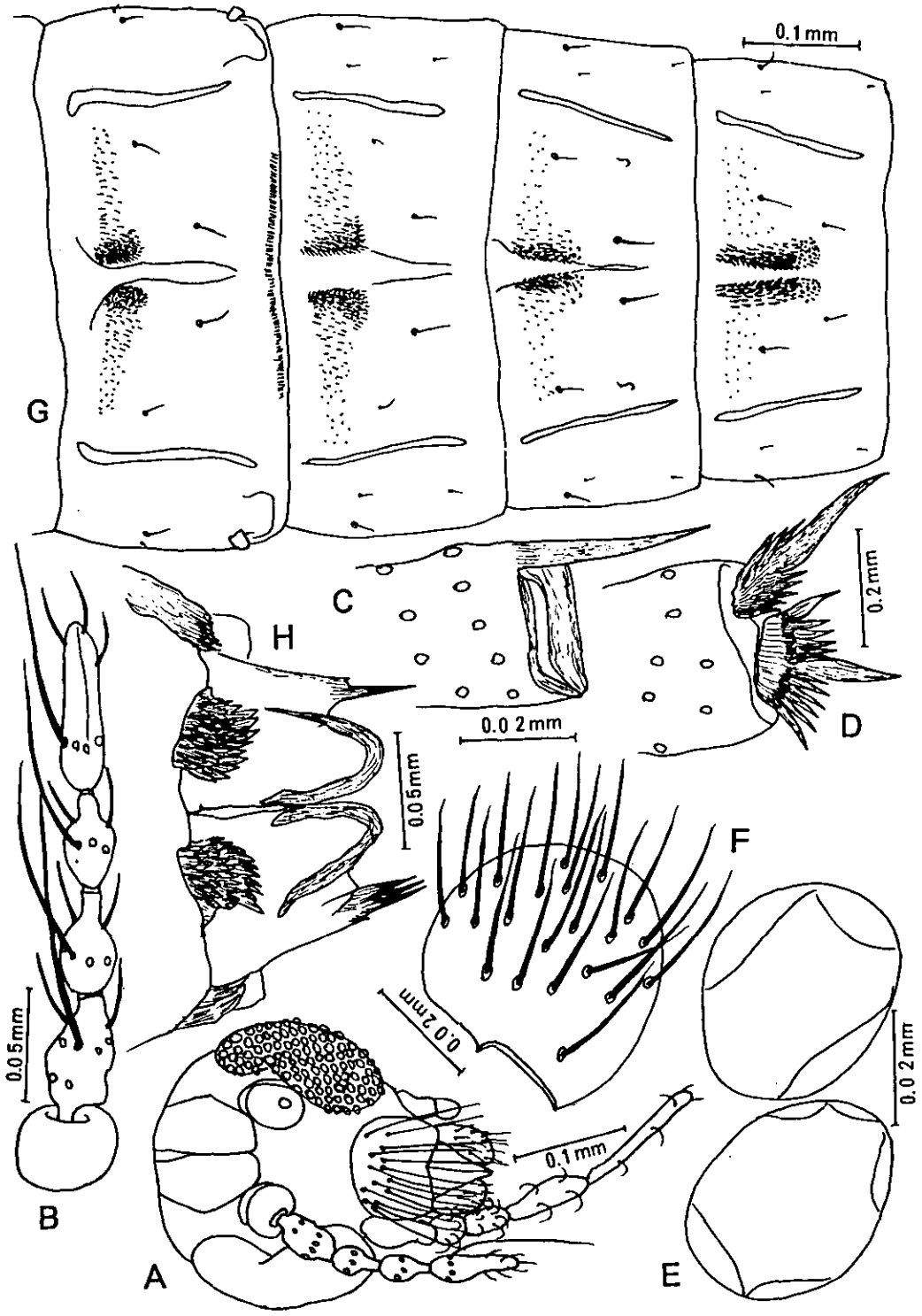


Fig. 16 *Tanytarsus tamanonus* Sasa

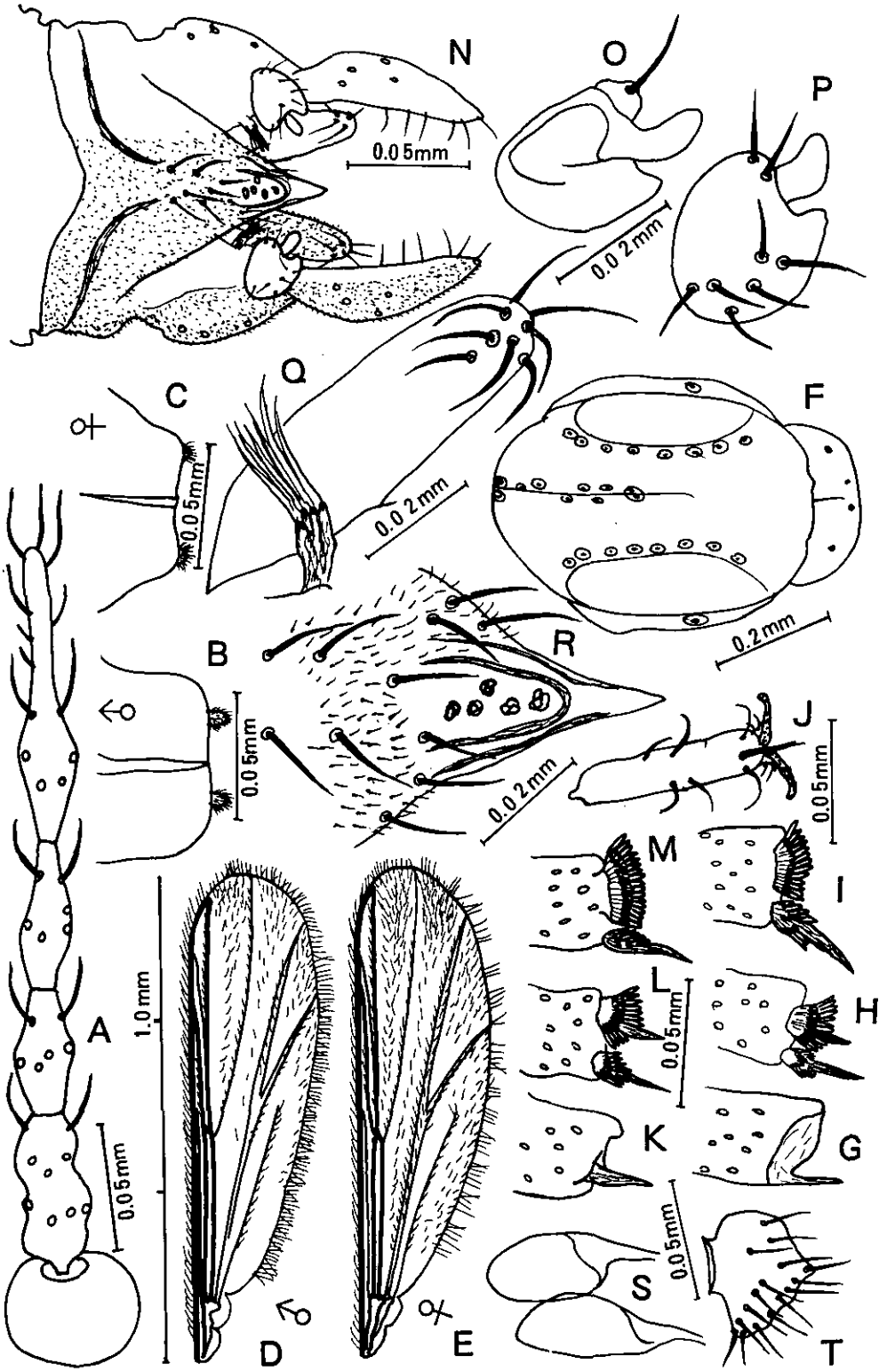


Fig. 17 *Tanytarsus tamaduodecimus*, sp. nov.

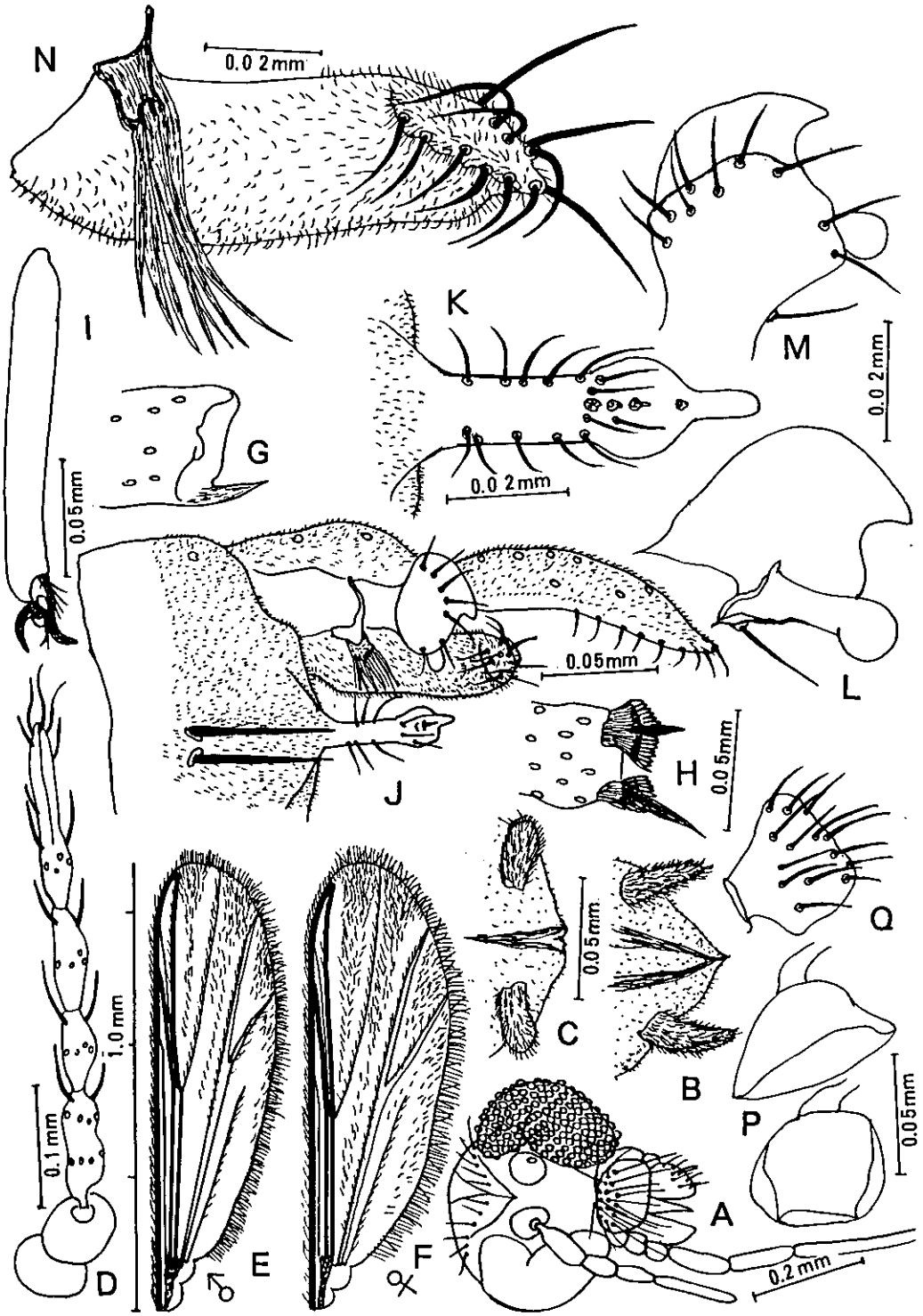


Fig. 18 *Tanytarsus tamakutibasi*, sp. nov.

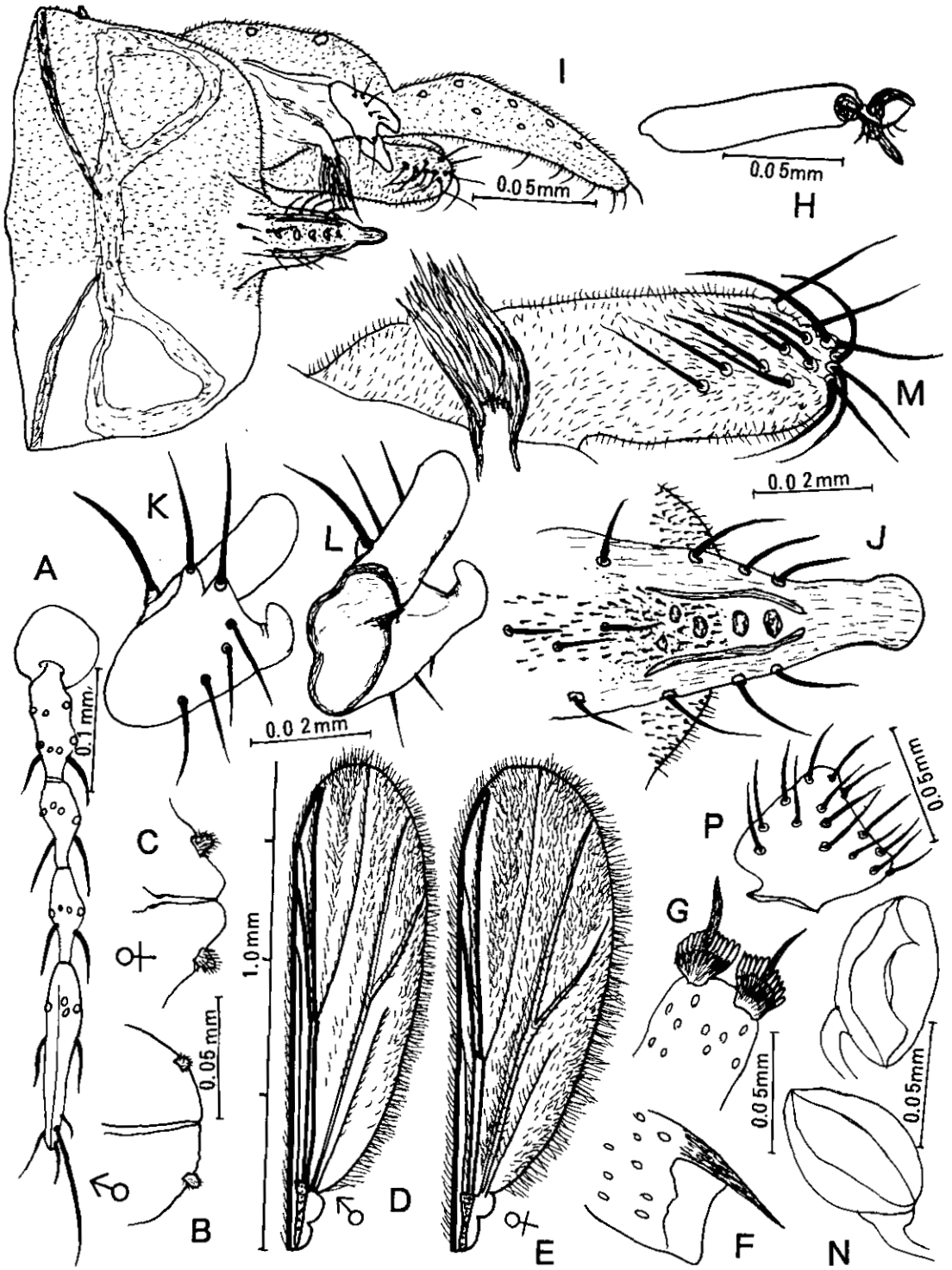


Fig. 19 *Tanytarsus tamagotoi*, sp. nov.

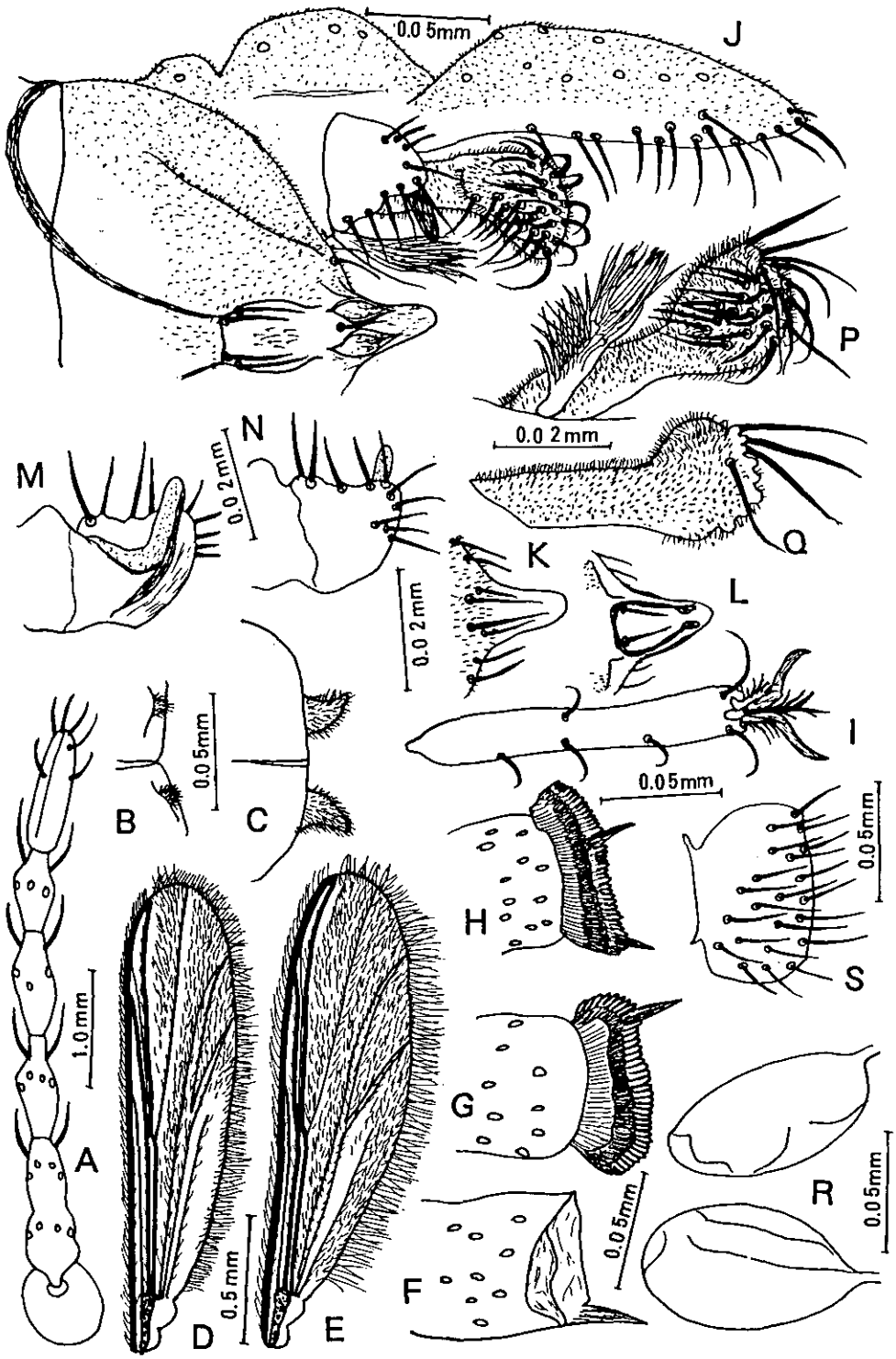


Fig. 20 *Paratanytarsus tamanegi*, sp. nov.

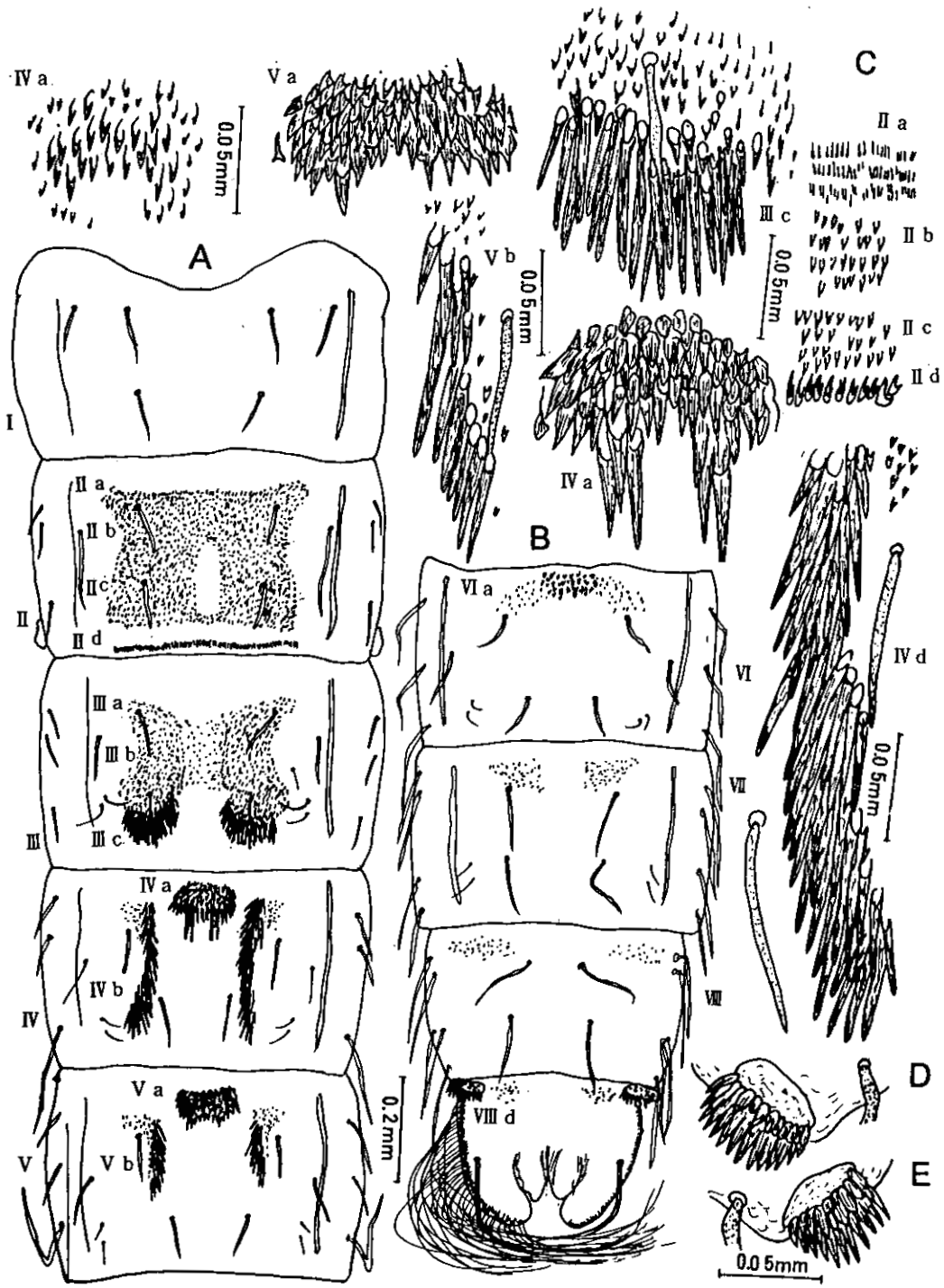


Fig. 21 ***Paratanytarsus tamanegi*, sp. nov.**

EXPLANATION OF PLATES

Plate I

1. *Paracladopelma tamahikawai,* sp. nov. #4, male hypopygium
2. *Paracladopelma tamanipparai,* sp. nov. #5, do
3. *Pentapedilum tamahamurai,* sp. nov. #10, do
4. *Polypedilum tamagohanum,* sp. nov. #18, do
5. *Polypedilum asakawaense* Sasa #19, do
6. *Polypedilum tamagoryoense* Sasa #20, do

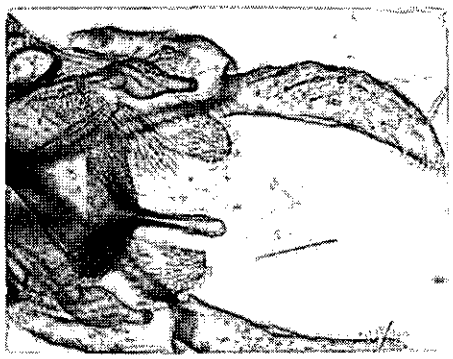
Plate II

7. *Polypedilum tamanigrum,* sp. nov. #15, male hypopygium
8. *Polypedilum tamahosohige,* sp. nov. #17, do
9. *Polypedilum tsukubaense* (Sasa) #12, do
10. *Tanytarsus tamakutibasi,* sp. nov. #28, do
11. *Tanytarsus tamagotoi,* sp. nov. #29, do
12. *Paratanytarsus tamanegi,* sp. nov. #30, do

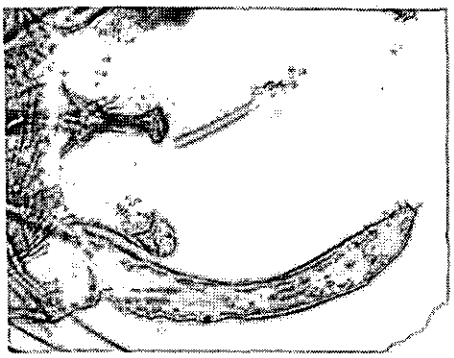
Plate III

13. *Polypedilum tamanigrum,* sp. nov. #15, male antenna
14. *Polypedilum tamahosohige,* sp. nov. #17, do
15. *Microtendipes tamaogouti,* sp. nov. #7, male wing
16. *Pentapedilum tamahamurai,* sp. nov. #10, do
17. *Tanytarsus tamakutibasi,* sp. nov. #28, do
18. *Tanytarsus tamakutibasi,* sp. nor. #28, female wing

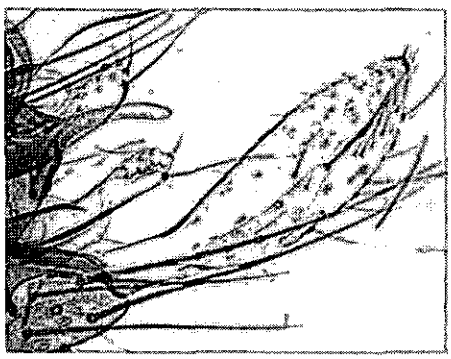
Plate I. Male hypopygium



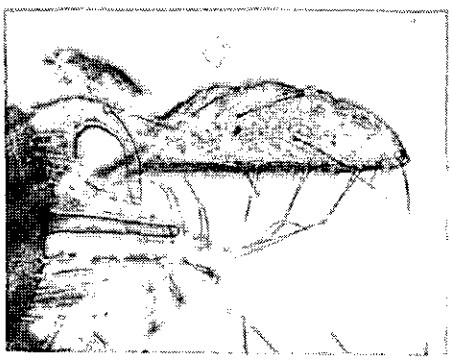
1. *Paracladopelma tamahikawai*



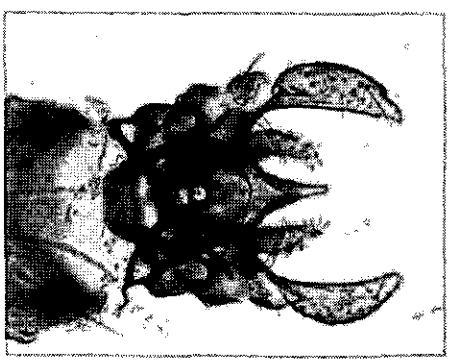
2. *Paracladopelma tamanipparai*



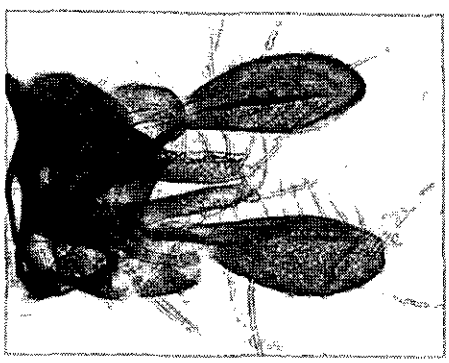
3. *Pentapedilum tamahamurai*



4. *Polypedilum tamagohanum*

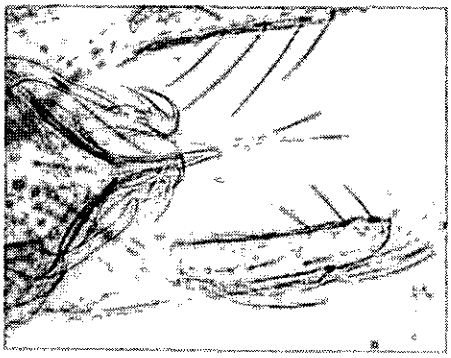


5. *Polypedilum asakawaense*

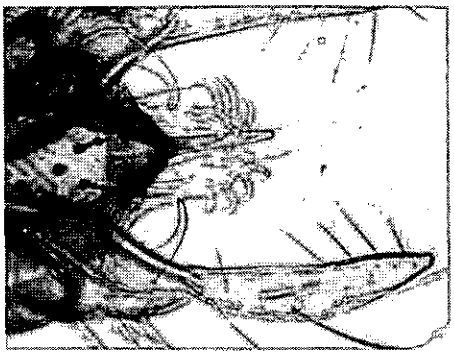


6. *Polypedilum tamagoryoense*

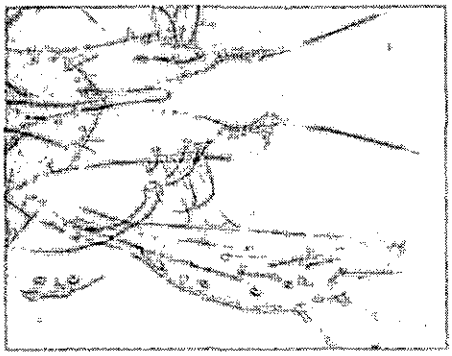
Plate II. Male hypopygium



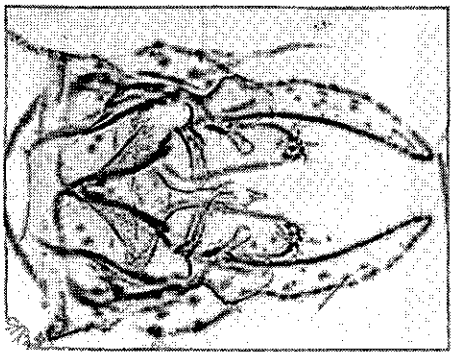
7. *Polypedilum tamanigrum*



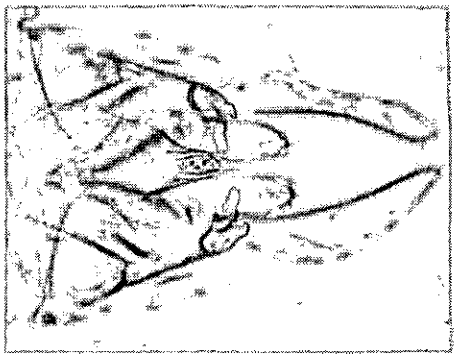
8. *Polypedilum tamahosohige*



9. *Polypedilum tsukubaense*



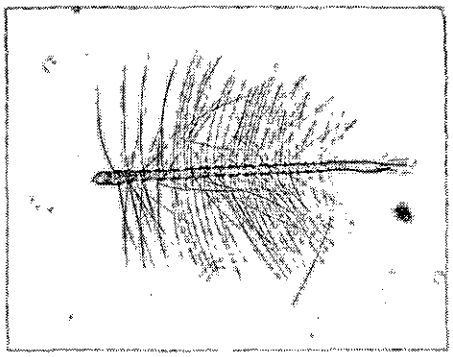
10. *Tanytarsus tamakutibasi*



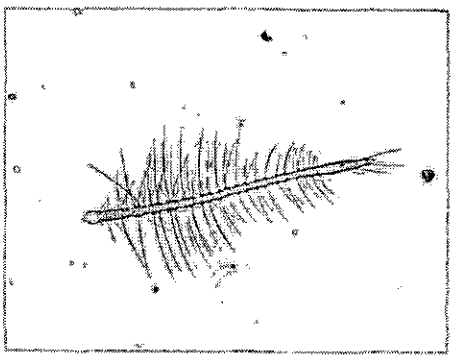
11. *Tanytarsus tamagotoi*

12. *Paratanytarsus tamanegi*

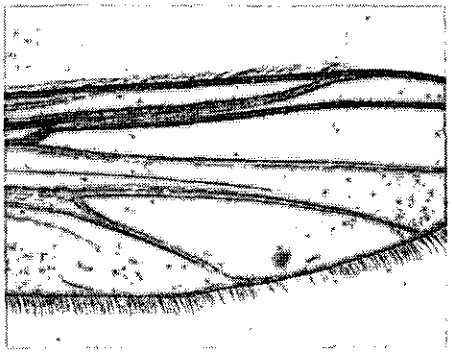
Plate III. Male antenna, and wings



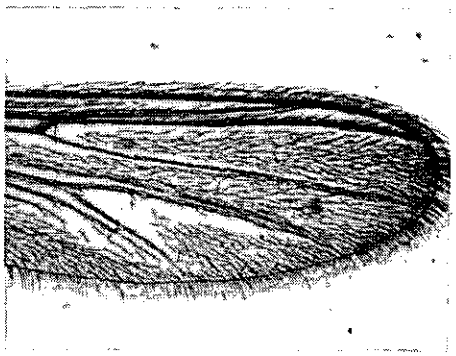
13. *Polypedilum tamanigrum*



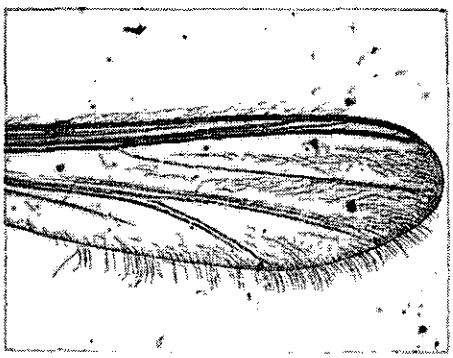
14. *Polypedilum tamahosohige*



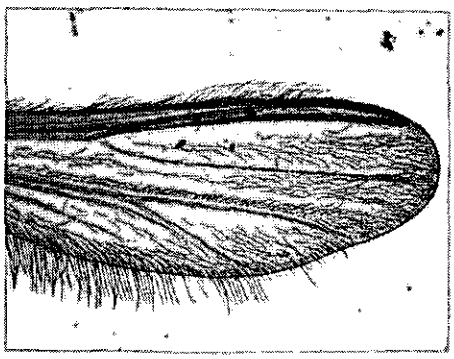
15. *Microtendipes tamaogouti*



16. *Pentapedilum tamahamurai*



17. *Tanytarsus tamakutibasi* (male)



18. *Tanytarsus tamakutibasi* (female)

多摩川に発生するユスリカの研究
第5報　本流に発生するユスリカ類の分布に関する6月の調査成績とユスリカ亜科に属する15新種等の記録

佐々　学

多摩川に発生するユスリカ類の種類と，河川の汚染度に関連したすみわけについては Sasa ら（1980），Sasa（1980，1981 a，b）がその一支流，南淺川について研究をおこない，この水系に合計46種のユスリカ類の生息を認め，それら各種の分布が下水による汚染度ときわめて高い相関を示すことを報告した。この研究でそのうち31種は日本未記録種ないし新種として記載され，かつ46種の大部分が欧米などに見出されていない日本特産種であることが示された。

今回は奥多摩湖に注ぐ山間の源流部から本流ぞいに河口まで約10Km おきに10ケ所の採集地点を設定し，1981年6月と1982年3月にその全長にわたり成虫の捕虫網による採集と底泥よりの幼虫の採集をおこない，幼虫は底泥と共に研究室内で成虫に羽化させて，各採集点より回収された成虫について同定をおこなった。6月の材料からは Chironominae 亜科30種，Orthocladinae亜科20種，Tanypodinae 亜科5種が確認されたが，そのうち本報告では Chironominae亜科の各種の分布と，新種15をふくむ未記録材料の記載をまとめたものである。

AからJまでの各採集地点の位置は第Ⅰ図の通りで，これら各地点におけるＢＯＤの価は第Ⅱ図に示すようにＣまではきわめて低く，ほぼ1 ppm，D，Eで1～5 ppm の間，Fより下流では5～10 ppm と汚染がすすんでいる。各地点から採集されたユスリカ各種の種類数，個体数は第1表に示す通りで，水のきれいな上流部では種類数が17～25と多く，汚染の進んだ下流部では6～10と少ない傾向がみられた。また，今回も水が最もきれいな上流部（A～C）にすむ種類と，やや汚れた中流部（D，E）と，かなり汚れているF以下とで生息する種類の分布にかなり明確な差がみられた。

なお，今回の調査で見出された Chironomini 族22種のうちの11種，Tanytarsini 族8種のうちの4種，Orthocladinae 亜科20種のうち13種はすでに南淺川等から報告されたものと同一であったが，残りは新記録種であった。

Part 6

Description of species of the subfamily Orthocladiinae recovered from the main stream in the July survey

Manabu SASA[1)]

1) Former Director, National Institute for Environmental Studies. Present Address: Toyama Medical and Pharmaceutical University, Toyama-shi, 930-01

CONTENTS

INTRODUCTION

This report is a continuation of Part 5 of this series, and deals mainly with description of the chironomid species belonging to the subfamily Orthocladiinae recovered from the main stream of the River Tama at the survey made in June 1979 by the author and his colaborators. Altogether 10 collection sites were selected along the main stream from Station A, the uppermost mountain stream flowing into Okutama Lake, to Station J at the mouth of the river. Accounts on the geographic status of the river at each collection site as well as the degree of pollution of the water as expressed by the annual average values of BOD were given in the previous paper (Part 5). The distribution of a total of 55 species of chironomids (including Orthocladiinae and Tanypodinae) and the description of those belonging to the subfamily Chironominae were also presented in the previous paper. As for the subfamily Orthocladiinae, a total of 20 species were confirmed as inhabitants of the river by identification of adult male specimens emerged from the bottom samples, among which 4 are described as new species, and the rest 16 species are judged as being the same as those recorded from Minamiasakawa River, a tributary of Tama, by Sasa (1980, 1981). It has again been confirmed that the distribution of Orthocladiinae is also highly correlated with the degree of pollution of the river by the inflow of sewage waters, or with the average value of BOD at aech collection site, as shown in Figure I and Table 1 of the previous paper.

DESCRIPTION OF SPECIES

(31) *Brillia japonica* Tokunaga, 1939

A total of 21 males and 26 females were recovered from samples of Station A, Yuba, and 19 males and 36 females from Station B, Okutama, partly together with pupal skin. This species was collected also from Stations 1, 2 and 3 of Minamiasakawa River, also from the upper and less polluted parts of the river, and the morphology of adults, pupa and larva was described in the previous paper by Sasa (1981, p.3). The original description of this species was made by Tokunaga (1939, p.306) based on males and females collected in Kyoto Prefecture. Altogether 11 males, 2 females, 2 pupal skins and a larval skin from the present collections were mounted on slides for morphological study (Specimen No. A. 70: 91-99). Standard measurement data in Table 3-A.

Morphologically, this species is characteristic in that wings bear numerous macrotichiae (Plate V-26), gonostylus is forked into two long branches; and inner lobe of gonostylus is long and finger-like. The value of AR is 0.60–0.71, eyes with a long dorsomedial projection with low ER value of 0.21–0.27, head and thorax with unusually numerous setae, and antepronotum with dorsal, middle and lateral groups of setae.

(32) *Orthocladius tamanitidus* Sasa, 1981

31 males and 38 males emerged from samples collected at Station B, Okutama, 14 males and 14 females from Station C, Hikawa, both from the least polluted parts of the mainstream. This species was described by Sasa (1981 b, p.80) by male, female, pupa and larva collected at Station No. 2 of Minamiasakawa River in December 1979. 13 males and 9 females among the present collections were mounted for morphological study (Specimens No. A 70:61–73). Standard measurement data in Table 3-B.

(33) *Paratrichocladius tamaater* Sasa, 1981

The numbers of adults recovered from bottom samples were 7 males and 5 females from Station A, 1 male and 9 females from Station B, 31 males and 51 females from Station C, 2 males and 3 females from Station D, and a male and a female from Station E, all from the less polluted parts of the mainstream. 17 males and 10 females among them were dissected and mounted on slides, specimens No. 69:01–23.

This species was first recorded and described by Sasa (1981, p.20) by male, female and pupa collected at Stations 1, 2 and 3 of Minamiasakawa River, also the less polluted parts of the stream. Some structures of male and female are illustrated again in Fig. 22 for comparison of morphological characters with the next species, which was first recorded from this river. This is a typical member of the genus *Paratrichocladius* Santos Abreu, since wings are bare, squama fringed, eyes highly pubescent (Fig. 22-A), anal point absent (Fig. 22-I), dorsolateral setae on scutum strong and arise from large pale pits, but dorsomedian setae are all minute and arise from small pits (Fig. 22-C).

(34) *Paratrichocladius rufiventris* (Meigen, 1930)

The numbers of males and females recovered were 7 and 18 from Station F, 4 and 6 from Station G, 6 and 3 from Station H, 19 and 13 from Station I, all from the more polluted parts of the mainstream. A female emerged from Station C (No. A 71:13) was identified also as that of this species, because its antenna is 7 segmented. 16 males and 18 females among them were dissected and mounted on slides (No. A 71:24–43). Standard measurement data in Table 3-D. Distribution of hairs on male abdominal tergites in Fig. 23-A, male hypopygium in Fig. 23-E. Antenna, cercus and spermathecae of female in Figs. 23 B, F, G.

Remarks. The two species of *Paratrichocladius* collected from the mainstream of the River Tama were so similar in body coloration, general structures of males and females, and of the male hypopygium, that it was first thought as belonging to the same species being distributed all along the mainstream of this river. However, it was soon recognized that females emerged from the upper reaches from Station A to D had 6 segmented antenna (a pedical and 5 flagellar segments, Fig. 22-B), while those emerged from the lower reaches had 7 segmented antenna (Fig. 23-B), corresponding to those described by Sasa (1981, p.22) by the name of *P. tamaater* from Minamiasakawa, and that by Sasa (1979, p.39), by the name of *P. rufiventris* (Meigen). The shape of spermathecae differs also between the two species, being narrower and longer in *P. tamaater* (cf. Figs. 22-J, 23-F). The males are more difficult to distinguish, and there seem to exist some overlapping in measurement data between the two populations; the antennal ratio is smaller in *tamaater* (0.98–1.22) than in *rufiventris* (1.28–1.60); the numbers of setae on abdominal tergites are smaller in the former (cf. Figs. 22-H, 23-C), those of lateral rows on tergites III and IV are most frequently 4 (range 3 to 8; average 5.1 and 5.4) in the former, and from 7 to 14 (average 10.5 and 9.8) in the latter; the numbers of setae on tergite IX are from 2 to 9 (average 5.2) in the former and from 8 to 14 (average 10.3) in the latter.

(35) *Cricotopus tamadigitatus* Sasa, 1981

25 males and 35 females were recovered from Station A, the uppermost part of the present survey; 9 males, 7 females and 3 pupal skins associated with adults were mounted for morphological study (Spercimens No. A 72:01–13). In the previous survey of Minamiasakawa River, this species was collected also from the uppermost parts of the stream, Stations No. 1 and 2. This species can be easily identified by that gonostylus is extremely stout, directed backwards and has a basal tubercle, inner lobe of gonostylus is long and finger-like, and only tergites 1 and 2 are pale (Plate VII-E), as described by Sasa (1981, p.87). Standard measurement data in Table 3-E.

(36) *Cricotopus metatibialis* Tokunaga, 1936

The numbers of males and females recovered were 65 and 61 at Station A, 7 and 5 at B, and 3 and 2 at D, indicating that this is another species associated with oligotrophic streams; 8 males and 4 females were mounted on slides (Specimens No. A 27). This species was recovered also from Station 1 of Minamiasakawa River (Sasa,

1981, p.16), and was first described by Tokunaga (1936, p.21), who stated that it was common in Kyoto and often captured at light. Male of this species can be identified by that pulvilli are absent, abdominal tergites 1, 4, 7 are entirely pale and 2, 3, 5 and 6 are partly pale (Plate IV-24), femora are largely dark, front and middle tibiae are pale in the middle while hind tibia is darker in the middle than in both ends. Standard measurement data in Table 3-F.

(37) *Cricotopus triannulatus* (Macquart, 1826)

4 males and 3 females were collected from samples obtained at Station C, Hikawa, and 3 males and 6 females from Station I, Noge. They were all mounted on slides for morphological study (Sepcimens No. A 72:31–46). This species was collected also from Station 5 of Minamiasakawa River, and morphological description of male and pupa was given by Sasa (1981, p.13). Male of this species can be identified by that pulvilli are absent, abdominal tergites 1, 4 and 5 as well as anterior half of tergite 2 are yellow (Plate IV-22), femora are largely dark and tibiae with a middle white ring, and inner lobe of gonocoxite is bifurcate. This species seems to be associated with moderately polluted parts of the river. Standard measurement data in Table 3-G.

(38) *Cricotopus bicinctus* (Meigen, 1818)

This species was collected again from the downstream parts of the river, 2 males from Station D, 2 males and 1 female from G, 2 males from H, 20 males and 13 females from I; 13 males and 4 females were mounted (Specimens No. A 51–64). Tokunaga (1936, p.16) recorded this species as being common in Kyoto, and Sasa (1979, p.37; 1981, p.11, p.87) collected it in Nagasaki, Ureshino and Minamiasakawa, all from highly polluted parts of streams. Male of this species can be identified by that pulvilli are absent, (Plate V-27), abdominal tergites 1 and 4 being pale and the remainder entirely dark (Plate IV-21), femora are largely dark, tibiae with a long white ring in the middle, inner lobe of gonocoxite is semicircular, and AR is about 1.4. Standard measurement data in Table 3-H.

(39) *Cricotopus* sp., "*yoroi*"

Materials studied: Two males and a female emerged from a sample collected at Station D, Yoroibashi; a male and 2 females from Station E, Hamura; a male collected by sweeping at Station H. All dissected and mounted.

Male. Specimens classified here tentatively as the "yoroi" form is a member of the *sylvestris*-group of subgenus *Isocladius* of genus *Cricotopus*, in that it has large pulvilli, inner margin of gonocoxite is produced basally to form a hump, inner lobe of gonocoxite is simple and roughly conical, and abdominal tergites I, IV, VII are entirely white, basal 2/3 of femora, middle 3/4 of tibiae, entire segment of middle and hind tarsi I and II as well as basal 2/3 of middle and hind tarsi III are white, while the rest parts of leg segments are dark. Standard measurement data in Table 3-I, photographic figures of abdominal tergites in Plate IV-19.

Remarks. In the previous report on Orthocladiinae of Minamiasakawa River by Sasa (1981, p.11), altogether 25 males and 19 females from Station 6 were recorded as *Cricotopus sylvestris* (Fabricius), but at re-examination of these specimens it was also shown that they included both the *yoroi* and the *noge* forms. Both forms are very closely related in morphological characters, but were differentiated by the length of body and wing (larger in *yoroi*), by values of AR (larger in *noge*), and by coloration of abdominal tergites (IV and VII are entirely white in *yoroi*, with dark patch in *noge*, pale parts on III and VI larger in *yoroi*, as shown in Plate IV-19, 20). The *yoroi* form was collected from the less polluted parts of the river (Stations D and E), while the *noge* form was from Stations G and H. The scientific names of these forms are retained until it becomes clear whether the two forms represent different species or ecological forms of the same species, and also to which species of the *sylvestris* group of *Cricotopus* they can be attributed.

(40) *Cricotopus* sp. "*noge*"

Materials studied: 11 males and 3 females emerged from samples collected at Station 3, Noge; 2 males and 2 females from Station G, Koremasa; a male collected by sweeping bushes at Station H, Noborito; 7 males and 3 females were mounted for morphological study (Specimens No. A 72:81–90).

Male. Body length 2.89–3.36 mm (3.11 mm in average of 7), wing length 1.54–1.75 mm (1.62 mm). Body coloration characteristic to this form; ground color of scutum yellowish white, scutal stripes dark brown, median stripe short and ending at about middle of scutum, prescutellar area white; abdominal tergite 1 entirely yellow, 2 and 3 largely dark brown and with a narrow pale band along anterior margin, 4 largely pale and with a small dark patch in the middle, 5 with a narrow pale band along anterior margin, 6 entirely dark, 7 pale at posterior half or 2/3 and dark at anterior half or 1/3, and often with a dark band along lateral margins, 8 and 9 entirely dark, hypopygium white (Plate IV-20). All femoral largely white and with a dark ring at apical end, all tibiae with a long white ring in the middle and dark bands at both ends; front tarsi entirely dark brown; middle tarsus I and II largely pale, the former with a proximal dark ring and the latter with a distal dark ring, middle tarsus III, IV and V entirely dark; hind tarsus I, II and III largely pale, I with a proximal dark ring, II and III with a distal dark ring, IV and V entirely dark.

Standard measurement data in Table 3-J. Antennal ratio 1.29–1.51 (1.39 in average of 7), smaller than in the *yoroi*-form. ER slightly larger than 1. Dorsomedian and dorsolateral setae on scutum all minute and decumbent, arising from small pits. Setae on tergites 2 to 5 highly reduced in numbers, all without transverse rows of setae, and median setae arranged roughly in a single longitudinal row. Pulvilli well developed (Plate V-28). Ninth tergite with 7–9 short setae on the dorsal surface, with a pair of lobes bearing numerous short and spine-like setae in the middle. Inner lobe of gonocoxite roughly triangular. Gonostylus widest near apex and bears a stout apical spur.

Discussion. Specimens tentatively classified here as the above two forms of *Cricotopus* correspond to those reported by Sasa (1981) from Minamiasakawa River by the name of *Cricotopus sylvestris* (Fabricius), and is associated with the more polluted parts of the rivers, co-existing with *Cricotopus bicinctus* (Meigen) and *Chironomus yoshimatsui* (Martin et Sublette). It is highly possible that the populations here

designated as different forms, the *noge* and the *yoroi*, represent different species.

These two forms are obviously members of the *sylvestris*-group of subgenus *Isocladius* of Hirvenoja (1973, p.255), since pulvilli are well developed, inner lobe of gonostylus is single, and setae on abdominal tergites 2 to 4 form a longitudinal row in the middle. Several closely related species are described within this group, among which the present forms are most closely related to *C. trifasciatus* in coloration of abdominal tergites. Among *Cricotopus* species described by Tokunaga (1936) from Japan, the present populations probably correspond also to that identified as *trifasciatus*. More detailed comparative studies are needed in order to clarify the taxonomic status of the present two forms, as well as that collected from Lake Kasumigaura and described by Sasa (1979, p.39) as *Cricotopus sylvestris*.

(41) *Rheocricotopus tamabrevis*, sp. nov.

Materials studied: A single male, emerged 29 June 1981 from Station A, Yuba (Holotype. No. A 70:21).

Male. Body length 1.81 mm, wing length 0.97 mm. Body coloration almost entirely dark. Ground color of scutum dark brown, scutal stripes black, scutellum dark brown, postnotum and abdominal tergites almost uniformly black; halteres brown, femora, tibiae and front tarsi dark brown, middle and hind tarsi brown.

Head in Fig. 24-A. Antenna with 13 flagellar segments, last segment relatively short and apically expanded, with more than 10 curved sensory setae near apex, AR 0.38; antennal hairs relatively short, AHR 0.31. Palp 4 segmented (38, 65, 84, 140 microns). Eyes reniform, highly pubescent. Vertex with 2 setae near middle and 3 setae laterally on both sides. Clypeal setae 10.

Antepronotum with 2 lateral setae on both sides. Dorsomedian setae 12, all short, minute and arising from small pits. Dorsolateral setae 8 and 9, arising from large pits. Supra-alar setae 3 on each side. Humeral pits small. Scutellum with 7 setae.

Wing in Fig. 24-B; membrane bare and smooth, slightly brown. R 2+3 separated from R 1 and R 4+5, ending about midway between the latter two veins. Costa produced beyond end of R 4+5. Tip of R 4+5 slightly beyond tip of Cu 1. fCu slightly beyond r-m. Squama with 4 or 5 fringe setae. Front tibia with a long terminal spur 36 microns in length (Fig. 24-C), middle tibia with two short terminal spurs 17 and 15 microns long (Fig. 24-D), hind tibia with a long terminal spur 32 microns in length, a short terminal spur 11 microns long, and a terminal comb composed of some 10 free spines (Fig. 24-E). Pulvilli well developed, pad-like and with numerous hairs (Fig. 24-F). LR1 0.70, LR2 0.42, LR3 0.58, TR1 0.18. Tarsi without long beards, ER1 1.5, BR2 1.7, BR3 1.8

Abdominal tergites (Fig. 24-G) with relatively small numbers of setae, those on tergites II to V are composed roughly of a proximal transverse row of 5 setae, a distal transverse row of some 8 setae, and lateral longitudinal rows of 3 setae on both sides. Hypopygium in Fig. 24-H. Anal point triangular and with sharply pointed apex, with lateral hairs (Fig. 24-I). Inner lobe of gonocoxite roughly rectangular (Fig. 24-J). Gonostylus with concave inner margin, with a prominent terminal spur, and a subapical tooth bearing a sharply pointed spur (Fig. 24-K).

Discussion. This species is a typical member of genus *Rheocricotopus* Thienemann, since wings are bare, Cu 2 almost straight, squama fringed, eyes highly pubescent,

dorsolateral setae arising from large pits, and anal point is large, triangular and with lateral setae. Among the known species of this genus as reviewed by Lehmann (1969) and Pinder (1978), this species is peculiar in that humaral pits are small, gonostylus is not abruptly curved and with a preapical tooth bearing a sharply pointed spur, and abdominal tergites bear relatively small numbers of setae arranged roughly into the anal and the oral transverse rows. The present species can be easily differentiated from the two previously known Japanese species of *Rheocricotopus*, i.e. *chalybeatus* (Edwards) of Tokunaga (1938) and *tamahumeralis* Sasa (1981) by the above morphological characteristics as well as by smaller value of AR.

(42) *Rheocricotopus tamahumeralis* Sasa, 1981

A male emerged from Station F, Hino, and a male and a female emerged from Station G, Koremasa, all dissected and mounted (Specimen No. A 70:26, 27). They were morphologically almost identical with specimens of *R. tamahumeralis* recorded by Sasa (1981, p.92) from Station No. 2 of Minamiasakawa at the survey of December 1979. Values of AR were 1.27 and 1.08, respectively.

(43) *Nanocladius tamabicolor* Sasa, 1981

This species was described by Sasa (1981a, p.22) based on 56 males and 57 females recovered from Stations 4, 5 and 6 of Minamiasakawa River, the more polluted parts of the stream. In the present survey, a male was collected from Station G, 13 males and 20 females from Station H, and 11 males and 2 females from Station I, also from the more polluted parts of the mainstream. In addition, a male was recovered from Station B, and 2 males and a female from Station C, the uppermost parts of the main stream. It was first thought that the two populations might belong to different species such as demonstrated with genus *Paratrichocladius*, but no clearcut morphological differences have so far been detected between the two groups of specimens (Specimens No. A 70:33, 36–39).

This is a small species with body coloration almost entirely black in male and brown in female. Standard measurement data of males in Table 3-K. Antenna with 13 flagellar segments, AR 0.80–0.91. Eyes small, pubescent, and pyriform, inner margin convex, ER large, 1.86 in average. Supraorbital seta only 1 on each side. Antepronotum without lateral seta. Dorsomedian setae of scutum absent, scutum with a small pale area in the middle bearing two small spurs. Squama with only 2 or 3 fringe hairs. Leg coloration peculiar to this species; front leg segments almost entirely dark brown; in middle and hind legs, basal half of femora dark distal half of femora and other distal segments pale yellow. Hypopygium with a long, narrow and sharply pointed anal point. For details of morphological characters, see Sasa (1981, p.22–25, and Plates 33–36).

(44) *Eukiefferiella tamaflavus* Sasa, 1981

7 males and 21 females emerged from Station A, and 5 males and 14 females from Station B. 8 males and 5 females among them were mounted (Specimens No. A 70:01–08). They were morphologically identical with the specimens described by the above name from Stations 1, 2 and 3 of Minamiasakawa River, also the less polluted parts of the stream. Standard measurement data in Table 3-L.

(45) *Parakiefferiella tamatriangulatus* Sasa, 1981

Materials studied: Two males and two females emerged from a sample of Station A; all dissected and mounted on slides (Specimens No. A 70: 11 A, B; 12 A, B).

Male. Body length 1.40 and 1.48 mm, wing length 0.83 and 0.80 mm. Antennal shaft and hairs brown; ground color of scutum yellow, scutal stripes reddish brown, scutellum yellow, postnotum dark brown; wing unmarked, slightly brown, halteres yellow; leg segments almost uniformly yellow; abdominal tergites largely yellowish brown, tergites 2 to 5 with a brown band along posterior margin, hypopygium brown.

Head in Fig. 25-A. Antenna with 13 flagellar segments, AR very small, 0.29 and 0.24; terminal segment (Fig. 25-C) very short, apically expanded and widest at about apical 1/3, bearing some 20 short setae at apical 1/3, and only 2 or 3 long setae near base (in most other males of chironomids, including *Eukiefferiella tamaflavus,* terminal segment of antenna is longer and bears more than 20 long setae on basal 2/3); antennal hairs short, AHR only 0.23 and 0.26. Palp 4 segmented, as usual. Eyes bare, reniform, without dorsomedial projection, ER 1.34 and 1.50. Supraorbital setae 4 or 3, clypeal setae 6 or 4.

Lateral pronotal setae 2 or 3 on each side. Scutum without dorsomedian setae, 4 or 5 weak dorsolateral setae on each side, and 2 or 3 pre-alar setae on each side. Scutellum with 2 or 4 setae. Squama without fringe setae. Wing membrane bare, smooth and unmarked. Venation in Fig. 25-E. R 2+3 fused with R 4+5. Costa extending much beyond end of R 4+5. Cu 1 ending distal of end of R 4+5. Cu 2 rather conspicuously bent in middle. Anal vein reaching beyond fCu. Legs almost unicolorous; LR1 0.54, 0.57; LR2 0.48, 0.50; LR3 0.55, 0.56; tarsus V relatively short, TR1 0.13, 0.14. Tarsi with only short hairs. Spurs and combs on tibiae as in other Orthocladiinae. Pulvilli absent. Numbers of setae on abdominal tergites highly reduced (Fig. 26-A).

Hypopygium in Figs. 25-F, G. Ninth tergite with rounded posterior margin. Ninth tergite with rounded posterior margin. Anal point low, triangular and with pointed apex, with 2 or 3 setae along lateral margins, ninth tergite otherwise devoid of long setae. Inner lobe of gonocoxite nearly rectangular. Gonostylus expanded apically and with slightly concave inner margin, with an apical spur but without subapical tooth.

Female. The two specimens examined were 1.51 mm, 1.39 mm in body length, 0.92, 0.80 mm in wing length. Body coloration as in male, generally brown or yellow. Head in Fig. 25-B. Antenna composed of a pedical and 5 flagellar segments, flagellar segments 1 to 4 almost globular, terminal segment without long subapical setae. Supraorbital setae 3 on each side. Clypeal setae 8 or 6. Eyes small, reniform, ER 1.05, 1.41. Dorsomedian setae of scutum absent, dorsolateral setae 6–11, pre-alar setae 3 on each side. Scutellum with 4 setae. Squama with 3 fring setae. Spermathecae almost globular, small, 44 microns wide and 46 microns long in one and 36 microns

wide and 50 microns in another (Fig. 25-H). Cercus ear-like, with a very long ventral projection, 20 microns wide and 41 microns long, as in Fig. 25-I.

Remarks. This species was recorded and described by Sasa (1981, p.94) by male, female and pupa collected at Stations 2 and 3 of Minamiasakawa River. Specimens of males collected at the present survey from the main-stream were smaller in body length (1.40–1.48/1.62–1.69), wing length (0.80–0.83/1.05–1.18), and in the value of AR (0.24–0.29/0.38–0.48), but such differences are considered here as physiological variations within the same genetical population.

(46) *Metriocnemus tamaokui*, sp. nov.

Materials studied: Holotype: A male, emerged 21 June from Station B, Okutama (Specimen No. A 70:46). Paratype: A male mounted together with pupal skin, emerged 15 June from Station A, Yuba (Specimen No. A 70:47).

Male. Body length 2.90 and 2.77 mm, wing length 1.68, 1.65 mm. Body almost uniformly black, including halteres. Head in Fig. 27-A. Antenna with 13 flagellar segments, AR 1.15, 1.16, antennal hairs long, AHR 0.48, 0.52. Eyes with a conspicuous dorsomedial projection, inner margin acutely concave, ER 0.79, 0.86. Supraorbital setae numerous, 26 and 25 in the type and 20 on each side in the paratype. Clypeal setae 28 in both specimens. Pronotum with 10, 10 and 10, 8 lateral setae, all arising from conspicuous pits. Scutum with 25 dorsomedian setae in both specimens, dorsolateral setae very numerous, 74 and 76 in the type, 56 and 58 in the paratype. Supra-alar setae 31 in the type, 20 and 23 in the paratype, the largest numbers among chironomids so far examined by the present author. Scutellum with 38 and 32 setae. Squama fringed with 15–25 setae.

Wing (Fig. 26-B) with numerous dark macrotrichiae on the entire surface. R 1 and R 4+5 running closely set, R 2+3 ending about midway between ends of R 1 and R 4+5. Costa extends much beyond end of R 4+5. Cu 1 ending almost under end of R 4+5. Cu 2 almost straight. fCu much beyond r-m. Anal vein extending beyond fCu.

Leg segments almost uniformly dark brown. LR1 0.64, 0.62; LR2 0.45 in both specimens; LR3 0.53, 0.54. Front tarsus V 0.13 times the length of front tibia in both specimens. Tarsi with relatively long hairs, BR1 2.9, BR2 3.2, BR3 4.5 Front tibia with a long terminal spur (66 microns, Fig. 27-C). Middle tibia with two short terminal spurs (34, 33 microns, Fig. 27-E). Hind tibia with a long terminal spur (75 microns), a short terminal spur (33 microns) and a terminal comb composed of 9 free spurs 31–40 microns long (Fig. 27-H). Tarsi I and II of middle leg as well as tarsus I of hind leg also with two short terminal spurs (Fig. 27-F, G, I). Pulvilli absent, claws and empodium well developed (Fig. 27-D). Tarsus IV of all legs cylindrical and longer than tarsus V.

Abdominal tergites almost uniformly black and with numerous setae almost uniformly distributed (Fig. 27-J). Hypopygium in Figs. 27-K, L. Ninth tergite with 35 setae in the type and 22 setae in the paratype, posterior margin smoothly rounded. Anal point narrowly triangular, apically truncate, covered with numerous microtrichiae but without lateral setae. Lobe of gonocoxite broad and conspicuous, with numerous strong setae. Gonostylus concave medially, with a large terminal spur but subterminal tooth is small.

Pupa. A pupal skin associated with the paratype male was studied. Length of abdomen 2.33 mm, color of the skin pale. Thoracic respiratory organs lacking. Abdominal tergites as in Fig. 26-C. Abdominal tergites II to VIII with an uniserial band of large, blunt spines along the caudal margin, the numbers of spines are almost the same from tergite II to VIII, 21, 21, 21, 22, 20, 19 and 19, respectively. Tergites III to VII with a proximal band of narrow and sharply pointed spines. In addition, tergites VI and VII bear central spinose area. Tergite IX with a large central spinose area. Hairs on abdominal tergites as well as lateral hairs are all highly reduced and minute, none of them long and filamentous.

Discussion. This species is designated as a member of genus *Metriocnemus* van der Wulp, since wing membrane has numerous macrotrichiae, gonostylus is simple, eyes are bare, Cu 2 is almost straight, costa produced much beyond end of R 4+5, and hypopygium has well developed anal point. Among species of this genus known from Europe, the present species belongs to group A of Edwards (1929, p.310), because LR3 is less than 0.55, costa produced, and eyes are bare; among species within this group, it is most closely related to *M. cavicola* Kieffer (or *M. martinii* Thienemann of Edwards, 1929), because wing is densely clothed with macrotrichiae, gonocoxite with a pronounced lobe, and AR is about 1. However, the present species is quite unique in having numerous setae on thorax and abdomen, and in the structure of male hypopygium, especially the shape of anal point and inner lobe of gonocoxite.

(47) *Parametriocnemus stylatus* (Kieffer, 1924)

Two males and 2 females were recovered from Station A, and a male from Station B (Specimens No. A 70:41–43). They were morphologically identical with the specimens collected by Sasa (1981, p.25, p.99) from Stations 1, 2 and 3 of Minamiasakawa River and described by the above scientific name. This species seems to be associated with the least polluted portion of rivers. Morphologically, the male is characteristic in that wing bears numerous macrotrichiae, Cu 2 is strongly curved, eyes are bare and with long and narrow dorsomedial projection, AR about 0.8, hypopygium has a robust anal point, inner lobe of gonocoxite is large and broad, and gonostylus is simple. Standard measurement data in Table 3-M.

(48) *Limnophyes tamakireides*, sp. nov.

Materials studied: Three males, all recovered from Station A, Yuba (Holotypes, No. A 70:81; paratypes, No. A 70:82a, b).

Male. Very small midge with body length of 2.25, 2.31, 2.00 mm, and wing length of 0.91, 0.92, 0.90 mm. Body coloration, as estimated from mounted specimens, almost uniformly black, scutal stripes hardly differentiated, abdominal tergites without pale bands, sternites brown and paler than tergites, leg segments uniformly dark. Standard measurement data in Table 3-N.

Head in Fig. 28-A. Antenna with only 12 flagellar segments, terminal segment very short, AR 0.22, 0.30, 0.27, antennal hairs short with AHR of 0.25–0.30 (Fig. 28-B). Supraorbital setae with a central pair, and 3 or 4 lateral pairs. Clypeal setae 14 in all the 3 specimens. Eyes reniform and with slightly concave inner margin, ER

1.35–1.46. Palp 4 segmented, as usual.

Antepronotum (Fig. 28-C) with 1 or 2 setae near midline, and 4 or 5 lateral setae on each side. Scutum (Fig. 28-D) without dorsomedian setae, dorsolateral setae very many, 54 or 58 on each side, those arising from anterior part slightly expanded in the middle (52–58 microns long and 2–3 microns wide), those from the posterior half stout but not expanded in the middle. Pre-alar setae 5 in the type and 8 in the paratypes. Scutellar setae 4, 6 or 8.

Wing membrane coursely dotted with microtrichiae (a characteristic of this genus). R 2+3 separated from both R 1 and R 4+5, ending about midway between the two veins. Costa much produced beyond end of R 4+5. Cu 1 ending much proximal of end of R 4+5. fCu much beyond r-m. Cu 2 strongly curved. Anal lobe flat. Squama with 3 fringe setae in all specimens examined. Tarsi I relatively short, LR1 0.46–0.48, LR2 0.44–0.45, LR3 0.53–0.54. TR1 0.13–0.14. Hairs on tarsi short, BR1 2.2–2.3, BR1 2.2–2.3, BR2 2.4–2.5, BR3 2.8–2.9. Front tibia with a long terminal spur (Fig. 28-E), middle tibia with two short terminal spurs (Fig. 28-F), hind tibia with a long terminal spur, a short terminal spur, and terminal comb composed of 9 free spurs (Fig. 28-G, H). Tarsi without terminal spurs. Pulvilli absent (Fig. 28-I).

Hairs on abdominal tergites almost evenly distributed (Fig. 28-L). Hypopygium in Fig. 28-J. Ninth tergite small, less than half as long as wide, bearing no long setae. Anal point absent. Gonocoxite with a small, conical lobe. Gonostylus characteristic to this species, widest at about middle and tapering towards apex, apical portion slightly curved inwards and without neither apical spur nor subapical tooth; gonostylus with several long setae on the convex inner margin (Fig. 28-K).

Discussion. Specimens of the present species were all recovered from the uppermost part of the stream, Station A, and is presumably associated with clean waters. They are morphologically characteristic in that body coloration is almost entirely black, scutum without dorsomedial setae but with numerous dorsolateral setae which are long and only slightly expanded in the middle, antenna with 12 flagellar segments only and last segment very short (AR 0.22–0.30), lobe of gonostylus is small and conical, ninth tergite without long setae and without anal point, and gonostylus is expanded in the middle and tapering towards apex where no spur is present. Among the known species of this genus, such combination of characters is most closely related to *L. gurgicola* (Edwards, 1929), but the shape of gonostylus is quite different (convex medially and straight laterally in the present, straight medially and convex laterally in *gurgicola*). It is also related to *L. prolongata* (Kieffer) in the shape of gonostylus and some other characters, which was also recorded from Japan (Kyoto) by Tokunaga (1965), but the present species is different from it in AR (0.5–0.6 in *prolengata*, 0.3 or less in the present species), and also in the number of segments of antenna (14 segmented in *prolongata* as usual, 13 segmented in the present species).

(49) *Limnophyes tamakiyoides*, sp. nov.

Materials studied: A single male, holotype, recovered from Station A, Yuba (No. A 70:86).

Male. Body length 1.53 mm, wing length 0.84 mm. Body coloration almost uniformly dark brown, excepting abdominal sternites, which are brown; ground color of scutum brown, stripes dark brown, scutellum and postnotum dark brown, halteres

brown with apical knob dark brown.

Head in Fig. 29-A. Eyes bare, reniform, inner margin slightly concave, ER 1.29. Antenna with only 10 flagellar segments (unusual as a chironomid species), AR 0.37, AHR 0.41. Palp 4 segmented, as usual. Supraorbital setae 1 near middle and 3 in the lateral part of both sides. Clypeal setae 10. Antepronotum with 3 pairs of dorsal setae and 2 pairs of lateral setae (Fig. 29-B). Scutum with 3 small dorsomedian setae, 13 dorsolateral setae on each side which are about 70 microns long and simple (not expanded in the middle to form lamellar appearance), and 6 pre-alar setae on both sides (Fig. 29-C). Scutellum with 6 simple setae in a transverse row (Fig. 29-C).

Wing membrane coursely dotted with microtrichiae (Plate V-25). Squama each with only 2 setae. R 2+3 separated from R 1 and R 4+5, ending about midway between the two ends. Costa extending much beyond end of R 4+5. Cu 1 ending almost under end of R 4+5. fCu much beyond r-m. Cu 2 strongly curved. Anal vein not reaching to fCu. Anal lobe flat. Front tibia short, LR1 0.49; LR2 0.45, LR3 0.52; TR1 0.14. Tarsal hairs short, BR1 1.9, BR2 1.9, BR3 2.0. Front tibia with a long terminal spur (Fig. 29-D), middle tibia with two short terminal spurs (Fig. 29-E), hind tibia with a long terminal spur, a short terminal spur, and a terminal comb composed of 9 free spurs (Fig. 29-F). Pulvilli absent.

Hypopygium in Fig. 29-H. Ninth tergite rather flat, with 12 short setae along posterior margin, anal point lacking. Inner lobe of gonocoxite broad, low and almost rectangular (Fig. 29-G). Gonostylus almost straight, slightly expanded near apex, with a large flat subapical spur (Fig. 29-I).

Discussion. This species is obviously a member of genus *Limnophyes*, since eyes are bare, wings without macrotrichiae but coursely dotted with microtrichiae, Cu 2 strongly bent, squama has only 2 fringe setae, costa is extended beyond end of R 4+5, and anal point is absent. Among known species of this genus, it is most closely related to *L. minimus* (Meigen) according to descriptions of Edwards (1929, p.355) and Pinder (1978, p.88), but is quite different in AR (0.6 in *minimus*, 0.37 in the present species), in the number of flagellar segments of antenna (only 10 in the present species, 13 in the previously known *Limnophyes* species), and in the shape of inner lobe of gonocoxite. The present species also differs from two species of *Limnophyes* recorded from Tama Tiver, *kitanaides* Sasa, 1981 and *kireides*, sp. nov., in the structure of hypopygium and the distribution and structure of setae on scutum.

Summary

In the present paper, accounts are given on the distribution and morphology of species of the subfamily Orthocladiinae, recovered from 10 collection sites along the main stream of the River Tama at the survey in June 1981. A total of 20 species belonging to this subfamily were confirmed as breeding in the river, among which 16 species were identified as those already reported by Sasa (1981a, b) from Minamiasakawa River, and 4 are described as new species. A group which was described as *Cricotopus sylvestris* (Fabricius) from Minamiasakawa by Sasa (1981a) were found to be separated into two forms in the present study, i.e. "noge" and "yoroi". The distribution of these species or forms was again shown to be highly correlated with the degree of pollution of the river with sewage waters.

Table 3. Standard measurement data of adult males (Orthocladiinae)

	Brillia japonica #31 (10)	*Orthocladius tamanitidus* #32 (12)	*Paratrichocladius tamaater* #33 (12)	*Paratrichocladius rufiventris* #34 (12)	*Cricotopus tamadigitatus* #35 (9)	*Cricotopus metatibialis* #36 (8)	*Cricotopus triannulatus* #37 (7)
BL (mm)	3.38–4.40 (3.48)	2.37–2.85 (2.58)	2.24–2.71 (2.43)	2.40–3.13 (2.90)	2.17–2.73 (2.47)	2.12–2.30 (2.20)	2.45–2.70 (2.57)
WL (mm)	1.70–2.00 (1.53)	1.33–1.55 (1.45)	1.16–1.49 (1.34)	1.30–1.63 (1.47)	1.20–1.45 (1.34)	1.12–1.25 (1.18)	1.35–1.52 (1.46)
AR	0.60–0.71 (0.66)	1.10–1.42 (1.30)	0.98–1.22 (1.10)	1.28–1.60 (1.40)	0.78–1.00 (0.86)	0.98–1.07 (1.01)	1.22–1.34 (1.27)
AHR	0.40–0.48 (0.43)	0.42–0.53 (0.48)	0.45–0.56 (0.46)	0.43–0.53 (0.49)	0.39–0.49 (0.44)	0.43–0.49 (0.46)	0.46–0.52 (0.48)
ER	0.21–0.27 (0.24)	0.65–0.88 (0.71)	0.42–0.85 (0.52)	0.60–0.90 (0.71)	0.51–0.66 (0.59)	0.80–0.94 (0.86)	0.66–0.92 (0.78)
so	38–56 (44.1)	4–7 (5.6)	4–7 (5.6)	6–9 (7.4)	6–10 (8.6)	2–5 (3.5)	3–8 (5.6)
cl	26–33 (30.0)	6–10 (7.0)	8–12 (10.1)	8–12 (10.0)	9–19 (12.8)	10–13 (11.1)	9–14 (10.7)
pn	26–42 (31.9)	4–7 (6.0)	8–14 (10.0)	6–8 (7.2)	3–4 (3.3)	2–3 (2.4)	4–6 (4.6)
dm	0 (0.0)	10–20 (14.5)	8–14 (10.0)	10–14 (12.0)	10–18 (13.0)	9–14 (11.6)	14–20 (17.1)
dl	63–97 (82.5)	10–15 (12.3)	10–16 (12.9)	13–21 (16.8)	10–14 (11.6)	10–19 (12.8)	8–14 (10.6)
pa	20–30 (25.2)	2–5 (4.0)	3–4 (3.2)	4–5 (4.7)	2–5 (3.2)	2–4 (3.0)	3–4 (3.1)
sc	56–80 (64.6)	7–10 (8.4)	10–14 (10.8)	10–16 (12.1)	8–12 (10.2)	10–12 (10.8)	6–8 (6.4)
sq	18–26 (23.9)	6–12 (8.0)	4–8 (5.4)	9–13 (11.5)	3–6 (4.1)	4–7 (5.0)	6–8 (6.8)
LR1	0.77–0.81 (0.79)	0.67–0.74 (0.70)	0.58–0.63 (0.60)	0.56–0.61 (0.58)	0.63–0.67 (0.65)	0.62–0.66 (0.64)	0.58–0.63 (0.61)
LR2	0.44–0.49 (0.47)	0.49–0.54 (0.51)	0.46–0.52 (0.49)	0.46–0.48 (0.47)	0.50–0.53 (0.51)	0.50–0.55 (0.51)	0.45–0.49 (0.47)
LR3	0.48–0.54 (0.51)	0.59–0.63 (0.61)	0.56–0.61 (0.58)	0.53–0.58 (0.55)	0.55–0.58 (0.57)	0.54–0.58 (0.56)	0.54–0.57 (0.55)
TR1	0.12–0.14 (0.13)	0.13–0.14 (0.13)	0.13–0.15 (0.14)	0.13–0.15 (0.14)	0.12–0.13 (0.13)	0.13–0.14 (0.13)	0.12–0.14 (0.13)
BR1	2.8–5.6 (3.5)	1.9–2.6 (2.2)	1.9–2.1 (2.0)	1.8–222 (2.0)	1.8–2.5 (2.0)	1.8–2.5 (2.0)	2.2–2.5 (2.3)
BR2	4.0–6.0 (4.8)	2.1–3.0 (2.4)	2.2–2.8 (2.5)	2.1–3.2 (2.7)	2.0–2.2 (2.1)	2.0–2.3 (2.1)	2.4–2.6 (2.5)
BR3	3.3–5.0 (4.2)	2.6–3.6 (3.2)	2.2–3.7 (2.8)	2.5–3.3 (2.9)	2.3–2.6 (2.5)	2.2–2.5 (2.3)	2.9–3.3 (3.1)

Cricotopus bicinctus #38 (13)	*Cricotopus* form *yoroi* #39 (4)	*Cricotopus* form *noge* #40 (10)	*Nanocladius tamabicolor* #43 (7)	*Eukiefferiella tamaflavus* #44 (8)	*Parametriocnemus stylatus* #47 (10)	*Limnophyes tamakireides* #48 (3)
2.60–2.83 (2.71)	3.50–4.10 (3.76)	2.88–3.36 (3.10)	1.58–2.08 (1.87)	1.78–2.00 (1.87)	1.85–2.55 (2.17)	1.80–2.25 (2.02)
1.28–1.50 (1.39)	1.88–1.96 (1.89)	1.52–1.75 (1.61)	1.00–1.08 (1.05)	0.95–1.05 (0.98)	1.10–1.25 (1.17)	0.90–0.92 (0.91)
1.41–1.58 (1.48)	1.63–1.98 (1.81)	1.29–1.52 (1.39)	0.80–0.91 (0.86)	0.36–0.48 (0.44)	0.65–0.93 (0.80)	0.22–0.30 (0.26)
0.44–0.53 (0.49)	0.53–0.55 (0.54)	0.42–0.52 (0.47)	0.44–0.48 (0.46)	0.29–0.39 (0.34)	0.43–0.56 (0.50)	0.25–0.30 (0.27)
0.77–0.93 (0.84)	1.05–1.16 (1.11)	1.05–1.09 (1.07)	1.68–2.25 (1.86)	1.13–1.29 (1.19)	0.32–0.57 (0.38)	1.35–1.46 (1.40)
3–7 (4.5)	5–6 (5.4)	4–7 (5.4)	1 (1.0)	2–3 (2.7)	8–11 (8.8)	4–6 (4.4)
8–13 (10.4)	8–16 (12.3)	12–16 (14.0)	6–11 (8.8)	7–10 (8.8)	8–11 (9.9)	14 (14.0)
2–6 (3.7)	4–7 (5.5)	4–7 (5.5)	0 (0.0)	1–2 (1.8)	4–6 (4.4)	4–6 (5.5)
13–16 (14.5)	17–21 (19.0)	12–22 (16.7)	0 (0.0)	0 (0.0)	11–17 (14.4)	0 (0.0)
12–16 (13.7)	14–20 (17.2)	12–25 (18.6)	4–6 (5.0)	8–12 (9.1)	10–16 (13.3)	54–58 (56.3)
2–4 (2.8)	3–6 (4.5)	3–4 (3.7)	1–2 (1.2)	3–4 (3.1)	3–6 (4.0)	5–8 (7.0)
4–8 (5.8)	9–10 (9.5)	8–10 (9.2)	2–3 (2.4)	4–5 (4.1)	4–8 (6.3)	4–8 (6.0)
3–10 (6.8)	15–22 (18.0)	10–16 (14.0)	2–3 (2.1)	3–5 (3.9)	3–6 (4.2)	3 (3.0)
0.58–0.64 (0.61)	0.54–0.58 (0.56)	0.51–0.56 (0.54)	0.63–0.67 (0.65)	0.82–0.86 (0.84)	0.68–0.77 (0.73)	0.46–0.48 (0.47)
0.48–0.52 (0.50)	0.44–0.47 (0.45)	0.43–0.46 (0.45)	0.48–0.52 (0.50)	0.48–0.50 (0.49)	0.54–0.58 (0.56)	0.44–0.45 (0.44)
0.53–0.61 (0.57)	0.52–0.53 (0.53)	0.51–0.55 (0.53)	0.56–0.59 (0.57)	0.54–0.59 (0.57)	0.62–0.64 (0.63)	0.53–0.54 (0.54)
0.13–0.14 (0.14)	0.11–0.12 (0.11)	0.12–0.13 (0.12)	0.14–0.16 (0.15)	0.17–0.20 (0.18)	0.12–0.14 (0.13)	0.13–0.14 (0.13)
2.0–2.3 (2.2)	1.2–2.2 (1.8)	1.6–2.3 (2.0)	2.1–2.5 (2.3)	2.8–3.3 (3.1)	1.3–2.7 (2.0)	2.2–2.3 (2.3)
2.2–3.2 (2.6)	2.4–3.0 (2.6)	2.0–2.5 (2.3)	3.0–3.7 (3.4)	3.0–4.9 (3.9)	2.0–3.6 (2.7)	2.4–2.5 (2.5)
2.4–3.4 (1.7)	2.6–3.1 (2.9)	2.1–2.9 (2.6)	3.2–3.7 (3.5)	5.2–6.6 (5.9)	3.3–5.1 (3.9)	2.5–2.9 (2.9)

EXPLANATION OF FIGURES

Fig. 22 ***Paratrichocladius tamaater*** **Sasa**

A. head, male. **B.** antenna, female. **C.** scutum and scutellum, male. **D.** tip of front tibia, male. **E.** tip of middle tibia, male. **F.** tip of hind tibia, showing terminal comb. **G.** tip of hind tibia, showing terminal spurs, male. **H.** abdominal tergites, male. **I.** hypopygium, male. **J.** spermathecae, female. **K.** cercus, female.

Fig. 23 ***Paratrichocladius rufiventris*** **(Meigen)**

A. head, male. **B.** antenna, female. **C.** abdominal tergites II to VI. **D.** front tarsus V. **E.** male hypopygium. **F.** spermathecae, female. **G.** cercus, female.

Fig. 24 ***Rheocricotopus tamabrevis,*** **sp. nov.**

Male: **A.** head. **B.** wing. **C.** tip of front tibia. **D.** tip of middle tibia. **E.** tip of hind tibia. **F.** hind tarsus V. **G.** abdominal tergites II to VII, showing bases of hairs. **H.** hypopygium. **I.** anal point. **J.** inner lobe of gonocoxite. **K.** gonostylus.

Fig. 25 ***Parakiefferiella tamatriangulatus*** **Sasa**

A. head, male. **B.** head, female. **C.** last 4 segments of male antenna. **D.** female antenna. **E.** male wing. **F.** male hypopygium, dorsal view. **G.** male hyppygium, lateral view. **H.** spermathecae, female. **I.** cercus, female.

Fig. 26 ***Parakiefferiella tamatriangulatus*** **Sasa; A.** setae on abdominal tergites, male. ***Metriocnemus tamaokui,*** **sp. nov. B.** male wing. **C.** abdominal tergites of pupa. **D.** enlarged views of spines on abdominal tergites II to IX, pupa.

Fig. 27 ***Metriocnemus tamaokui,*** **sp. nov.**

Male: **A.** head. **B.** scutum and scutellum, left half. **C.** tip of front tibia. **D.** front tarsus V. **E.** tip of middle tibia. **F.** tip of middle tarsus I. **G.** tip of middle tarsus II. **H.** tip of hind tibia. **I.** tip of hind tarsus I. **J.** abdominal tergites III and IV. **K.** hypopygium, dorsal view. **L.** hypopygium, ventral view.

Fig. 28 ***Limnophyes tamakireides,*** **sp. nov.**

Male: **A.** head. **B.** antenna. **C.** antepronotum. **D.** scutum and scutellum. **E.** tip of front tibia. **F.** tip of middle tibia. **G.** tip of hind tibia, showing terminal spurs. **H.** tip of hind tibia, showing terminal comb. **I.** tip of hind tarsus V. **J.** male hypopygium, left half. **K.** inner margin of gonocoxite, and gonostylus. **L.** abdominal tergites.

Fig. 29 ***Limnophyes tamakiyoides,*** **sp. nov.**

Male: **A.** head. **B.** antepronotum. **C.** scutum and scutellum. **D.** tip of front tibia. **E.** tip of middle tibia. **F.** tip of hind tibia. **G.** inner margin of gonocoxite. **H.** hypopygium, right half, dorsal view. **I.** left gonostylus.

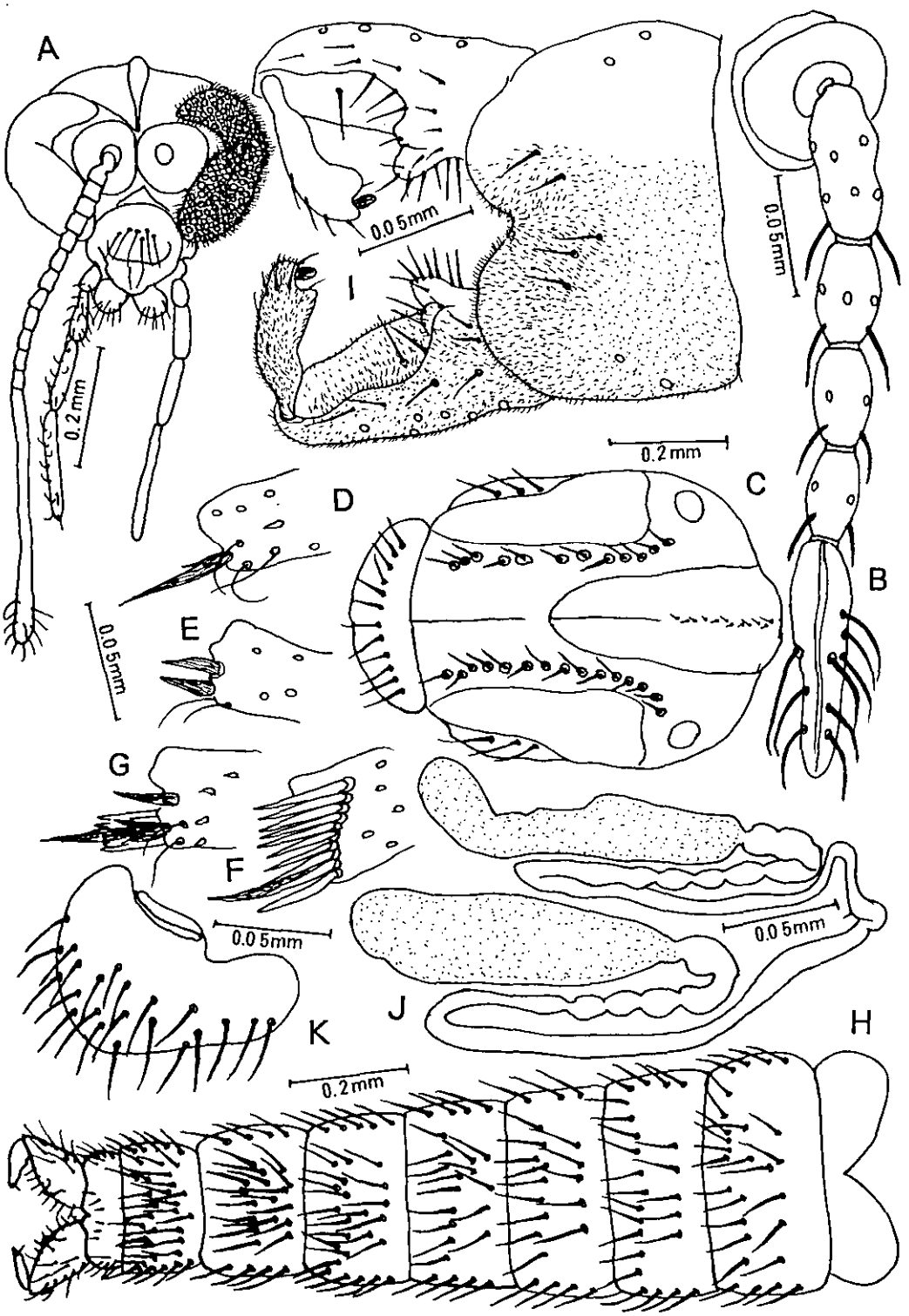


Fig. 22 *Paratrichocladius tamaater* (Sasa)

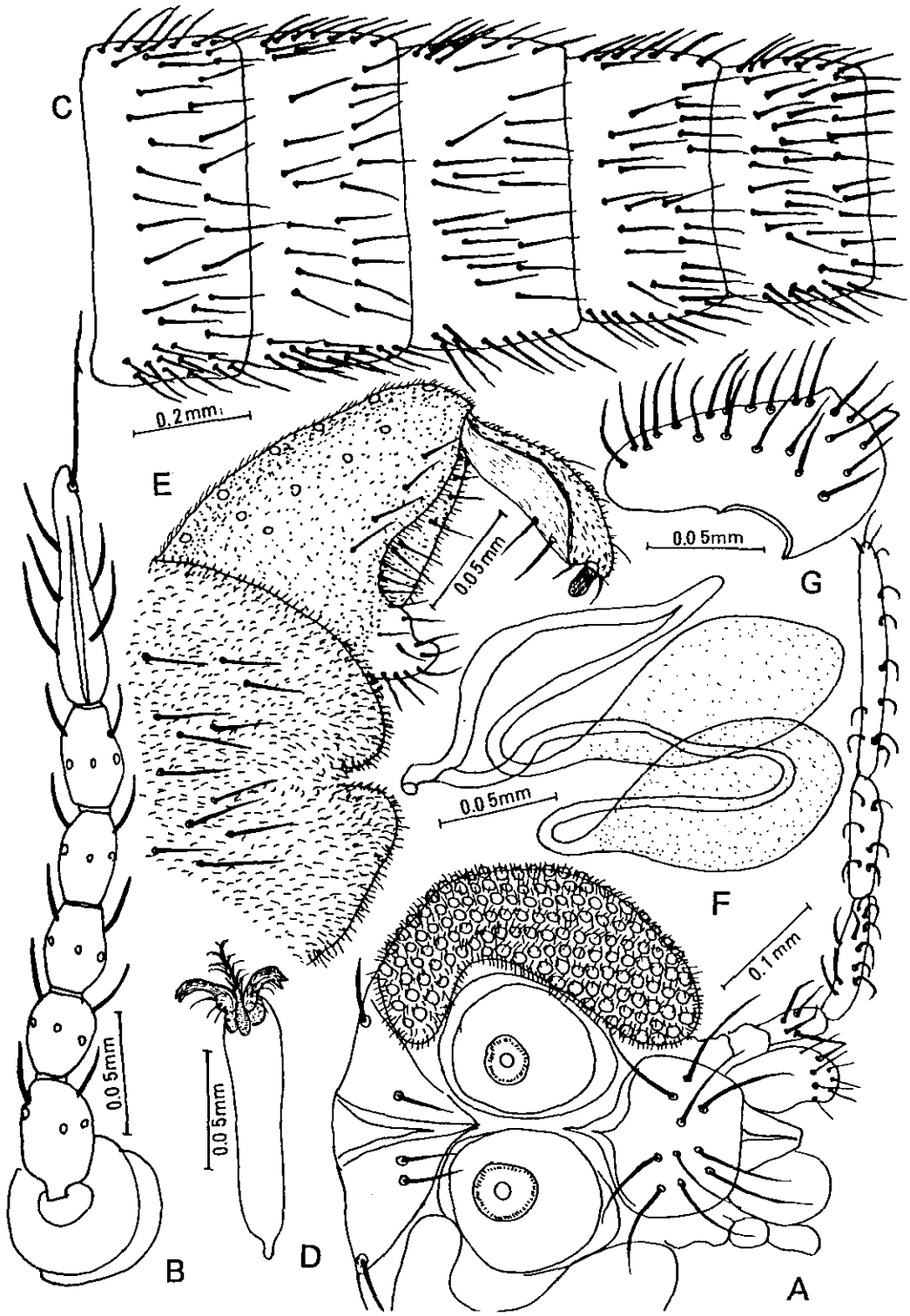


Fig. 23 *Paratrichocladius rufiventris* (Meigen)

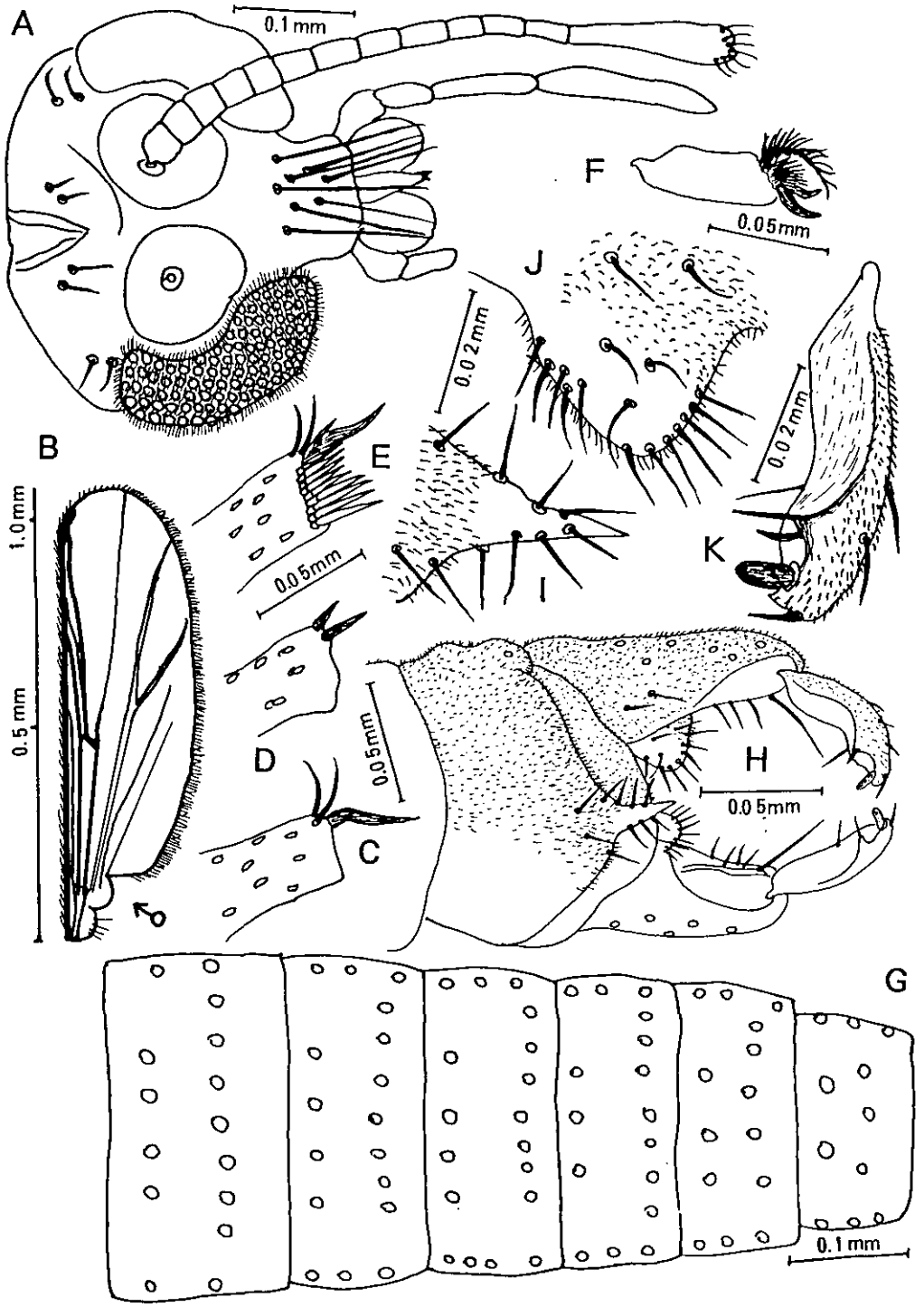


Fig. 24 *Rheocricotopus tamabrevis*, sp. nov.

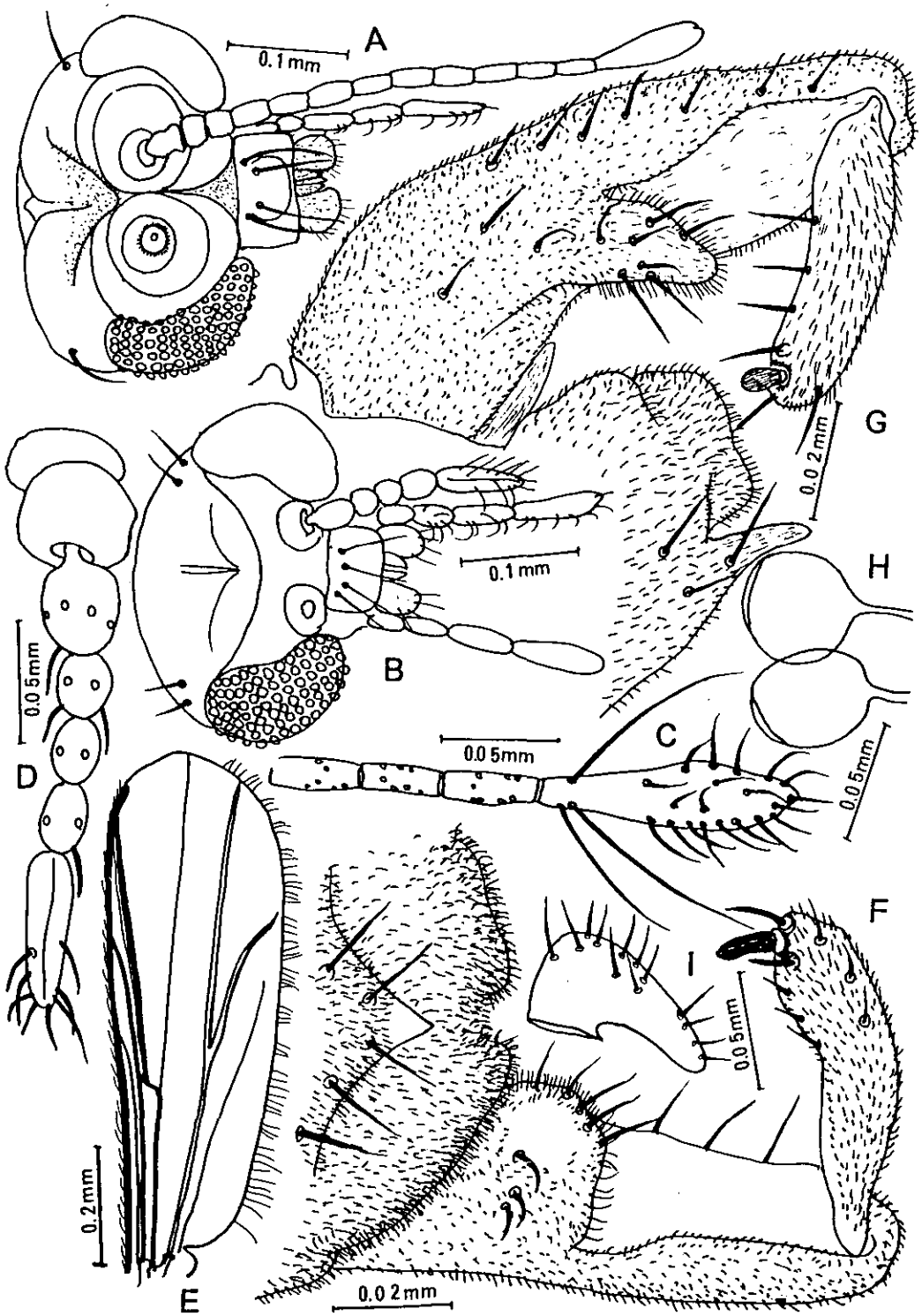


Fig. 25 ***Parakiefferiella tamatriangulatus*** **(Sasa)**

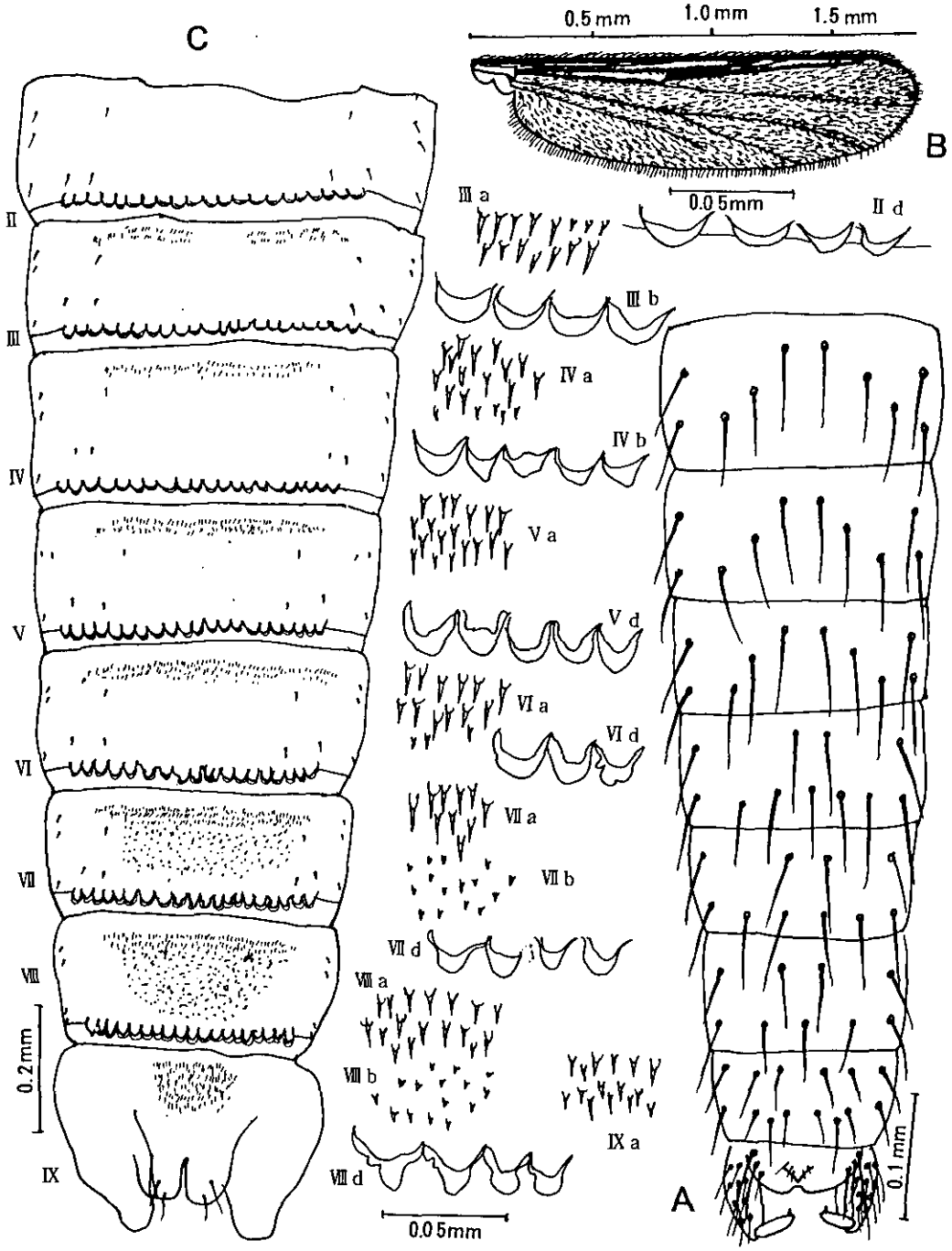


Fig. 26 *Parakiefferiella tamatriangulatus* Sasa (A)
Metriocnemus tamaokui Sasa (B, C, D)

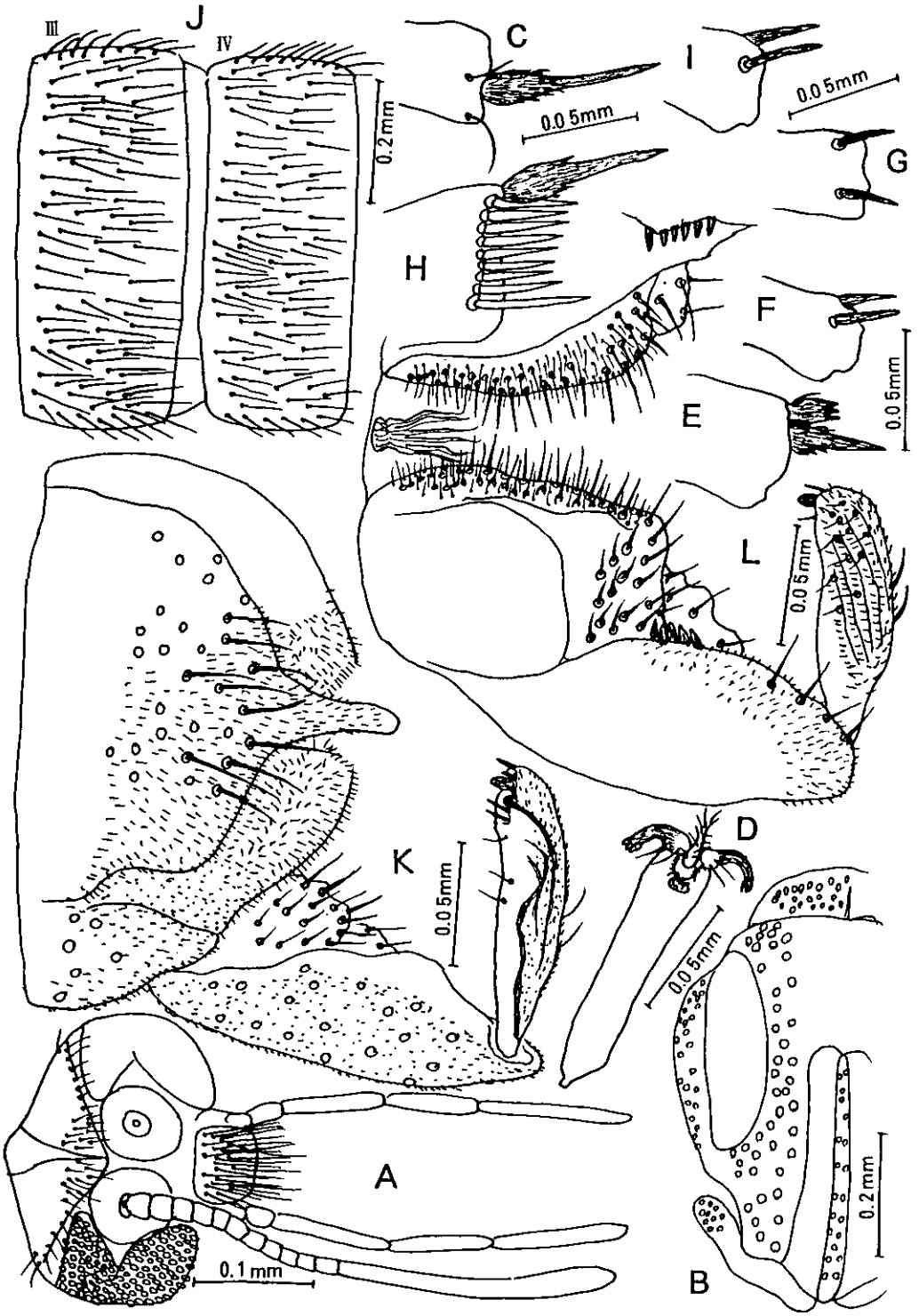


Fig. 27 *Metriocnemus tamaokui*, **sp. nov.**

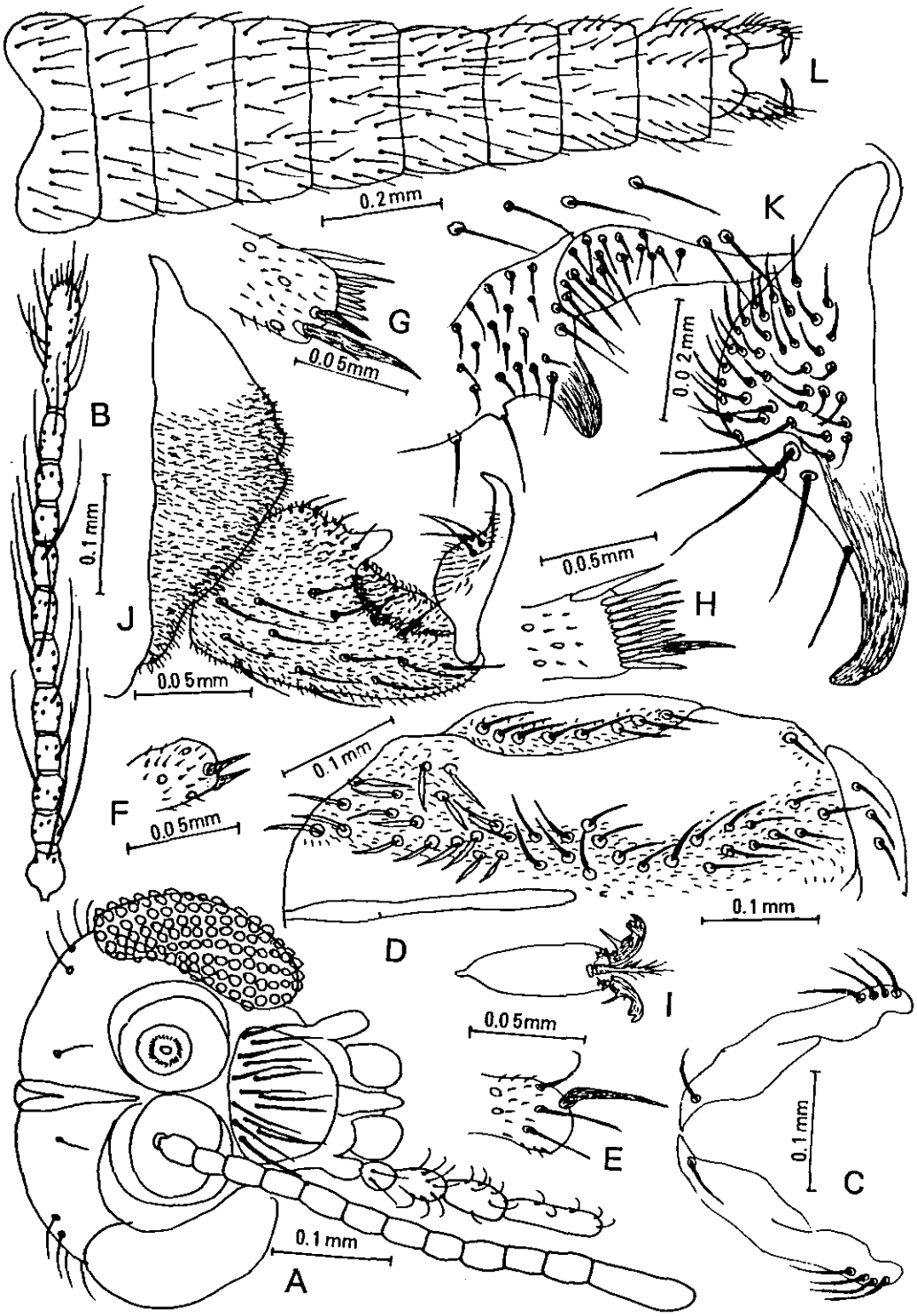


Fig. 28 *Limnophyes tamakireides*, sp. nov.

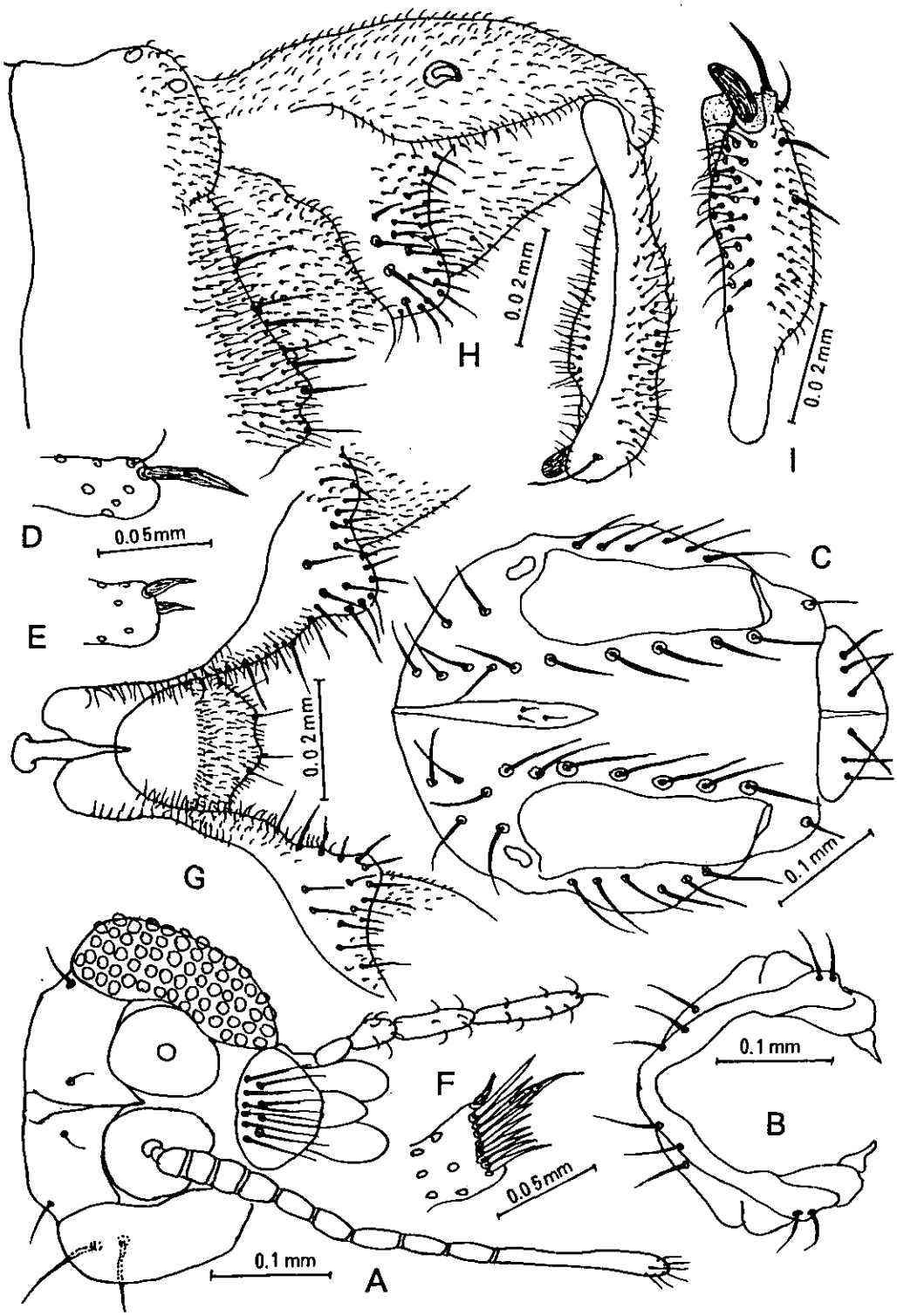


Fig. 29 ***Limnophyes tamakiyoides*, sp. nov.**

EXPLANATION OF PLATES

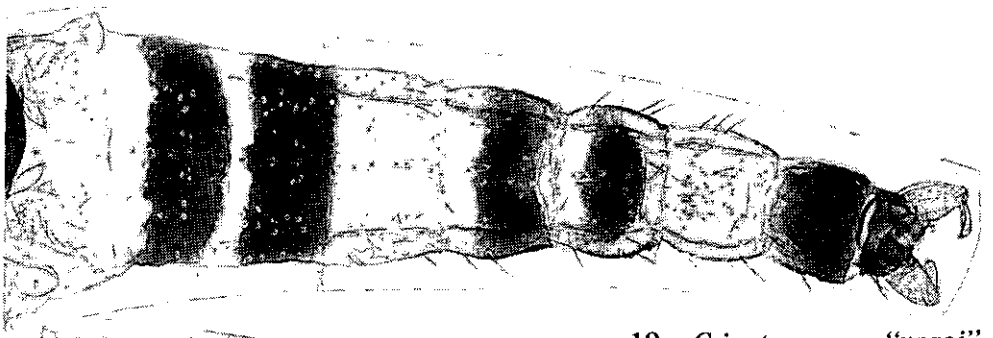
Plate IV

19.	*Cricotopus*, sp., *"yoroi"*	#39, male abdominal tergite
20.	*Cricotopus*, sp., *"noge"*	#40, do
21.	*Cricotopus bicinctus* (Meigen)	#38, do
22.	*Cricotopus triannulatus* (Macquavt)	#37, do
23.	*Cricotopus tamadigitatus* Sasa	#35, do
24.	*Cricotopus metatibialis* Tokunaga	#35, do

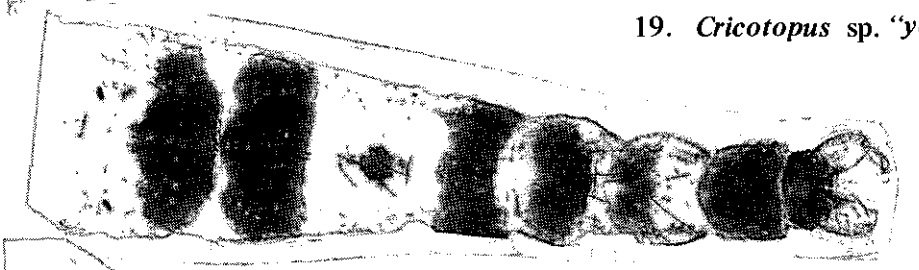
Plate V

25.	*Limnophyes tamakiyoides*, n. sp.	#49, male wing
26.	*Brillia japonica* Tokunaga	#31, do
27.	*Cricotopus bicinctus*	#38, male front tarsus V
28.	*Cricotopus*, sp., *"noge"*	#40, do

Plate IV. Abdominal tergites of *Cricotopus*

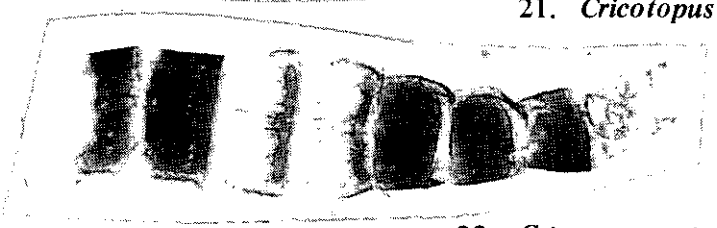


19. *Cricotopus* sp. *"yoroi"*

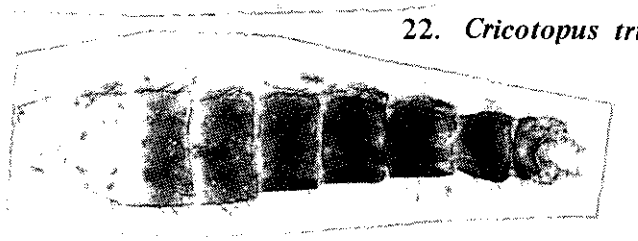


20. *Cricotopus* sp. *"noge"*

21. *Cricotopus bicinctus* (Meigen)



22. *Cricotopus triannulatus* (Macquart)

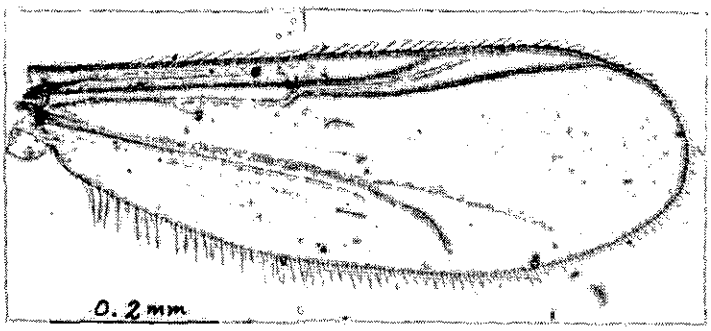


23. *Cricotopus tamadigitatus* Sasa

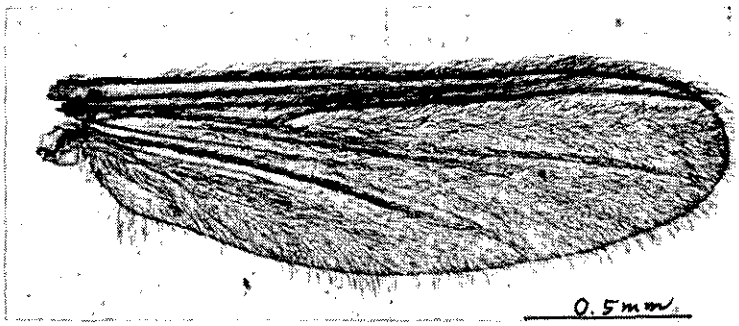
24. *Cricotopus metatibialis* Tokunaga

0.05mm

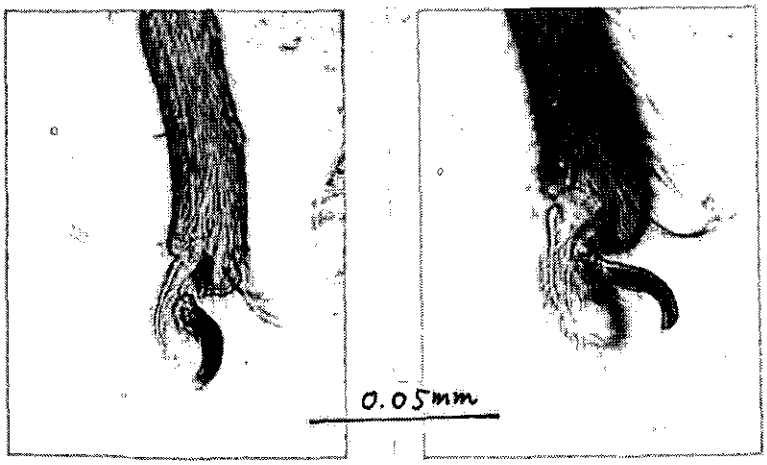
Plate V. Wings and tip of legs



25. *Limnophyes tamakiyoides*, sp. nov., wing



26. *Brillia japonica*, Tokunaga, wing



27. *Cricotopus bicinctus*
(front tarsus V, without pulvilli)

28. *Cricotopus* sp. *"noge"*
(front tarsus V, with pulvilli)

多摩川に発生するユスリカ類の研究
第6報　多摩本流より6月に採集されたエリユスリカ亜科の各種について

佐々　学

私共は1981年6月に多摩川の河口から約100 Km上流の奥多摩湖に注ぐ小渓流（A点）から，本流ぞいに約10Kmおきに河口まで10ケ所の採集点を設定し，各点の河底からユスリカ幼虫をふくむ泥，砂，石，水草などを採集してこれを前報に述べた方法で研究室内で飼育し，羽化した成虫の雌雄別の数を各種類ごとに記録した。それらの各採集場所ごとの分布は前報（第5報）にユスリカ科全種について表示したが，本報告ではこれらのうちエリユスリカ亜科 Orthocladiinae に属する種の記載をおこなった。

今回の調査で多摩川本流に生息することが確認されたユスリカ科の虫は全部で55種であるが，うちエリユスリカ科に属するものは20種にのぼり，うち16種はすでに南淺川に生息することがSasa（1981 a，b）に示されたものと同じ種類と判定したが，残りの4種は今回新たに発見された新種とみなされる。そして，これら各種の分布は，水質が最も清浄な上流部と，中等度に下水による汚染がみられる中流部と，ＢＯＤが年間平均5ないし10 ppmと汚染されている下流部とで異なっており，本亜科のユスリカも水質汚染の指標生物として利用しうることが示された。

Part 7

Additional species collected in winter from the main stream

Manabu SASA[1] and Kazuya ICHIMORI[2]

1) Former Director, National Institute for Environmental Studies. Present Address: Toyama Medical and Pharmaceutical University, Toyama-shi, 930-01

2) Research Collaborator, National Institute for Environmental Studies. Present Address: Teikyo University Medical School, 2-11-1 Kaga, Itabashi-ku, Tokyo, 173.

CONTENTS

INTRODUCTION

This is the seventh report of a series of surveys of chironomids of the River Tama. In the first four papers, reports were made on the species collected from a tributary, Minamiasakawa River, and their distribution along the stream in relation to the degree of pollution with sewage waters (Sasa et al., 1980; Sasa, 1980, 1981a, b). A total of 20 species of Chironominae (including 13 new species) and 13 species of Orthocladiinae (including 6 new species) were recorded in a collection made in August 1979 at 6 stations along the stream. In the second collection made in December 1979, 5 species of Chironominae (including one new species) and 16 species of Orthocladiinae (including 8 new species) were recovered from the same stations. A survey of chironomids along the main stream of the River Tama was carried out in June 1981, and 30 species of Chironominae (including 15 new species) and 20 species of Orthocladiinae (including 4 new species) were collected and their distribution in relation to the degree of pollution with sewage waters was again discussed (Sasa, 1983, Part 5, 6).

The present survey was carried out on 11 and 12 March 1982 by a team of the authors and their collaborators, with the same methods as used in the previous surveys. Because the senior author has soon moved to Toyama in April, collections of adult specimens and their dissection and mounting were done mostly by the junior author. In the present survey, a total of 17 species of Chinominae, 8 species of Orthocladiinae and 4 species of Tanypodinae were recovered and identified by examination of adult specimens, as in Table 4. Among the Chironominae and Orthocladiinae species collected in the present survey, 4 species are newly described in the present paper.

DESCRIPTION OF NEWLY RECORDED SPECIES

(56) *Cryptochironomus tamayoroi*, sp. nov.

Materials studied: 5 males and 2 females emerged from a bottom sample collected at Station D, under Yoroi Bridge, on 11 March, 1982; all dissected and mounted in gum-chloral (No. A 74:01, holotype; 74:02–07, paratypes).

Male. Body length 5.50–6.50 mm, wing length 2.55–2.80 mm. Body coloration largely yellowish green; antennal shaft dark brown, hairs brown; ground color of scutum greenish yellow, scutal stripes reddish brown, scutellum yellow, postnotum brown, abdominal tergites greenish yellow, hypopygium brown; wing unmarked, slightly purplish under transmitted light, cross vein r-m pale; front femur yellow, front tibia and tarsi dark brown (this is a remarkable distinguishing character of this and the next species from other co-existing chironomids); in the middle and hind legs, femur, tibia, tarsi I and II yellow, tarsi III, IV and V brown; halters yellow. Standard measurement data in Table 2-D of the previous paper.

Head in Fig. 30-A. Frontal tubercles (Fig. 30-B) well developed, slightly longer than wide, 13 microns high, 8 microns wide, and 42 microns apart from each other (from center to center). Antenna with 11 flagellar segments, AR 2.60 in average, antennal hairs long, AHR 0.57 in average.

Pronotum with lateral hairs (3–9 on each side, 5.8 in average). Wing vein R 2+3 separated from both R 1 and R 4+5, ending nearly midway between ends of the latter two veins; fCu beyond r-m. LR1 1.62, LR2 0.65, LR3 0.67 in the averages, LR2 relatively large and close to the value of LR3. Front tibia with two long terminal setae, the terminal scale with rounded apical margin (Fig. 30-C). Terminal combs of middle and hind tibiae both with a short spur (Fig. 30-D). Front tarsus V relatively short, about 0.25 the length of front tibia. Pulvilli well developed.

Hypopygium in Figs. 30-E, F. Ninth tergite with relatively flat anterior margin, and without long setae in the middle. Anal point long, slender and parallel-sided. Both dorsal and ventral appendages highly reduced, the former being pad-like, covered with numerous microtrichiae, and bears 3–5 long setae directed inwards (Figs. 30-G, H), the latter a small conical tubercle, with numerous microtrichiae, and 2–4 long terminal setae (Figs. 30-G, I). Gonostylus ankylosed with gonocoxite, rather short and stout, widest at base and tapering towards apex, with a stout terminal spur, and with a row of several short setae along inner margin (Fig. 30-E).

Female. Coloration as in male, body largely greenish yellow, scutal stripes reddish brown; front femur yellow, tibia and tarsi entirely dark brown; base of middle and hind tibiae with a dark ring, tarsi II to V brown, other segments and parts yellow. Frontal tubercles roughly conical (Fig. 30-K). Antenna 6 segmented (Fig. 30-J). Spermathecae in Fig. 30-L, cercus with rounded posterior margin (Fig. 30-M).

Discussion. This species is obviously a member of the *Cryptochironomus-Harnischia* complex of *Chironomus* in wider sense, as its dorsal and ventral appendages are both highly reduced, pubescent and bear a few terminal setae. Among the European species of this group, it is most closely related to *Cryptochironomus albofusciatus* (Staeger), as frontal tubercles are well developed, gonostylus is not distally broadened, and anal point is slender and parallel-sided, but differs from it in the absence of long

tarsal beards. It is also closely related to *C. hentonaensis* found from Okinawa and also from Station F at the present survey, but differs from it in the shape and structure of gonostylus and ventral appendages.

(57) *Cryptochironomus* sp. "hentona"

Materials studied: 7 males and 4 females have emerged from bottod samples collected at Station F, under Hino Bridge; all dissected and mounted in gum-chloral (Specimens No. A 74:11–17).

Male. Body length 2.25–2.60 mm (5.55 in average), wing length 2.25–2.60 mm (2.49 mm), somewhat smaller than the preceding species. Body coloration similar to the preceding species, body largely greenish yellow, scutal stripes reddish brown, abdomen greenish yellow, hypopygium brown; front femur yellow, front tibia and tarsi dark brown; middle and hind femora, tibiae, and proximal segments of tarsi yellow, distal tarsal segments dark brown.

Frontal tubercles well developed (Fig. 31-E), AR 2.66 in average. Lateral pronotal hairs 8–12 on each side. Other standard measurement data in Table 2-E of the previous paper. Terminal scale of front tibia with rounded margin, and bears 3 long subterminal setae (Fig. 31-F). Terminal combs of middle and hind tibiae fused and with one short spur (Fig. 32-A). Hypopygium in Figs. 31-G, J. Ninth tergite with rather numerous setae near base of anal point but without long setae in the middle. Anal point long, slender and parallel-sided. Dorsal appendages small, pad-like, covered with numerous microtrichiae, and bear 1–3 long setae (Figs. 31-H, H'). Ventral appendages small, conical, and with 2 or 3 long setae but without microtrichiae as in the preceding species (Figs. 31-I, I'). Gonostylus rather short and stout, basally constricted and widest at about basal 1/3, apically pointed and with a stout terminal spur, with numerous short setae along the inner margin.

Female. Body coloration as in male. Antenna 6 segmented (Fig. 31-A). Frontal tubercles smaller than in the male (Fig. 31-B). Spermathecae in Fig. 31-C. Cercus in Fig. 2-D, with an angulate posterior margin and somewhat smaller than that of the preceding species.

Discussion. This species was collected at a relatively polluted part of the River Tama, and is probably the same as that collected by Sasa and Hasegawa from Okinawa and being described as a new species by the name of *Cryptochironomus hentonaensis.* in Jap. J. Sanit. Zool. (Eisei Dobutsu), 1983.

(58) *Polypedilum tamahinoense*, sp. nov.

Materials studied: 55 males and 99 females have emrged from samples collected at Station F, Hino; 11 males and 11 females among them were mounted in gum-chloral. Holotype: A 74:21, male. Paratypes: 10 males and 11 females, A 74:21–34.

Male. Body length 3.18 mm, wing length 1.65 mm in average. Antenna brown; ground color of scutum brown, pruinose and whitish, stripes dark brown, scutellum brown, postnotum dark brown; abdominal tergites I–V greenish yellow, VI to hypopygium dark brown; halteres yellow; wing with three dark spots as in Fig. 32-C, that in cell 5 (between R 4+5 and M) is a large dark spot not reaching to the base of the cell;

in the front leg, femur is brown for basal 2/3 and yellow for distal 1/3 excepting the extreme tip which is again dark brown; front tibia entirely yellow, tarsi entirely brown; in the middle and hind legs, basal half and apical end are brown and apical half is largely yellow, while tibiae and tarsi I and II are yellow and the distal tarsal segments are brown.

Standard measurement data in Table 2-L of the previous paper. Antenna with 13 flagellar segments, AR 1.14–1.38 (1.26 in average). Frontal tubercles absent. Eyes with a long dorsomedial projection, ER 0.21 in average. Lateral pronotal setae absent. Wing with three conspicuous dark marks, as in Fig. 32-C, cell between R 4+5 and M with one large dark patch. fCu far beyond r-m.

Hypopygium in Fig. 32-I. Ninth tergite with 8–10 long setae in the middle, and a pair of narrow conical processes on both sides of anal point. Anal point short, apically expanded and constricted in the middle (Figs. 32-I, F). Dorsal appendages short, broad and pad-like, highly pubescent, with a long seta on the lateral margin and 3 or 4 shorter setae on the ventral surface near inner margin (Fig. 32-H). Ventral appendages narrow and slender, with some 12 recurved setae arising from apical portion (Fig. 32-G). Gonococite long, slender and widest at about middle, with 5 long setae along the inner margin (Fig. 32-I).

Female. Coloration as in male, excepting that abdominal tergites are all dark brown and with a faint pale band along the posterior margin. Antenna 6 segmented, segments II to IV with a neck, V semiglobular and without neck; last segment with 4 long terminal setae (Fig. 32-J). Cercus 110 microns wide and 80 microns long, with rounded posterior margin (Fig. 32-L). Spermathecae small, semiglobular, about 50 microns long and 40 microns in diameter (Fig. 32-K).

Discussion. This species is a typical member of subgenus *Tripodura* of Townes (1945), since ninth tergite of male has a pair of prominent processes flanking base of anal point, dorsal appendages are pad-like, pubescent, and with long setae, and R 1 and R 2+3 of wing are separated from each other. Among the known species of this group, it is similar in body coloration and wing marks to *Polypedilum unifascium* (Tokunaga), which was recovered also in large numbers from the same river in the upper parts, but the present species is much larger in body and wing length, and the value of AR is quite different (1.26 in average in the present species, 0.58 in *unifascium*); the shape of anal point and the structure of dorsal appendages are also quite different between the two species. The present species was collected only at the present survey and from Station F, under Hino Bridge, where the river is highly polluted with sewage water.

(59) *Stictochironomus tamamontuki*, sp. nov.

Materials studied: 22 males and 16 females emerged from samples collected at Station D, under Yoroi Bridge; 13 males and 10 females among them were mounted (No. A 74:61–74). A male emerged from a sample from Station F, Hino Bridge (No. A 74:77).

Male. Relatively large species with body coloration largely black, legs with conspicuous ring marks. Antennal shaft and hairs dark brown, ground color of scutum black but pruinose with silvery white dusts, stripes black, scutellum dark brown, postnotum black; halteres yellow; wing with a small but conspicuous dark spots around r-m, vein r-m and R dark brown, other parts of wing membrane colorless; leg segments with conspicuous black and white rings (Fig. 32-M); all femora largely black and with a narrow

subapical ring; tibiae with a proximal, middle and apical dark rings and two pale rings between them; tarsi I, II and III each with an apical dark ring, the basal portion more or less paler; tarsi IV and V entirely dark brown; abdominal tergites I to VI largely black and each with a white band along the posterior margin, VIII and hypopygium dark brown or black.

Standard measurement data in Table 2-F of the previous paper. Antenna composed of 13 flagellar segments, AR 1.43–1.83 (1.67 in average), antennal hairs long, AHR 0.48–0.61. The value of ER relatively large as a member of Chironomini, 0.36 in the average. Frontal tubercles absent. Lateral pronotal setae absent. Wing with a small but conspicuous dark spot around cross vein r-m. R 2+3 separated from both R 1 and R 4+5, ending nearly midway between ends of the latter two veins. fCu slightly proximal to r-m (this character is quite different from most members of *Polypedilum*, in which the former is much beyond r-m). Vein An well developed, extending far beyond fCu and almost reaching to wing margin. Leg coloration characteristic to this species, as previously described. Front tarsus I only slightly longer than front tibia, LR1 1.05–1.21 (1.16 in average). Front tibia with rounded apical scale, and two long subapical seta (Fig. 33-E). Terminal comb scales of middle and hind tibiae are fused with each other, and with only one short spur (Fig. 33-F). Tarsi without long beards. Pulvilli well developed (Fig. 33-G). Scutum with a dorsal tubercle in the middle (Fig. 33-D).

Hypopygium in Fig. 33-H. Ninth tergite with 3–5 long and stout setae in the middle, posterior margin rounded; bands of ninth tergite separated in the middle. Anal point long, slender and parallel-sided, with rounded apex. Dorsal appendages composed of a relatively narrow and setigerous base, and a horn with strongly curved apex, bearing a long lateral seta arising near the apex (Fig. 33-I). Ventral appendages long and slender, bear a relatively short and curved apical seta, and some 28 recurved setae arising from almost the entire length of the shaft (Fig. 33-J). Gonocoxite roughly conical, longer than gonostylus and widest near base, tapering towards apex but with rounded end. Gonostylus with a convex lateral margin and a slightly concave inner margin, with a small apical hook and 6 short setae along the inner margin.

Female. Coloration same as in male and characteristic to this species. Head in Fig. 33-A. Frontal tubercles absent. Antenna 6 segmented (including pedicel), pedicel entirely dark; first flagellar segment long and with double rows of antennal hairs; segments II to IV with a long neck, dark in the middle expanded portion and pale at both ends; last segment entirely dark and with two long subterminal setae. Scutum with a dorsal tubercle. Wing with a dark spot around cross vein r-m. Legs with conspicuous pale rings, as in male. Spermathecae in Fig. 33-B. Cercus with a long ventral process (Fig. 33-C).

Discussion. This species is a typical member of genus *Stictochironomus*, since male antenna is composed of 13 flagellar segments, frontal tubercles absent, antepronotum reduced in the middle, terminal combs of middle and hind tibiae are fused and with only one spur, squama fringed, scutum with a dorsal tubercle, and wing has a conspicuous dark mark. Among the known species of this genus, the present species is most closely related to *S. sticticus* (Fabricius) or *Chironomus histrio* (Fabricius) of Edwards (1929) in the structure of male hypopygium, and coloration of legs and wings. According to Edwards (1929, p.401) and Goetghebuer (1937, p.55), however, tibiae of front and middle legs in *histrio* (a synonym of *sticticus* according to Pinder, 1978) are whitish with both ends black, and only hind tibia has a middle dark ring, while in the present new species all tibiae have a middle dark ring in addition to dark rings at

both ends. According to the latter author, *histrio* has long beards on front tarsus I, while the beards are short in the present species. Apical long seta of ventral appendage is absent in the members of European *Stictochironomus* according to Edwards (1929). The present species is also similar in structure of male hypopygium and coloration to *Chironomus (Stictochironomus) akizukii* Tokunaga, which was collected by the original author from Sakhalin, Tokyo, Wakayama and Fukuoka, and by the present author from Yunoko and Chuzenji Lakes of Nikko National Park, but both species differ remarkably in the values of AR and LR (about 2.5 and 1.4 respectively in *akizukii* according to Tokunaga, 1940, 1.67 and 1.16 in averages in the present species).

According to a recent review by Yamamoto (1980), 5 species of genus *Stictochironomus* are found from Japan, *pictulus* (Meigen), *histrio* (Fabricius), *akizukii* (Tokunaga), *multannulatus* (Tokunaga), and an undescribed species. Morphology of the present species apparently does not fit to any of these species.

Summary

A survey of chironomids breeding in the main stream of the River Tama was conducted in March 1981. Bottom samples were collected from the 10 stations same as in the previous survey conducted in June 1980, and were cultured in the laboratory with the same method. As the result, a total of 18 species of subfamily Chironominae, 8 species of Orthocladiinae and 4 species of Tanypodinae were recovered and identified by examination of adult midges. The distribution of these species was again shown to be highly correlated with the degree of pollution of the river with sewage waters. Of the total of 30 species, 26 were the same as those recorded from the main stream or Minamiasakawa River at the previous surveys, but 4 species were newly discovered.

Table 4. Numbers of adult chironomids (males/females) emerged from samples collected at 10 stations (from A to J) along the mainstream of the River Tama in March 1982.

Chironomus yoshimatsui	F(32/19) G(4/5) H(3/1) I(26/26)
Chironomus circumdatus	D(0/1)
Chironomus kiiensis	D(1/0) F(1/1)
**Cryptochironomus tamayoroi*	D(5/2)
**Cryptochironomus* sp. *"hentona"*	F(7/4)
Paratendipes tamayubai	E(1/0)
**Stictochironomus tamamontuki*	D(22/16)
Pentapedilum tamahamurai	E(1/0)
**Polypedilum tamahinoense*	F(55/99)
Polypedilum tsukubaense	A(1/0)
Polypedilum tamaharaki	A(2/0) B(0/1) C(9/2) E(1/0)
Polypedilum tamanigrum	C(16/9) D(7/5)
Polypedilum tamagohanum	B(1/13) C(12/19) D(10/9)
Polypedilum asakawaense	C(2/0) D(4/1) F(37/55) H(1/0)
Polypedilum tamagoryoense	F(1/0)
Polypedilum ureshinoense	F(9/6)
Tanytarsus tamaundecimus	D(7/16) F(7/10)
Brillia japonica	A(2/4) C(7/5)
Orthocladius tamanitidus	C(1/1)
Orthocladius tamaputridus	E(1/0)
Paratrichocladius rufiventris	F(2/7)
Cricotopus triannulatus	I(1/0)
Eukiefferiella sp.	C(1/0)
Parakiefferiella tamatriangulatus	C(1/1)
Metriocnemus tamaokui	C(1/1)

(* new species described in the present paper)

EXPLANATION OF FIGURES

Fig. 30 ***Cryptochironomus tamayoroi,*** **sp. nov.**

A. head, male. **B.** frontal tubercles, male. **C.** tip of front tibia, male. **D.** tip of hind tibia, male. **E.** male hypopygium, dorsal view. **F.** inner margin of gonocoxite and anal point, ventral view. **G.** left dorsal appendage (da) and ventral appendage (va), dorsal view. **H.** dorsal appendage, dorsal view, and contour of ventral appendage. **I.** ventral appendage, and contour of dorsal appendage. **J.** female antenna. **K.** frontal tubercles, female. **L.** spermathecae. **M.** cercus.

Fig. 31 ***Cryptochironomus*** **sp.** ***"hentona"***

A. female antenna. **B.** frontal tubercles, female. **C.** spermathecae. **D.** cercus. **E.** frontal tubercles, male. **F.** tip of front tibia, male. **G.** hypopygium, dorsal view and internal skeleton. **H, H'.** two examples of variation in structure of ventral appendages. **I, I'.** two examples of variation in structure of dorsal appendages, with contour of ventral appendage. **J.** inner margin of gonocoxite, and ventral view of anal point.

Fig. 32 **A.** ***Cryptochironomus*** **sp.** ***"hentona",*** tip of hind tibia, showing both combs with a long spur. **B-L.**

B-J. ***Polypedilum tamahinoense,*** **sp. nov.**

B. head, male. **C.** wing, male. **D.** tip of front tibia. **E.** tip of hind tibia, showing one comb with a long spur, the other comb without spur. **F.** anal point, lateral view. **G.** ventral appendage, dorsal view. **H.** dorsal appendage, dorsal view. **I.** male hypopygium, dorsal view. **J.** female antenna. **K.** spermathecae. **L.** cercus.

M. ***Stictochironomus tamamontuki,*** **sp. nov.**, pale and dark rings of legs 1, 2 and 3.

Fig. 33 ***Stictochironomus tamamontuki,*** **sp. nov.**

A. head, female. **B.** spermathecae. **C.** cercus. **D.** scutum and scutellum, dorsal view, male. **E.** tip of front tibia, male. **F.** tip of hind tibia, male. **G.** hind tarsus V, male. **H.** male hypopygium. **I.** dorsal appendage. **J.** ventral appendage.

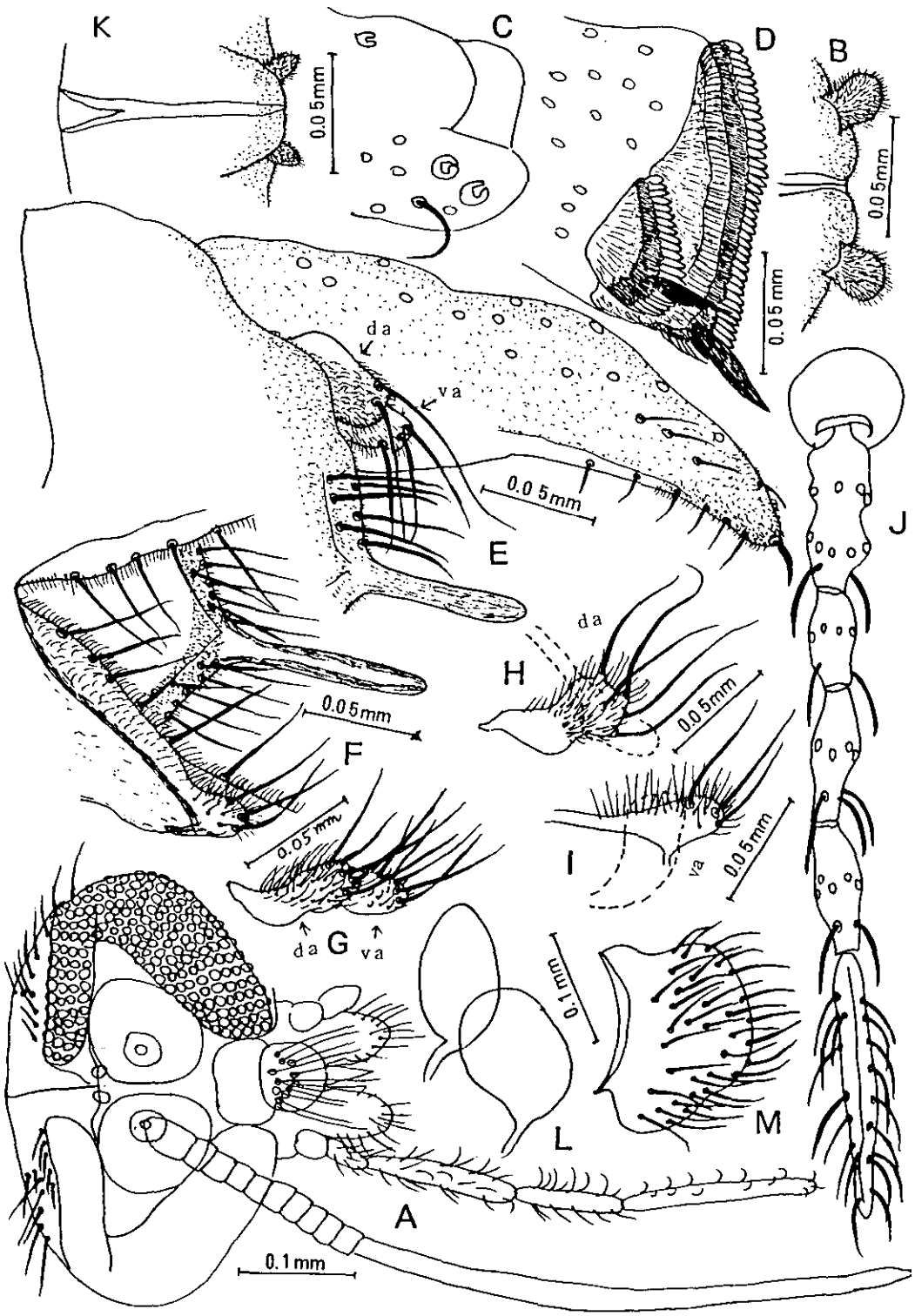


Fig. 30 ***Cryptochironomus tamayoroi*, sp. nov.**

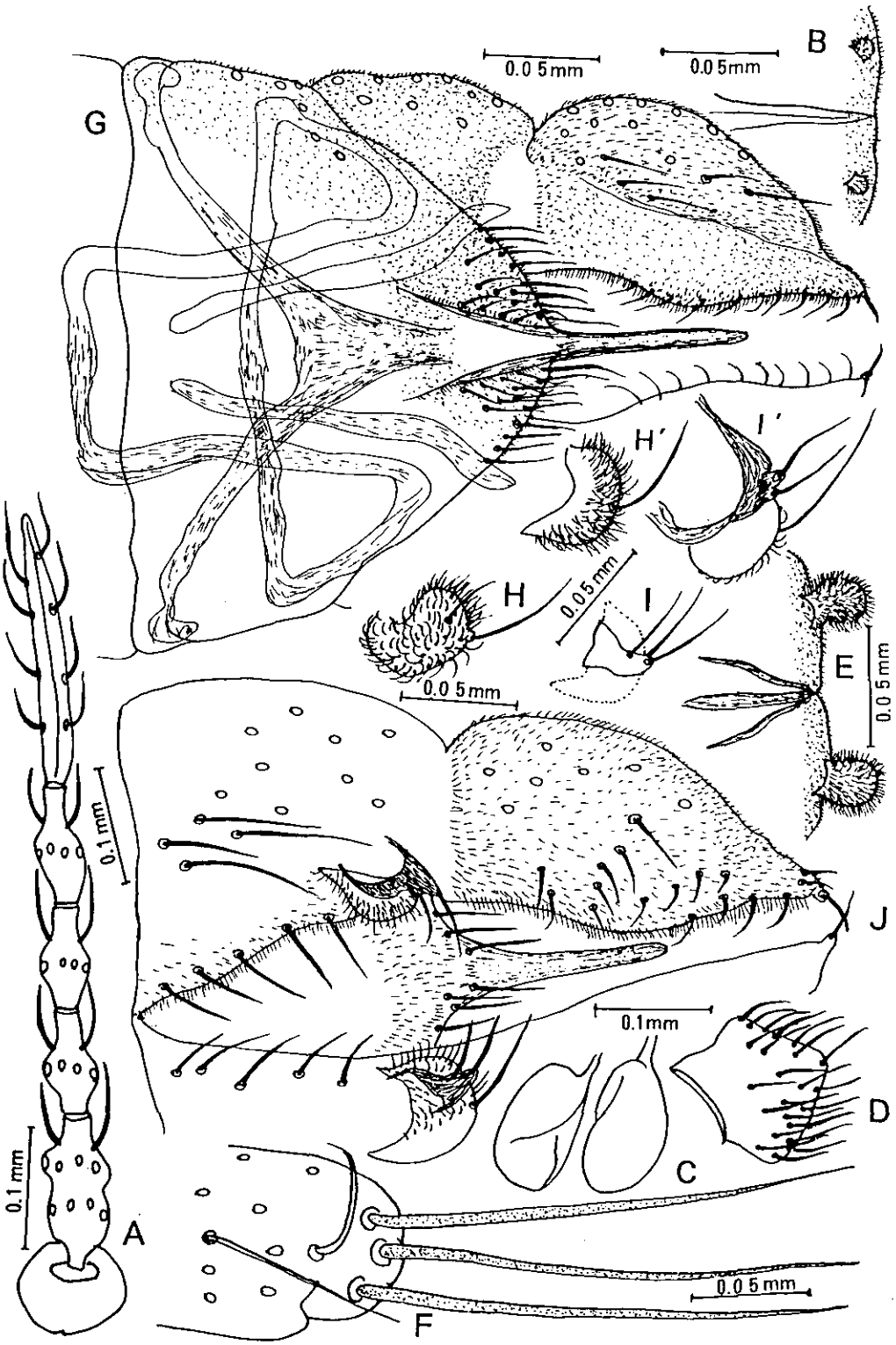


Fig. 31 *Cryptochironomus* sp. *"hentona"*

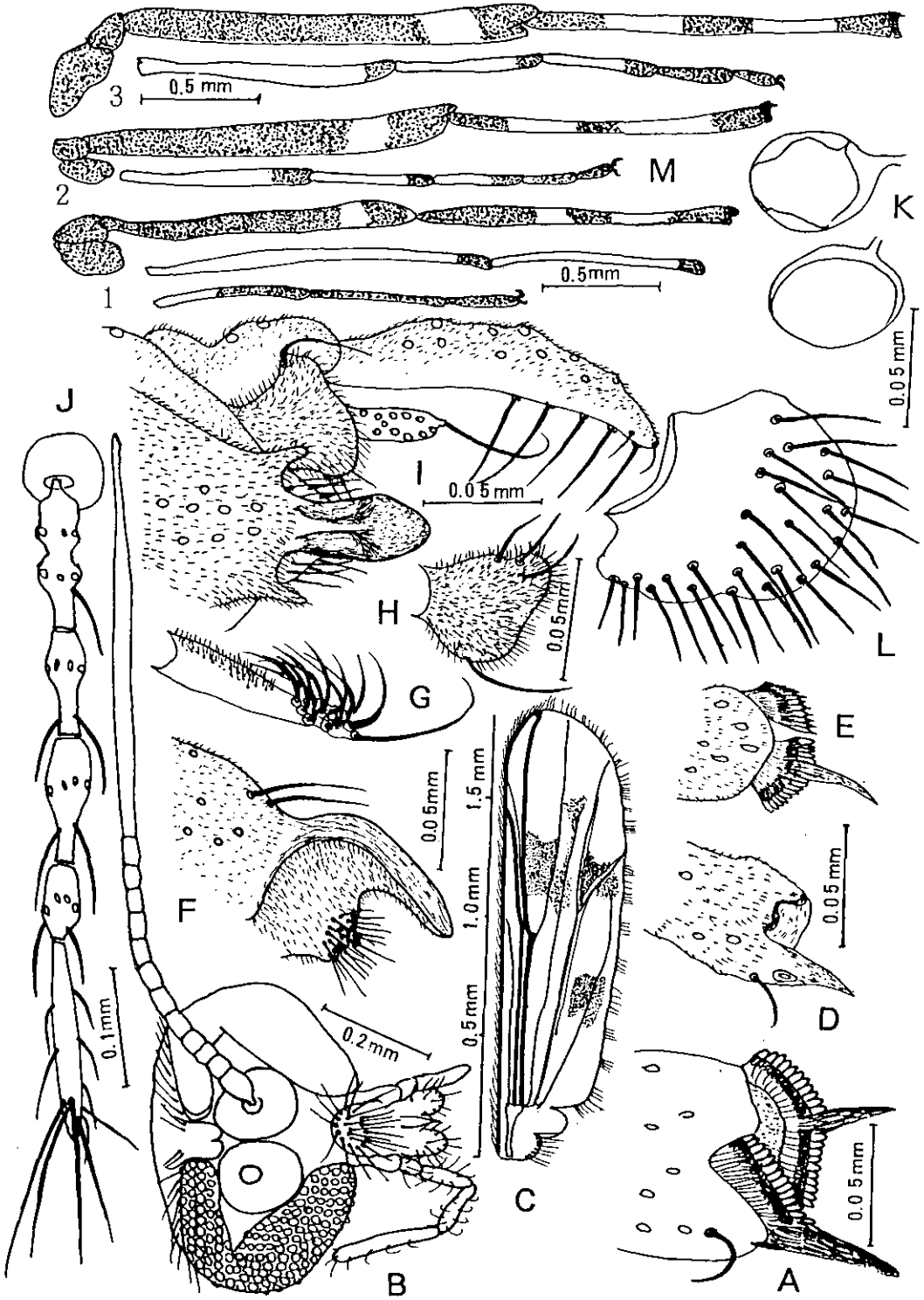


Fig. 32 A. *Cryptochironomus* sp. *"hentona"*
B–J. *Polypedilum tamahinoense*, sp. nov.
M. *Stictochironomus tamamontuki*, sp. nov.

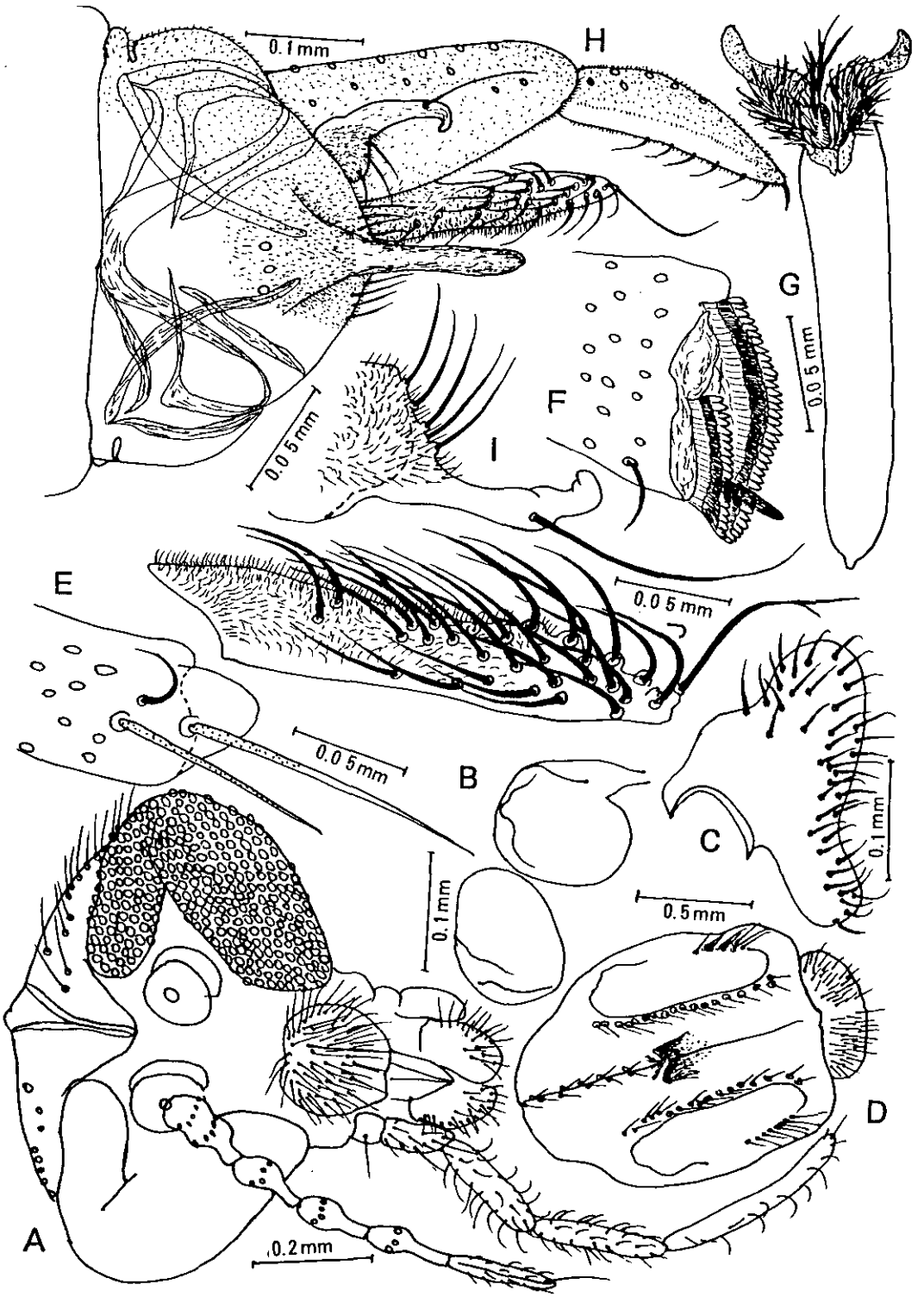


Fig. 33 *Stictochironomus tamamontuki*, sp. nov.

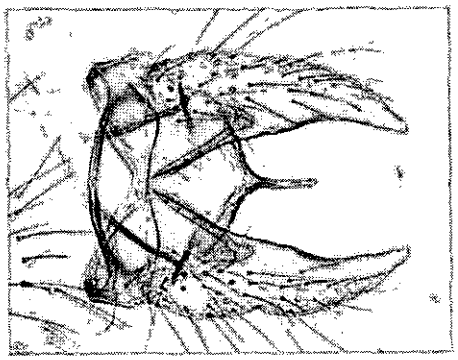
EXPLANATION OF PLATES

Plate VI

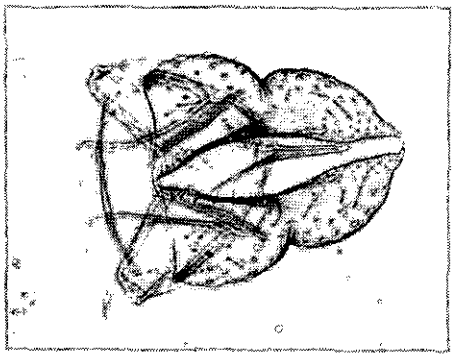
Abdominal tergites of *Cricotopus*

29.	*Cryptochironomus tamayoroi*, sp. nov.	#56, male hypopygium
30.	*Cryptochironomus*, sp. *"hentona"*	#57, do
31.	*Polypedilum tamahinoense*, sp. nov.	#58, do
32.	*Stictochironomus tamamontuki*, sp. nov.	#59, do
33.	*Polypedilum tamahinoense*, sp. nov.	#58, male wing
34.	*Stictochironomus tamamontuki*, sp. nov.	#59, do

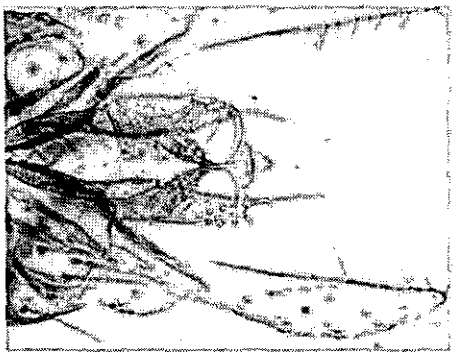
Plate VI.



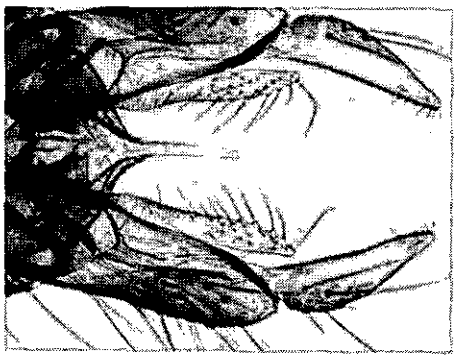
29. *Cryptochironomus tamayoroi*, sp. nov. male hypopygium



30. *Cryptochironomus* sp. *"hentona"* male hypopygium



31. *Polypedilum tamahinoense*, sp. nov. male hypopygium



32. *Stictochironomus tamamontuki*, sp. nov. male hypopygium

33. *Polypedilum tamahinoense*, sp. nov. male wing

34. *Stictochironomus tamamontuki*, sp. nov. male wing

多摩川に発生するユスリカ類の研究
第７報　多摩本流より３月に採集されたユスリカ科の各種について

佐々　学・一盛和世

多摩川の本流ぞいにさきに1980年6月に採集したと同じ11か所の川底から砂，泥，石，水藻などユスリカ幼虫の生息する試料を集め，研究室内で飼育して幼虫を羽化させて標本とした。その結果，ユスリカ亜科18種，エリユスリカ亜科８種，モンユスリカ亜科４種が同定された。それらのうち，Chironomini 族の４種に未記録の新種がふくまれていたのでここに記載した。あとの26種はすでに本流ないし支流から記録したものと同じであった。これら各種の分布は川の下水による汚染度ときわめて特異的な関連がみられた。

REFERENCES

Bause, E. (1913): Die Metamorphose der Gattung *Tanytarsus* und einige verwandter Tendipedidenarten. Ein Beitrag zur Systematik der Tendipediden. *Arch. Hydrobiol.* Suppl. 2: 1-126. Taf. XII.

Brundin, L. (1956): Zur Systematik der Orthocladiinae. *Rep. Inst. Freshwat. Res. Drottningholm,* 37: 1-185.

Edwards, F.W. (1929): British non-biting midges (Diptera, Chironomidae). *Trans. R. Ent. Soc. Lond.* 77: 279-429.

Fittkau, E.J., Reiss, F., & Hoffrichter, O. (1976): A bibliography of the Chironomidae. *Gunneria,* 26: 5-177.

Forthys, D.J. (1971): Some New Jealand Chironomidae (Diptera). J. R. Soc. New Zealand, 1: 113-144.

Freeman, P. (1956): A study of the Chironomidae (Diptera) of Africa south of the Sahara. Part II. *Bull. Brit. Mus. (Nat. Hist.) Ent.,* 4: 287-368.

Freeman, P. (1957): A study of Chironomidae (Diptera) of Africa South of the Sahara. III. *Bull. Brit. Mus. (Nat. Hist.) Ent.,* 5: 323-426.

Freeman, P. (1959): A study of the New Zealand Chironomidae (Diptera, Nematocera). *Bull. Brit. Mus. (Nat. Hist.) Ent.,* 7: 395-437.

Freeman, P. (1961): The Chironomidae (Diptera) of Australia. *Aust. J. Zool.,* 9: 611-737.

Goetghebuer, M. (1937): A. Die Imagines: Subfamilie Tendipedidae (Chironomidae), in E. Lindner, *Die Fliegen der Palaearktischen Region,* 13c: 1-138.

Goetghebuer, M. (1940): do, 13g: Subfamilie Orthocladiinae, 1-208.

Hashimoto, H. (1977a): *The Chironomus of Japan. *Iden,* 31 (4): 78-84.

Hashimoto, H. (1977b): *"Akamusi" (Chironomus larva) of Japan. *Iden,* 31 (10): 76-81.

Hirvenija, M. (1973): Revision der Gattung *Cricotopus* ven der Wulp und ihrer Verwandten (Diptera, Chironomidae). *Ann. Zool. Fennici.* 10: 1-363.

Johannsen, O.A. (1932): Chironominae of the Malayan subregion of the Dutch East Indies. *Arch. Hydrobiol. Suppl.,* 11: 503-552.

Johannsen, O.A. (1937): Aquatic Diptera. IV. Chironomidae: Subfamily Chironominae. *Mem. Cornell. Univ. Agr. Exp. Stn.,* 210: 3-56.

Kieffer, J.J. (1912): Tendipedidae. In 'Formosa Ausbeute'. Supplta ent. 1: 27-43.

Kieffer, J.J. (1916): Tendipedides (Chironomides) de Formose *conservés* au Muséum National Hongrois de Budapest et detérminés par J.J. Kieffer. *Ann. hist. nat. Mus. nat. hung.* 14: 81-121.

Kieffer, J.J. (1921): Chironomides des Philippines et de Formose. *Philip. J. Sci.,* 18: 557-593.

Kieffer, J.J. (1924): Chironomides non piqueurs de Java. *Ann. Soc. Sci. Brux.,* 43: 262-270.

Lehmann, J. (1970): Revision der europaischen Arten (Imagines und Puppen) der Gattung *Rheotanytarsus* Bause (Diptera, Chironomidae). *Zoologische Anzeiger* 185: 348-381.

Lehmann, J. (1972): Revision der europaischen Arten (Puppen ♂♂ und Imagines ♂♂) der Gattung *Eukiefferiella* Thienemann. *Beitr. Ent.* 22: 347-405.

Lehmann, J. (1971): Die Chironomiden der Fulda. Systematische, Ökologische und faunistische Untersuchungen. *Arch. Hydrobiol.* 66 (3): 348-381.

Lehmann, J. (1979): Chironomidae (Diptera) aus Fliessgewässer Zentralafrikas (Systematik, Ökologie, Verbreitung und Produktionsbiologie). Teil I: Kivu-Gebiet, Ostzaire. *Spixiana (Zeit, Zool.,* München), Suppl. 3-144.

Lenz, F. (1937): B. Die Metamorphose der Tendipedidae. In E. Lindner, *Die Fliegen der Palaearktischen Region,* 13c: 139-260.

Lenz, F. (1937): Chironomariae aus Niederländisch-Indien. Larven und Puppen. *Arch. Hydrobiol.* Suppl. XV. Tropische Binnengewässer, Bd. VII: 1-29.

Martin, J., & J.E. Sublette (1972): A review of the genus *Chironomus* (Diptera, Chironomidae). III. *Chironomus yoshimatsui,* a new species from Japan. *Stud. Nat. Sci.* (Eastern New Mexico Univ.) 1 (3): 1-58.

Pinder, L.C.V. (1976): Morphology of the adult and juvenile stages of *Microtendipes rydalensis* (Edw.) comb. nov. (Diptera, Chironomidae). *Hydrobiologia* 48: 179-184.

Pinder, L.C.V. (1978): A key to adult males of British Chironomidae. 1: 1-169; 2: Fig. 77-184, *Freshwater Biological Assoc. Publ.* No. 37, Windermere Laboratory, The Ferry House, Ambleside, Cambria, LA22 0LP, England.

Potthast, A. (1915): Ueber die Metamorphose der *Orthocladius*-Gruppe. Ein Beitrag zur Kenntnis der Chironomiden. *Arch. Hydrobiol.* Suppl. 2: 243-376.

Ree, H.I. (1981): Studies on Korean Chironomidae (Diptera). 2. Description of a new genus and a new species of Chironominae. *Korean J. Zool.,* 24: 217-220.

Ree, H.I. and H.S. Kim (1981): Studies on Chironomidae (Diptera) in Korea. 1. Taxonomical study on adults of Chironomidae. *Proc. Coll. Nat. Sci. Seoul Nat. Univ.,* 6: 123-226.

Reiss, F. (1965): *Micropsectra praecox* Meig, und *Micropsectra contracta* n. sp. (Diptera: Chironomidae). Chironomidenstudien III. *Arch. Hydrobiol.* 61: 228-241.

Reiss, F. (1969): Revision der Gattung *Micropsectra* Kieff., 1909 (Diptera, Chironomidae). I. Die *attenuata*-Gruppe der Gattung *Micropsectra.* Beschreibung 5 neuer Arten aus Mitteleuropa und Nordafrika. *Deutsch. Entom. Zeit.* 16: 431-449.

Reiss, F. (1974): Revision des Typen-Materials einiger *Tanytarsus*-Arten (Chironomidae, Diptera) aus dem Museum Brüssel. *Ent. Tidskr.* 95: (Suppl.) 203-211.

Reiss, F., & Fittkau, E.J. (1971): Taxonomie und Ökologie europäisch verbreiteter *Tanytarsus*-Arten (Chironomidae, Diptera). *Arch. Hydrobiol.* Suppl. 40: 75-200.

Ringe, F. (1974): Chironomiden-Emergenz 1970 in Breitenbach und Rohrwiesenbach. Schlitzer produktionsbiologische Studien (10). *Arch. Hydrobiol.* Suppl. 45: 212-304.

Roback, S.S. (1957): The immature tendipedids of the Philadelphia area (Diptera Tendipedidae). *Monographs Acad. Nat. Sci. Phila.* 9: 1-152.

Saether, O.A. (1969): Some Nearctic Podonominae, Diamesinae, and Orthocladiinae. *Bull. Fish. Res. Board Canada,* No. 170: 1-154.

Saether, O.A. (1971): Notes on general morphology and terminology of the Chirnomidae (Diptera). *Can. Ent.* 103: 1237-60.

Saether, O.A. (1977): Female genitalia in Chironomidae and other Nematocera: morphology, phylogenies, keys. *Bull. Fish. Res. Board Canada.* 197: 1-210.

Saether, O.A. (1977b): Taxonomic studies on Chironomidae: *Nonocladius, Pseudochironomus,* and the *Harnischia* complex. *Bull. Fish. Res. Board Canada.* 196: 1-143.

Sasa, M. (1978): A comparative study of adults and immature stages of nine Japanese species of the genus *Chironomus* (Diptera, Chironomidae). *Res. Rep. Nat. Inst. Environ. Stud.*, No. 3: 1-63.

Sasa, M. (1979a): Taxonomic accounts on the so-called *Chironomus dorsalis* complex of Japan. *Jap. J. Sanit. Zool.*, 30: 187-192.

Sasa, M. (1979b): A morphological study of adults and immature stages of 20 Japanese species of the family Chironomidae (Diptera). *Res. Rep. Nat. Inst. Environ. Stud.*, No. 7: 1-148.

Sasa, M. (1980): Studies on chironomid midges of the Tama River. Pt. 2. Description of 20 species of Chironominae recovered from a tributary. *Res. Rep. Nat. Inst. Environ. Stud.*, No. 13: 9-107.

Sasa, M. (1981a): Studies on chironomid midges of the Tama River. Pt. 3. Species of the subfamily Orthocladiinae recorded at the summer survey and their distribution in relation to the pollution with sewage waters. Pt. 4. Chironomidae recovered at a winter survey. *Res. Rep. Nat. Inst. Environ. Stud.*, No. 29: 1-78.

Sasa, M. (1981b): Studies on chironomid midges of the Tama River. Pt. 4. Chironomidae recorded at a winter survey. *Res. Rep. Nat. Inst. Environ. Stud.*, No. 29: 79-148.

Sasa, M. & H. Hasegawa (1983): Chironomid midges of the tribe Chironomini recovered from sewage ditches, eutrophicated ponds and clean streams of the Ryukyu Islands, southern Japan. *Jap. J. Sanit. Zool.* (in press)

Sasa, M. & Sublette, J.E. (1979): Synonymy, distribution and morphological notes on *Polypedilum nubifer* (Skuse). (Diptera: Chironomidae) *Jap. J. Sanitary Zool.* (Eisei Dobutsu) 31: 93-102.

Sasa, M. & Y. Yamamoto (1977): A checklist of Chironomidae recorded from Japan. *Jap. J. Sanit. Zool.*, 28: 301-318.

Sasa, M., M. Yasuno, M. Ito & T. Kikuchi (1980): Studies on chironomid midges of the Tama River. Pt. 1. The distribution of chironomid species in a tributary in relation to the degree of pollution with sewage water. *Res. Rep. Nat. Inst. Environ. Stud.*, No. 13: 1-8.

Sawedal, L. (1976): Revision of the *notescens*-group of the genus *Micropsectra* Kieffer, 1909, *Ent. scand.* 7: 109-144.

Sublette, J.E. & Sublette, M.F. (1973): Family Chironomidae. In Delfinado, M.D. & Hardy, D.E. (ed.), "A Catalogue of Diptera of the Oriental Region", pp. 389-422 (University Press of Hawaii).

Thienemann, A. (1936): Chironomiden-Metamorphosen. XI. Die Gattung *Eukiefferiella.* Stettines Entomol. Ztg. 97: 43-65.

Thienemann, A. (1944): Bestimmungstabellen für die bis jetzt bekannten Larven und Puppen der Orthocladiinen. *Arch. Hydrobiol.* 39: 551-664.

Tokunaga, M. (1936): Japanese *Cricotopus* and *Corynoneura* species (Chironomidae, Diptera). Tenthredo 1: 9-52.

Tokunaga, M. (1937): *Nihon Dobutsu Bunrui (Fauna Nipponica). Vol. 10, Fasc. 7, No. 1. Family Chironomidae, 1: 1-110 (in Japanese).

Tokunaga, M. (1938): Chironomidae from Japan. X. New or little known midges, with descriptions of the metamorphoses of several species. *Philipp. J. Sci.*, 65: 318-383.

Tokunaga, M. (1939): Chironomidae from Japan. XI. New or little known midges, with special references to the metamorphoses of torrential species. *Philipp. J. Sci.*, 69: 297-345.

Tokunaga, M. (1940): Chironomidae from Japan. XII. New or little known Ceratopogonidae and Chironomidae. *Philipp. J. Sci.*, 72: 255-317.

Tokunaga, M. (1950): *Chironomidae. In *Nihon Konchu Zukan*, Descriptions of adults of 15 species, pp. 1560-1565, *Hokuryukan*, Tokyo.

Tokunaga, M. (1959, 1973): *Chironomidae. In *Nihon Yochu Zukan*, Descriptions of 18 species of chironomid larvae. pp. 637-64, *Hokuryukan*, Tokyo.

Tokunaga, M. (1964a): A snow midge from Japan. *Akitu*, 11: 20-22.

Tokunaga, M. (1964b): Supplementary notes on Japanese Orthocladiinae midges. *Akitu*, 12: 17-20.

Tokunaga, M. (1964c): Three Japanese snow midges. *Akitu*, 12: 20-22.

Tokunaga, M. (1964d): Diptera, Chironomidae. In *Insects of Micronesia* 12 (5): 485-628 (Bishop Museum, Honolulu).

Tokunaga, M. (1965a): A new snow midge from Japan. *Kontyu*, 33 (1): 42-45.

Tokunaga, M. (1965b): Chironomids as winter bait of overwintering swallow. *Akitu*, 12: 39-41.

Towns, H.K. Jr. (1945): The Nearctic species of Tendipedini. [Diptera, Tendipedidae (=Chironomidae)] *Amer. Midl. Nat.* 34: 1-206.

Yamamoto, M. (1980): Systematic study on the genus *Stictochironomus* from Japan (Diptera, Chironomidae). XVI. Intern. Congr. Entomol. Abstract (Kyoto), p.24.

Zavrel, J. (1934): Tanytarsuslarven und -puppen aus Niederdändisch-Indien. *Arch. Hydrobiol.* Suppl. 13: 139-165.

Zavrel, J. (1939): Chironomidarum Larvae et Nymphae II. Genus *Eukiefferiella* Th. *Acta Soc. Sci. Nat. Moravo-Silesiacae* II: 3-39.

Note: References with * are described only in Japanese, and the titles were translated into English by the present author.

List of Publications

Studies on Chironomidae of Japan

Part 1 Sasa, M. and Y. Yamamoto (1977): A checklist of Chironomidae recorded from Japan. Jpn. Sanit. Zool. (Eisei Dobutsu), **28**, 301–318.

Part 2 Sasa, M. (1978): Taxonomical and biological notes on *Tokunagayusurika akamusi* (Tokunaga), with description of immature stages (Diptera, Chironomidae). Jpn. J. Sanit. Zool. (Eisei Dobutsu), **29**, 93–101.

Part 3 Sasa, M. (1978): A comparative study of adults and immature stages of nine Japanese species of the genus *Chironomus* (Diptera, Chironomidae). Res. Rep. Natl. Inst. Environ. Stud., No. 3, 1–63.

Part 4 Sasa, M. (1979): Taxonomic accounts on the so-called *Chirnomus dorsalis* complex of Japan (Diptera, Chironomidae), Jpn. J. Sanit. Zool. (Eisei Dobutsu), **30**, 187–192.

Part 5 Sasa, M. (1979): A morphological study of adults and immature stages of 20 Japanese species of the family Chironomidae (Diptera). Res. Rep. Natl. Inst. Environ. Stud., No. 7, 1–148.

Part 6 Sasa, M. and J. E. Sublette (1980): Synonymy, distribution, and morphological notes on *Polypedilum* (s. s.) *nubifer* (Skuse) (Diptera: Chironomidae). Jpn. J. Sanit. Zool. (Eisei Dobutsu), **31**, 93–102.

Part 7 Sasa, M., M. Yasuno, M. Ito and T. Kikuchi (1980): Studies on chironomid midges of the Tama River. Part 1. The distribution of chironomid species in a tributary in relation to the degree of pollution with sewage water. Res. Rep. Natl. Inst. Environ. Stud., No. 13, 1–8.

Part 8 Sasa, M. (1980): Studies on chironomid midges of the Tama River. Part 2. Description of 20 species of Chironominae recovered from a tributary. Res. Rep. Natl. Inst. Environ. Stud., No. 13, 9–107.

Part 9 Sasa, M. (1981): Studies on chironomid midges of the Tama River. Part 3. Species of the subfamily Orthocladiinae recorded at the summer survey and their distribution in relation to the pollution with sewage waters. Res. Rep. Natl. Inst. Environ. Stud., No. 29, 1–77.

Part 10 Sasa, M. (1981): Studies on chironomid midges of the Tama River. Part 4. Chironomidae recorded at a winter survey. Res. Rep. Natl. Inst. Environ. Stud., No. 29, 79–148.

Part 11 Sasa, M. (1983): Studies on chironomid midges of the Tama River. Part 5. An observation on the distribution of Chironominae along the main stream in June, with description of 15 new species. Res. Rep. Natl. Inst. Environ. Stud., No. 43, 1–67.

Part 12 Sasa, M. (1983): Studies on chironomid midges of the Tama River. Part 6. Description of species of the subfamily Orthocladiinae recovered from the main stream in the June survey. Res. Rep. Natl. Inst. Environ. Stud., No. 43, 69–99.

Part 13 Sasa, M. and K. Ichimori (1983): Studies on chironomid midges of the Tama River. Part 7. Additional species collected in winter from the main stream. Res. Rep. Natl. Inst. Environ. Stud., No. 43, 101–122.

Report of Special Research Project the National Institute for Environmental Studies

No. 1* Man activity and aquatic environment – with special references to Lake Kasumigaura – Progress report in 1966. (1977)

No. 2* Studies on evaluation and amelioration of air pollution by plants – Progress report in 1976-1977. (1978)

[Staring with Report No. 3, the new title for NIES Report was changed to:]

Research Report from the National Institute for Environmental Studies

No. 3 A comparative study of adults and immature stages of nine Japanese species of the genus *Chironomus* (Diptera, Chironomidae). (1978)

No. 4* Smog chamber studies on photochemical reactions of hydrocarbon-nitrogen oxides system – Progress report in 1977. (1978)

No. 5* Studies on the photooxidation products of the alkylbenzene-nitrogen oxides system, and on their effects on Cultured Cells – Research report in 1976-1977. (1978)

No. 6* Man activity and aquatic environment – with special references to Lake Kasumigaura – Progress report in 1977-1978. (1979)

No. 7 A morphological study of adults and immature stages of 20 Japanese species of the family Chironomidae (Diptera). (1979)

No. 8* Studies on the biological effects of single and combined exposure of air pollutants – Research report in 1977-1978. (1979)

No. 9* Smog chamber studies on photochemical reactions of hydrocarbon-nitrogen oxides system – Progress report in 1978. (1979)

No.10* Studies on evaluation and amelioration of air pollution by plans – Progress report in 1976-1978. (1979)

No.11 Studies on the effects of air pollutants on plants and mechanisms of phytotoxicity. (1980)

No.12 Multielement analysis studies by flame and inductively coupled plasma spectroscopy utilizing computer-controlled instrumentation. (1980)

No.13 Studies on chironomid midges of the Tama River. (1980)
Part 1. The distribution of chironomid species in a tributary in relation to the degree of pollution with sewage water.
Part 2. Description of 20 species of Chironominae recovered from a tributary.

No.14* Studies on the effects of organic wastes on the soil ecosystem – Progress report in 1978-1979. (1980)

No.15* Studies on the biological effects of single and combined exposure of air pollutants – Research report in 1977-1978. (1980)

No.16* Remote measurement of air pollution by a mobile laser radar. (1980)

No.17* Influence of buoyancy on fluid motions and transport processes – Meteorological characteristics and atmospheric diffusion phenomena in the coastal region – Progress report in 1978-1979. (1980)

No.18 Preparation, analysis and certification of PEPPERBUSH standard reference material. (1980)

No.19* Comprehensive studies on the eutrophication of fresh-water areas – Lake current of Kasumigaura (Nishiura) – 1978-1979. (1981)

No.20* Comprehensive studies on the eutrophication of fresh-water areas – Geomorphological and hydrometeorological characteristics of Kasumigaura watershed as related to the lake environment – 1978-1979. (1981)

No.21* Comprehensive studies on the eutrophication of fresh-water areas – Variation of pollutant load by influent rivers to Lake Kasumigaura – 1978-1979. (1981)

No.22* Comprehensive studies on the eutrophication of fresh-water areas – Structure of ecosystem and standing crops in Lake Kasumigaura – 1978-1979. (1981)

No.23* Comprehensive studies on the eutrophication of fresh-water areas – Applicability of trophic state indices for lakes – 1978-1979. (1981)

No.24* Comprehensive studies on the eutrophication of fresh-water areas – Quantitative analysis of eutrophication effects on main utilization of lake water resources – 1978-1979. (1981)

No.25* Comprehensive studies on the eutrophication of fresh-water areas – Growth characteristics of Blue-Green-Algae, *microsystis* – 1978-1979. (1981)

No.26* Comprehensive studies on the eutrophication of fresh-water areas – Determination of argal growth potential by algal assay procedure – 1978-1979. (1981)

No.27* Comprehensive studies on the eutrophication of fresh-water areas – Summary of researches – 1978-1979. (1981)

No.28* Studies on effects of air pollutant mixtures on plants – Progress report in 1979-1980. (1981)

No.29 Studies on chironomid midges of the Tama River. (1981)
Part 3. Species of the subfamily Orthocladiinae recorded at the summer survey and their distribution in relation to the pollution with sewage waters.
Part 4. Chironomidae recorded at a winter survey.

No.30* Eutrophication and red tides in the coastal marine environment – Progress report in 1979-1980. (1982)

No.31* Studies on the biological effects of single and combined exposure of air pollutants – Research report in 1980. (1981)

No.32* Smog chamber studies on photochemical reactions of hydrocarbon-nitrogen oxides system – Progress report in 1979 – Research on the photochemical secondary pollutants formation mechanism in the environmental atmosphere (Part 1). (1982)

No.33* Meteorological characteristics and atmospheric diffusion phenomena in the coastal region – Simulation of atmospheric motions and diffusion processes – Progress report in 1980. (1982)

No.34* The development and evaluation of remote measurement methods for environmental pollution – Research report in 1980. (1982)

No.35* Comprehensive evaluation of environmental impacts of road and traffic. (1982)

No.36* Studies on the method for long term environmental monitoring – Progress report in 1980-1981. (1982)

No.37* Study on supporting technology for systems analysis of environmental policy. (1982)
– evaluation labolatory of Man-environment Systems.

No.38 Preparation, analysis and certification of POND SEDIMENT certified reference material. (1982)

No.39* The development and evaluation of remote measurement methods for environmental pollution – Research report in 1981. (1983)

No.40* Studies on the biological effects of single and combined exposure of air pollutants – Research report in 1981. (1983)

No.41* Statistical studies on methods of measurement and evaluation of chemical conditions of soil. (1983)

No.42* Studies on the characteristics of mud transportation. (1983)

No.43 Studies on chironomid midges of the Tama River. (1983)

Part 5. An observation on the distribution of Chironominae along the main stream in June, with description of 15 new species.

Part 6. Description of species of the subfamily Orthocladiinae recovered from the main stream in the June servey.

Part 7. Additional species collected in winter from the main stream.

* in japanese

RESEARCH REPORT FROM
THE NATIONAL INSTITUTE FOR ENVIRONMENTAL STUDIES

No. 43

国立公害研究所研究報告 第43号

(R—43—'83)

昭和58年3月30日発行

編 集 国立公害研究所編集委員会

発 行 環境庁 国立公害研究所

茨城県筑波郡谷田部町小野川16番2

印刷 フクダ工芸株式会社
東京都中央区新川1—3—3

Published by The National Institute for Environmental Studies
Yatabe-machi, Tsukuba, Ibaraki 305, Japan
March, 1983