

THE GENUS PLATYCHEIRUS LEPELETIER AND SERVILLE, 1828 (DIPTERA, SYRPHIDAE) OF JAPAN, WITH DESCRIPTIONS OF THREE NEW SPECIES

Ohara, Kenji

<https://doi.org/10.5109/2405>

出版情報 : ESAKIA. 15, pp.97-142, 1980-10-31. Entomological Laboratory, Faculty of Agriculture,
Kyushu University

バージョン :

権利関係 :



**THE GENUS *PLATYCHEIRUS* LEPELETIER AND SERVILLE,
1828 (DIPTERA, SYRPHIDAE) OF JAPAN, WITH
DESCRIPTIONS OF THREE NEW SPECIES***

KENJI ÔHARA

Entomological Laboratory, Faculty of Agriculture
Kyushu University, Fukuoka 812, Japan

Abstract

Japanese species of the genus *Platycheirus* Lepeletier and Serville, 11 species in all, are treated. Three new species, *P. subcomplicatus*, *P. pennipes* and *P. immaculatus* are described and figured. *P. peltatus*, *P. complicatus*, *P. clypeatus*, *P. perpallidus* and *P. dux* are recorded from Japan for the first time.

The genus *Platycheirus* Lepeletier and Serville belongs to the tribe Melanostomatini of the subfamily Syrphinae. Males of most species of this genus are easily distinguished from those of the allied genera by the characteristically dilated front legs and ornamental hairs of legs. At present this genus is known to comprise 12 Holarctic, 35 Palearctic, 25 Nearctic, 2 Oriental and 3 New Zealand species. In Japan, Matsumura (1919) described a new species, *Melanostoma urakawense*, based on the female from Hokkaido. Shiraki (1930) revised the Syrphidae of Japan and its adjacent areas, but he ignored this species. In 1964, Minamikawa and Fukuhara transferred *urakawense* to *Platycheirus*. Kimura (1953) and Hara (1978) recorded *Melanostoma ambiguum* (Fallén, 1817) (= *Platycheirus ambiguus*) from Kyoto and Saitama, Honshu, respectively. Ikezaki (1978) recorded *Platycheirus scutatus* (Meigen, 1822) from Nagasaki, Kyushu. Thus this genus is hitherto represented by three species in Japan. In the course of the present study I was able to find eight more species of this genus from Japan in addition to the three known species mentioned above; among them three are new to science. Descriptions or redescriptions of these species are given in this paper.

* Contribution from the Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka (Ser. 3, No. 80).

Platycheirus Lepeletier and Serville, 1828

Platycheirus Lepeletier and Serville. in Latereille et al., 1828, Encycl. Méth. (Ins.) 10(2) :

513. Type-species : *Syrphus scutatus* Meigen, 1822 (by designation of Westwood, 1840).
Platycheirus, emend.

Head entirely black, usually with yellowish or whitish pollinosity, and with moderate hairs; central knob and epistoma produced or scarcely produced. Eye bare. Antenna blackish, ventral part of 3rd segment sometimes yellowish; arista dorsal, with only microscopic pubescence. Thorax black to aeneous black, without any yellowish part; hairs on thorax blackish or yellowish, and curled at apices. Metasternum bare and fully developed. Legs blackish to yellowish; all coxae and trochanters always dark brown to black; front tibia and/or front tarsus of male flattened and dilated in most species except for *ambiguus* (Fallen), *immaculatus* sp. nov. and *dux* Violovitsh, and all legs usually with ornamental hairs; if front leg not dilated, then at least front leg with characteristic ornamental hairs or bristles (except *dux* Violovitsh), legs of female scarcely dilated and usually without ornamental hairs. Wing hyaline, slightly tinged with brown, membrane entirely trichose or partly bare on basal portion of wing. Abdomen nearly parallel-sided in male, slightly oval in female, unmarginated, and usually with 3-4 pairs of yellowish or occasionally bluish spots (except *immaculatus* sp. nov.). Male genitalia blackish; cercus, superior lobe and aedeagus usually brownish. Epandrium of capsule-like structure ; surstylus bicornuate ; superior lobe sickle-shaped and strongly recurved, and longitudinally excavated on apical 1/3-1/2; aedeagus entirely sclerotized, tubular, not segmented and swollen dorsally toward tip, then strongly constricted subapically; tip of aedeagus with a pair of lateral denticles and with many minute hairs at ventral part of gonopore (except *dux* Violovitsh).

Verrall (1901) discussed the characters separating the genus *Platycheirus* from the allied genera. This genus was distinguished from *Melanostoma* by the dilated front leg in the male, and from *Pyrophæna* by the regular pairs of abdominal spots. As the females of *Platycheirus* and *Melanostoma* are very similar to each other, he could not express the distinguishing character in words. He provided a key of the females of allied genera jointly.

Metcalf (1921) studied the male genitalia of the Syrphidae, and stated that "the bicornuate form of styles of this genus (= *Platycheirus*) will characterize the genus", but Fluke (1957) emphasized that the strongly recurved sickle-shaped superior lobe appears to be even more characteristic of *Platycheirus* than the forked styles.

Andersson (1970) found that *Melanostoma mellinum* Linnaeus, the type-species of *Melanostoma*, is provided with the small spear head-shaped metasternum, while in *Platycheirus* the metasternum is fully developed. Taking this

character and the bicornuate styles and the sickle-shaped superior lobe of the male genitalia in consideration, he transferred *Melanostoma ambiguum* (Fallen) and *M. transfugum* (Zetterstedt) to *Platycheirus*, although the two species are provided with the simple front legs. I am quite agreeable to his treatment, and it seems that this fully developed metasternum of ***Platycheirus*** is a good character separating the females of this genus from *Melanostoma*.

Platycheirus immaculatus sp. nov. has the simple front legs in the male. Moreover the abdomen is entirely blackish and without paired spots in both sexes which have been considered to be one of the important characters of this genus. But I describe this new species under the genus ***Platycheirus***, as it has the fully developed metasternum, the ornamental hairs on the male front legs, the bicornuate surstyli and the sickle-shaped and strongly recurved superior lobes of the male genitalia. The new species much resembles *P. ambiguus* in simple front leg and the male genitalia.

Platycheirus dux Virolvitsh much differs from other species of ***Platycheirus***, for it has the simple front leg and unornamental hairs on legs in the male. Moreover its aedeagus is rather long and slender, and has the gonopore not sclerotized but membranous and a pair of lateral denticles situated subapically.

KEYS TO JAPANESE SPECIES OF ***Platycheirus***

MALES

1. Front tibia scarcely dilated even at apex or dilated only on apical 1/5 2
- Front tibia distinctly dilated. 7
2. Front tarsus scarcely dilated 3
- Front tarsus, especially 1st and 2nd tarsomeres, dilated 5
3. Front femur with a characteristic long curved bristly hair on its posterodistal portion 4
- Front femur without a characteristic long curved bristly hair. All legs without any ornamental hair; central knob and epistoma conspicuously produced; large species (about 11-12 mm) ***dux*** Virolvitsh
4. Abdomen narrow, without any abdominal spot ***immaculatus*** sp. nov.
- Abdomen wide, with 3 pairs of bluish white pollinose spots ***ambiguus*** (Fallen)
5. First tarsomere of front tarsus large, flattened and dilated, shorter than 2nd to 5th tarsomeres together; middle femur and tibia normal 6
- First tarsomere of front tarsus remarkably large, flattened and dilated, as long as 2nd to 5th tarsomeres together; middle femur with a characteristic anterior excavation ***peltatus*** (Meigen)
6. First tarsomere of front tarsus about 2.3× as long as wide; front tibia with about 5-6 long black bristly hairs on its apical 1/2 of posterior surface ***subcomplicatus*** sp. nov.
- First tarsomere of front tarsus about 1.5~ as long as wide; front tibia with about 10 long black bristly hairs on its posterior surface ***complicatus*** Becker
7. Abdominal spots small, placed on anterior 1/2 of each segment, and not extending to its anterior margin 8
- Abdominal spots large, in 3rd and 4th terga expanding from anterior margin to posterior submargin of each tergum 9

8. Posterior surface of front femur with 3 outstanding long black bristly hairs at middle $1/3$; middle coxa without a finger-like process; 1st tarsomere of front tarsus about 2.5~ as long as 2nd tarsomere urakawensis (Matsumura)
- Posterior surface of front femur without 3 outstanding long bristly hairs at middle $1/3$; middle coxa with a finger-like process; 1st tarsomere of front tarsus about 6X as long as 2nd tarsomere **scutatus** (Meigen)
9. Front femur with a small posterior tuft of silky white hairs basally; front tibia gradually dilated from base to apex 10.
- Front femur without a small posterior tuft of silky white hairs basally, its posterior surface with characteristic fringe of many yellowish brown sub-pennate bristles; front tibia dilated and thickened beyond subbasal portion, widest at middle **pennipes** sp. nov.
10. Posterior surface of front femur with 2-3 long black bristly hairs on subbasal portion **clypeatus** (Meigen)
- Posterior surface of front femur without long black bristly hairs **perpallidus** Verrall

FEMALES*

1. Abdomen with 3 or 4 pairs of spots 2
- Abdomen without any spot or marking **immaculatus** sp. nov.
2. Abdominal spots yellowish brown to brownish yellow *
- Abdominal spots bluish white urakawensis (Matsumura)
3. Abdominal spots shorter than wide, about $1/4 \times$ as long as each tergum 4
- Abdominal spots as long as, or longer than wide, more than $1/3 \times$ as long as each tergum 5
4. Front and middle legs almost black; face with weak median carina; 3rd antennal segment slightly longer than wide, entirely black **complicatus** Becker
- Front and middle legs almost yellowish brown; face without weak median carina; 3rd antennal segment distinctly longer than wide, yellowish brown on ventral $1/2$ **scutatus** (Meigen)
5. Central knob and epistoma slightly or scarcely produced 6
- Central knob and epistoma conspicuously produced **dux** Virolvitsh
6. Lunula slightly produced; 3rd antennal segment longer than wide; front femur with a small posterior tuft of silky white hairs at base 7
- Lunula much produced; 3rd antennal segment rounded, about as long as wide; front femur without a small posterior tuft of silky white hairs at base **pennipes** sp. nov.
7. Hind femur and tibia brownish yellow, darkened at middle **clypeatus** (Meigen)
- Hind femur and tibia entirely brownish yellow **perpallidus** Verrall

Platycheirus scutatus (Meigen, 1822)

Syrphus scutatus Meigen, 1822, Syst. Besch., 3: 333.

Platycheirus scutatus: Lepeletier and Serville, 1828, Encycl. Méth. (Ins.) 10(2): 513.

Platycheirus scutatus: Verrall, 1901, Syrphidae, British Flies 8: 277.

Platycheirus scutatus: Sack, 1930, Syrphidae, Die Fliegen 31: 155.

Platycheirus scutatus: Ikezaki, 1978, Bull. Nagasaki Nishi High School 5: 58.

* Females of *peltatus* (Meigen), *ambiguus* (Fall&n) and *subcomplicatus* sp. nov. are not known to me.

Male: Head (Figs. 2. A; 5. A) black in ground color; frons and face grayish brown pollinose; lunula, central knob, epistoma and cheek subshining black; occiput densely yellow pollinose; ocellar tubercle thinly yellow pollinose; antenna and arista brownish black, ventral 1/2 of 2nd and 3rd antennal segments brownish in specimens from Kyushu. Ocellar tubercle with many black hairs on its anterior 1/2, and with pale yellow hairs on posterior 1/2; frons with many black hairs; lunula not produced; central knob and epistoma moderately produced. Facial hairs rather abundant, almost black, a few yellow hairs mixed; occipital hairs almost yellow, a few black hairs mixed on dorsal portion of occiput. Third antennal segment longer than wide; arista thickened on its basal 1/2 (Fig. 4. C).

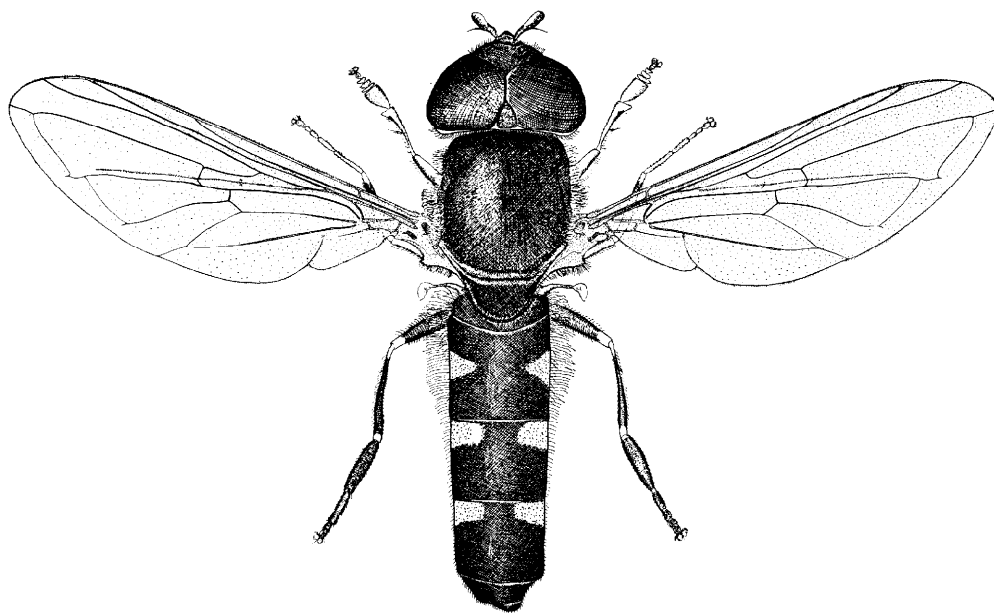


Fig. 1. *Platycheirus scutatus*. Male in dorsal view.

Thorax black in ground color; mesonotum and scutellum subshining black, thinly yellow pollinose; pleura yellowish brown pollinose. Hairs on mesonotum and scutellum brownish; mesopleural hairs yellowish brown, curled at apices.

Wing hyaline, slightly tinged with brown, and following areas without microtrichia: center of 1st costal cell, bases of 2nd costal cell and cell R_1 , 1st basal cell in front of suprious vein as far as the level of node of suprious vein, subbasal portion to the level of fork of R_s along anterior margin of 2nd basal cell, anal cell along 1st anal vein except base. Veins dark brown, costa brownish black; stigma pale brown; squama and its fringe grayish brown. Halter brownish yellow, darkened apically.

Legs black and yellowish brown; all coxae and trochanters almost black. Front femur black, ventral surface broadly brownish yellow at base, with 4 small black patches, of which apical one is often united with large black area at middle of femur, basal yellowish area of ventral surface narrowly extending apically along anterior surface, apical portion of the femur also yellowish, posterior surface sometimes pale. Front tibia pale yellowish white, posterior surface darkened near middle, ventral surface dark brown on its basal portion, with a crescent-shaped mark at middle, apical portion broadly pale yellowish brown, and a whitish narrow transverse band appearing on subapical portion. Front tarsus yellowish white, 5th tarsomere yellowish brown; 1st tarsomere slightly darkened dorsally, its ventral surface brown, and marked with an oblique anterior band, posterior border and apical portion whitish; 2nd and 3rd tarsomeres darkened posterodistally; ventral surface of 5th tarsomere with 2 black basal dots. Middle femur yellowish brown, dorsal surface slightly darkened apically, ventral surface black, yellowed anteroventrally on basal 2/5, this black area much reduced in specimens from Kyushu, tip of the femur also yellowish brown. Middle tibia black, with basal 2/5 and apical 1/5 of dorsal surface yellowish brown, ventral surface yellowish brown at base and extreme tip. Middle tarsus dark brown to black, each extreme base and tip of 1st and 2nd tarsomeres yellowish brown. Hind femur black, base and apex yellowish brown; hind tibia black, base and tip slightly pale; hind tarsus black.

Front trochanter with an anterior tuft of a few long yellowish hairs and a ventral tuft of short yellowish hairs, the anterior tuft almost reduced in specimens from Kyushu; posteroventral surface of front femur with a small tuft of long curled silky white hairs on basal portion, 2 clumps of 8-10 tangled long black hairs on subbasal portion, and a posteroventral series of short fine black hairs and a posterior series of fairly long black hairs; anteroventral surface of front femur with a row of 4-5 yellowish bristly hairs on basal 1/3. Front tibia dilated at apical 1/3, posterior surface with many curled black hairs, of which middle ones compose of a tangled mass. Front tarsus remarkably flattened and dilated, 1st tarsomere 1.2~ as long as wide, straight on anterior margin and evenly dilated on posterior margin; 2nd tarsomere 1/6× as long as 1st, shortest of the five tarsomeres. Middle coxa with a characteristic pale yellow finger-like process at anteroventral portion. Middle femur with an anteroventral row of rather short black hairs on apical 2/3, 3-4 recurrent black hairs apically and irregular rows of longer posteroventral hairs which are yellow on basal 1/3 and black on apical 2/3. Middle tibia with many curled black hairs on posterior surface, and with many shorter yellowish curled hairs on basal 1/3 of anterior surface. Hind femur sparsely clothed with long yellowish hairs on ventral surface. Hind tibia with an anterior row of short black hairs. First tarsomere of hind tarsus moderately

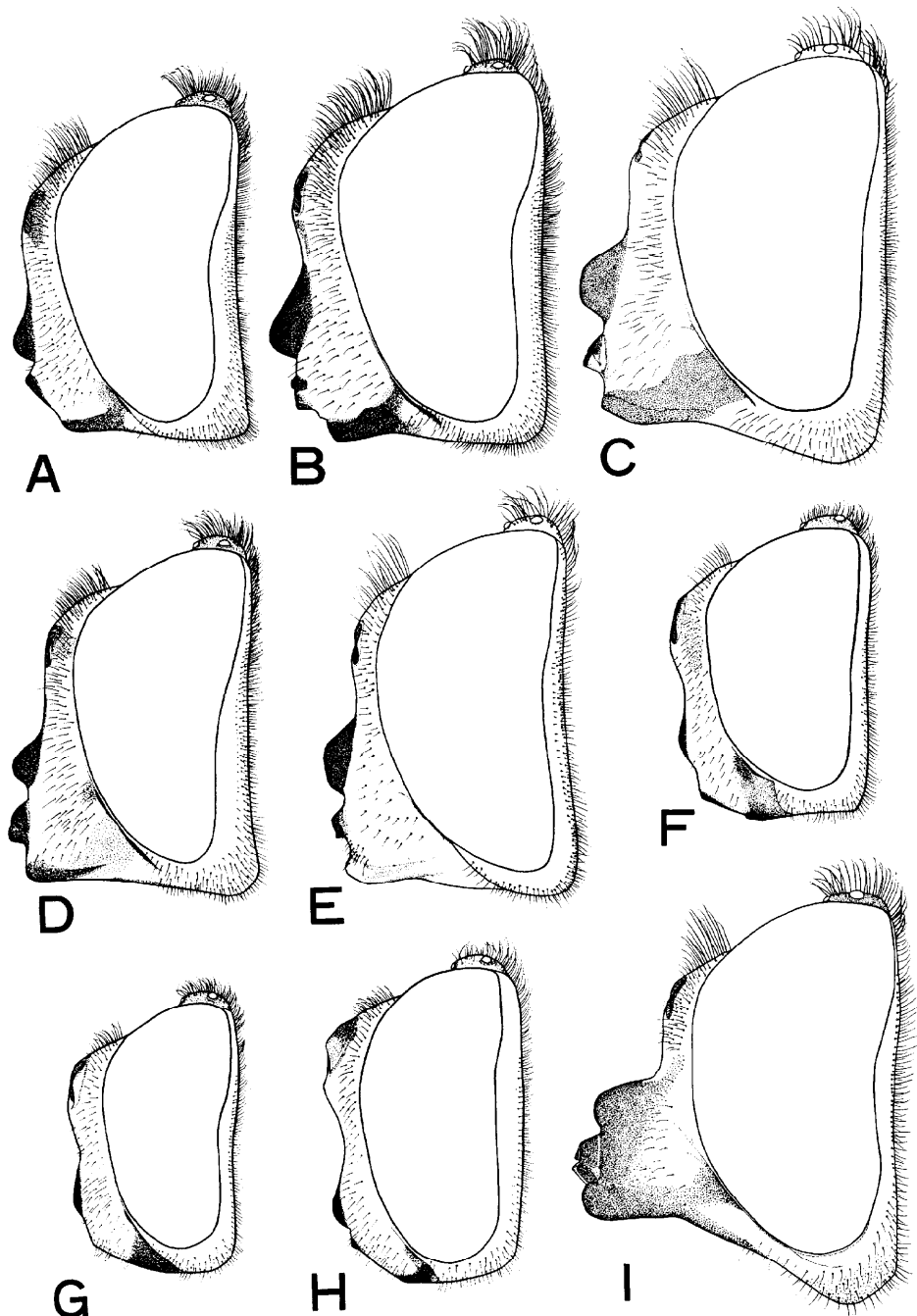


Fig. 2. Male heads in lateral view. A : *P. scutatus*; B : *P. urakawensis*; C : *P. peltatus*; D : *P. complicatus*; E : *P. subcomplicatus* sp. nov. ; F : *P. clypeatus*; G : *P. perpallidus*; H : *P. pennipes* sp. nov. ; I : *P. dux*.

thickened, and as long as 2nd to 5th tarsomeres together.

Abdomen black in ground color; dark brown pollinose; 2nd to 4th terga each with a pair of lateral yellowish brown spots which are covered with yellowish pollinosity, subquadrate in shape, shorter than $1/2$ length of each tergum and close to black anterior border of each tergum; 1st sternum subshining black, 2nd to 4th sterna subshining brown to dark brown. Abdominal terga clothed with short black hairs above, long yellow hairs at sides.

Male genitalia (Figs. 3. A, B) : Surstylus slender and gradually tapering toward apex, its thumb-like process remarkably large; superior lobe separated from hypandrium by a slender membranous area; dorsoproximal part of superior lobe projecting into a short process; aedeagus with straight ventral margin, and its dorsal swelling very large and strong,

Length : Body 9.0-9.5 mm ; wing 6.5-7.0 mm.

Female: Similar to male. Head black in ground color; frons subshining black, with a pair of large triangular yellow pollinose markings at middle ; face yellow pollinose, shining on central knob and epistoma; occiput densely pale yellow pollinose. Hairs on frons black, those on face yellow; hairs on occiput yellowish brown above, whitish below; antenna black, yellowish brown ventrally ; arista dark brown. Lunula' not produced; central knob and epistoma

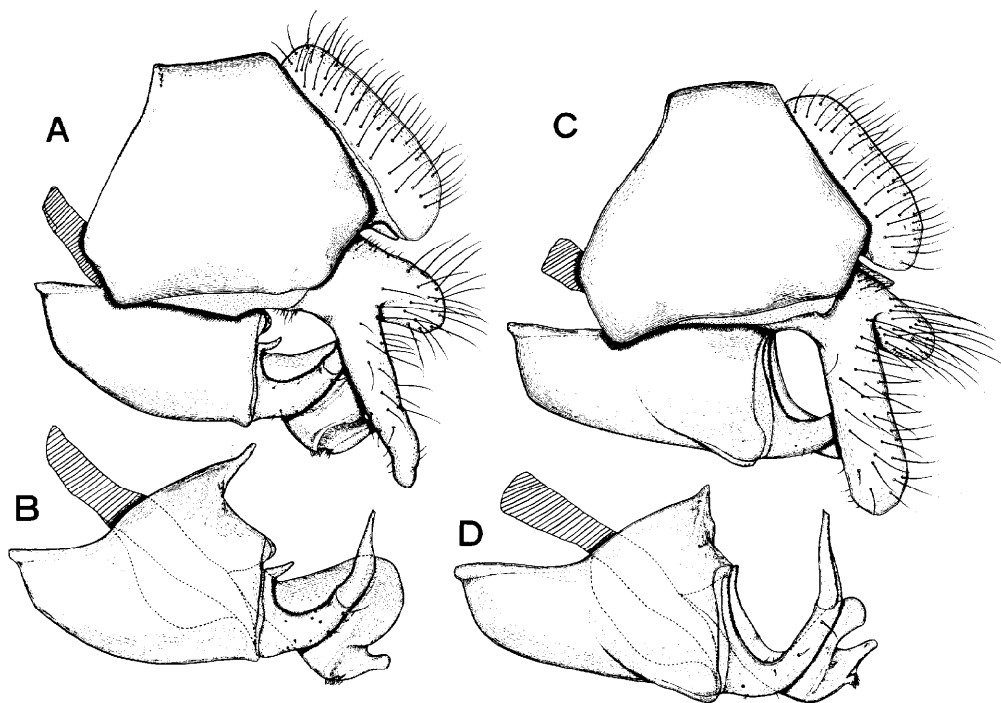


Fig. 3. Male genitalia in lateral view. A, B: *P. scutatus*; C, D: *P. urakawensis*. A, C: whole genitalia; B, D: hypandrium, superior lobe and aedeagus.

moderately produced.

Thorax black in ground color ; mesonotum and scutellum subshining black; pleura yellow pollinose. Hairs on mesonotum and scutellum entirely yellowish brown, rather shorter than in male; mesopleural hairs white, curled at apices.

Wing hyaline, slightly tinged with yellowish brown, and following areas without microtrichia: 1st costal cell, basal $1/5-1/4$ of 2nd costal cell, basal $1/5-1/4$ of cell R_1 , 1st basal cell except posterodistal $1/4$ and near the node of supracubital vein, anteroproximal $1/2$ of 2nd basal cell, basal $1/2$ of anal cell, axillary lobe narrowly in front of, and behind axillary vein. Stigma pale brown; squama and its fringe yellowish white to white. Halter pale yellow.

Legs almost yellowish brown with following areas dark brown to black: all coxae and hind trochanter, subapical $1/3$ of hind femur, apical $1/2$ of hind tibia except apex and dorsal surface of hind tarsus; middle $1/3$ of dorsal surface of front tibia and subapical $1/4$ of middle tibia sometimes darkened.

Front femur with a small posterior tuft of 3-4 silky white hairs near base, and with 2-3 posterior rows of yellowish hairs; middle femur with many yellow and black posterior hairs; hind femur sparsely clothed with yellowish white hairs; 1st tarsomere of hind tarsus slightly thickened, more slender than in male.

Abdomen including lateral spots almost as in male.

Length : Body 9.2-9.4 mm ; wing 7.1-7.6 mm.

GEOGRAPHICAL DISTRIBUTION: This species is widely distributed in the Holarctic Region, and in Japan it is known from the mountain region of Hokkaido and Kyushu.

SPECIMENS EXAMINED: (HOKKAIDO) 1♂, Pippudake, Mts. Taisetsuzan, 11. vi. 1967 (T. Saigusa) ; 1♂, Shikaribetsuko, Tokachi, 4. ix. 1977 (S. Ikudome) ; (KYUSHU) 1♀, Hikosan, Fukuoka Pref., 4. v. 1976; 1♀, same locality, 29. ix. 1976 (K. Ôhara); 1♂, same locality, 22. iv. 1979 (T. Gotô); 1♀, Mt. Hakuchôzan (1300 m), Izumimura, Kumamoto Pref., 17. v. 1978 (T. Saigusa) ; 1♀, same locality and date, (K. Ôhara); 2♂♂ 10♀♀, Yoshibu, Mts. Kuju, Oita Pref., 24. ix. 1978 (K. Ôhara).

REMARKS: This species appears to be related to *P. albimanus* (Fabricius), *P. urakawensis* (Matsumura) and *P. formosanus* Shiraki, in the chaetotaxy and markings of the male front femur, but the presence of a ventral finger-like process on the middle coxa in the male will at once distinguish it.

Platycheirus urakawensis (Matsumura, 1919)

Melanostoma urakawense Matsumura, 1919, Ent. Mag. Kyoto, 3(3, 4): 132.

Platycheirus urakawense: Minamikawa et Fukuhara, 1964, Kontyû 32(2): 225.

Platycheirus urakawensis : Kuwaya ma, 1967, Insect Fauna of the Southern Kurile Islands: 115.

Platycheirus urakawense : Hara, 1978, Fauna of Saitama Pref.: 149.

Platycheirus urakawense; Ikezaki, 1978, Bull. Nagasaki Nishi High School 5: 57.

Male: Head (Figs. 2. B; 5. B) black in ground color ; frons and face thinly grayish brown pollinose ; lunula, central knob, epistoma and cheek subshining black ; occiput densely gray pollinose ; ocellar tubercle black ; antenna black, ventral $1/3-1/2$ of 3rd segment yellowish brown to pale brown; arista dark brown. Frons and ocellar tubercle with many black hairs; lunula not produced ; central knob and epistoma moderately produced; facial hairs entirely black; occipital hairs black above, yellowish below, but sometimes entirely yellow. Third antennal segment longer than wide; arista thickened on its basal $1/3-1/2$ (Fig. 4. D).

Thorax black in ground color; mesonotum and scutellum black, yellowish brown pollinose; pleura yellowish brown pollinose. Hairs on mesonotum and scutellum pale yellow, many blackish hairs mixed; mesopleural hairs yellowish white, curled at apices, a few black hairs mixed.

Wing hyaline, slightly tinged with brown, and following areas without microtrichia: center of 1st costal cell, base of 2nd costal cell narrowly extending along posterior margin to the level of fork of Rs, 1st basal cell in front of suprious vein at middle $1/3$, anterior margin of basal $3/4$ of 2nd basal cell, basal $1/3$ of anal cell narrowly and obscurely behind 1st anal vein except base. Veins brownish black; stigma yellowish brown ; squama pale brown, its fringe brown to pale yellow. Halter pale brown.

Legs: Front femur black, ventral surface brownish yellow at base, with 4 small black patches of which apical one is often united with black area at middle of femur, basal $1/3-1/2$ of dorsal surface yellowish brown, apical portion of the femur also brownish yellow, anterior surface sometimes pale. Front tibia yellowish white, basal $1/3$ brownish yellow, posterior surface darkened near middle, apical $1/2$ of anterior surface darkened, apical portion of ventral surface marked with 2 blackish stripes from black border of posterior surface, one of them arising beyond the middle of tibia, extending to subapical portion of posterodistal expansion of tibia and surrounding a long, crescent-shaped pale area, another stripe arising before the middle of tibia, tapering apically, and hardly extending to 3 small black stripes near tibiotarsal joint, middle one of these stripes bearing a comb of setulae, and basally white bordered, apical margin of the posterodistal expansion and basal border of the crescent-shaped pale marking yellowish brown; the black markings of ventral surface rather obscure apically in specimens from northern Japan. Front tarsus pale yellow to brownish yellow, 5th tarsomere yellowish brown; ventral surface of 1st tarsomere dark brown, with an oblique anterior and a transverse posterior pale bands which extend near mid-line of the tarsomere,

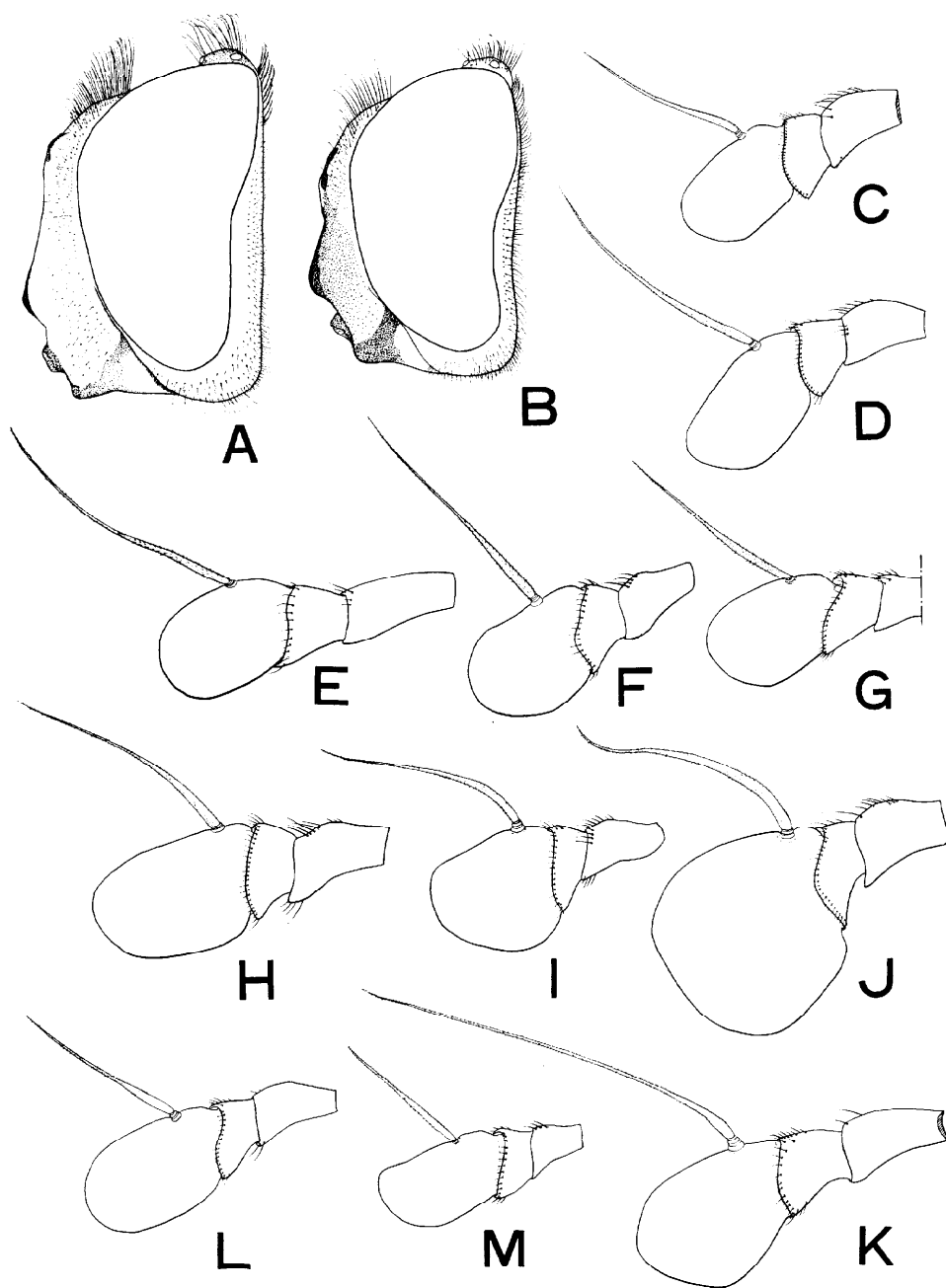


Fig. 4. Male heads and male left antennae in lateral view. A, B: head; C-M: left antenna. A: *P. ambiguus*; B: *P. immaculatus* sp. nov.; C: *P. scutatus*; D: *P. urakawensis*; E: *P. peltatus*; F: *P. complicatus*; G: *P. subcomplicatus* sp. nov.; H: *P. clypeatus*; I: *P. perpallidus*; J: *P. pennipes* sp. nov.; K: *P. dux*; L: *P. ambiguus*; M: *P. immaculatus* sp. nov.

basal border of these bands and posterodistal margin of the tarsomere yellowish, 2 black spots appearing near tip; ventral surface of 2nd tarsomere with 2 black basal spots or stripes. Hind leg almost black, tip of hind femur and base of hind tibia yellowish brown, tip of hind tibia sometimes pale.

Front trochanter with simple short hairs beneath; front femur resembling that of *scutatus*, hairs of posterior series longer, 3-4 in number, anteroventral yellowish hairs almost undeveloped. Front tibia more strongly dilated on apical $1/2$ than in *scutatus*, posterodistal corner strongly produced, posterior surface with many short black hairs, mixed with 1-2 long stiff hairs, postero-dorsal surface with longish black hairs at middle. Front tarsus flattened and dilated, widest at middle of 1st tarsomere, then gradually narrowing apically; 1st tarsomere about 1. l-l. $3 \times$ as long as wide, weakly arched on anterior margin, strongly dilated to the middle on posterior margin; 2nd tarsomere $1/4-1/3 \times$ as long as 1st. Middle coxa simple; middle femur with an anterior row of 10-13 short black spines, and with a long recurrent black hair apically, posterior surface with a row of many black hairs. Middle tibia with a fine long anteroventral hairs at subbasal portion, 2-4 long black posterior hairs at middle and 2 short posteroventral bristly hairs at apex. Hind femur sparsely clothed with long yellowish hairs on anterior surface. Hind tibia with an anterior row of black hairs. First tarsomere of hind tarsus slightly thickened, about as long as 2nd to 5th tarsomeres together.

Abdomen black in ground color, blackish brown pollinose; 2nd to 4th terga each with a pair of lateral dark grayish brown to dark brown spots which are covered with grayish white pollinosity, the pollinosity on lateral spots of 3rd and 4th terga appearing circular spots when viewed from behind; spots on 2nd tergum small and obscure, those on 3rd and 4th terga triangular or subquadrate in shape, shorter than $1/2$ length of each tergum and close to black anterior margin of each tergum. Sterna black, thinly grayish brown pollinose, yellowish haired. Abdominal terga clothed with short black hairs above, long yellowish white hairs at sides.

Male genitalia (Figs. 3. C, D) : Surstylus wider than in *scutatus*, nearly parallel-sided to apex, its thumb-like process moderately large; superior lobe larger than in *scutatus*, separated from hypandrium by a slender membranous area, without a dorsoproximal projection; aedeagus slender, curved dorsally beyond middle, its dorsal swelling much smaller than in *scutatus*.

Length : Body 9.0-10.2 mm ; wing 7.8-8.5 mm.

Female: Head black in ground color; frons subshining black, with a pair of narrow white pollinose markings at middle; face white pollinose, shining on central knob and epistoma; occiput densely white pollinose. Hairs on frons black, those on face almost white; occipital hairs white, a few black hairs mixed on dorsal portion of occiput. Central knob and epistoma moderately produced.

Thorax almost as in male; mesopleural hairs white, curled at apices; wing hyaline, slightly tinged with brown, and following areas without microtrichia: 1st costal cell, basal $1/3$ of 2nd costal cell which narrowly extends along posterior margin as far as the level of fork of Rs, basal $1/6$ of cell R_1 , 1st basal cell in front of suprious vein as far as the level of node of suprious vein, 2nd basal cell in its entire width at basal $1/2$ except extreme base, and extending along anterior margin to the level of node of suprious vein, anal cell narrowly behind anal vein to its apex. Stigma yellowish brown; squama and its fringe pale yellow. Halter yellowish brown.

Legs almost black with following areas pale brown to yellowish brown: base and apex of all femora, basal $1/3$ – $1/2$ of front and middle tibiae, basal $1/4$ of hind tibia; and apex of middle tibia and base of 1st tarsomere of middle tarsus in some specimens.

Front femur with a small posterior tuft of silky white hairs near base, the tuft sometimes reduced to 2-3 stiff whitish hairs, posteroventral surface sparsely clothed with short white hairs. Front tibia and tarsus simple. Middle femur with 2-3 irregular posterior rows of blackish hairs. Anterior and posterior surfaces of hind femur sparsely clothed with whitish hairs. Middle and hind tibiae and tarsi simple and short haired.

Abdomen subshining black, dark brown pollinose; 2nd to 4th terga each with a pair of lateral bluish gray pollinose markings, subquadrate in shape, shorter than $1/2$ length of each tergum, those on 2nd tergum obscure, when viewed from behind circular pollinose markings appearing on the lateral spots as in male; sterna black, thinly yellow pollinose.

Length: Body 8.1-9.7 mm; wing 7.3-8.2 mm.

GEOGRAPHICAL DISTRIBUTION: This species is known from the mountain region throughout Japan. The commonest species of this genus in Japan.

SPECIMENS EXAMINED: [HOKKAIDO] 1 ♂, Rishiriyama, 300-900 m, Rishiri Is., 3. vii. 1967; 2 ♀♀, Wakasakanai, on beach, Toyotomi, 1. vii. 1967; 1 ♀, Tenninkyo 600-700 m, Higashigawa, 9. vi. 1967; 1 ♂ 3 ♀♀, Nagayamadake, 1800-1900 m, Mts. Taisetsuzan, 10. vii. 1967; 1 ♂ 3 ♀♀, Aizankei-Ginmeisui, Mts. Taisetsuzan, 7. viii. 1967; 2 ♂♂ 2 ♀♀, Pippudake, 2040 m, Mts. Taisetsuzan, 11. viii. 1967; 2 ♀♀, same locality, 13. viii. 1967; 9 ♂♂ 31 ♀♀, Ginmeisui-Nagayamadake, Mts. Taisetsuzan, 13. viii. 1967 (T. Saigusa); 1 ♂, Sounkyo, Mt. Daisetsu, 14. vii. 1966 (K. Kusigemati); 3 ♀♀, Ginmeisui, Mts. Taisetsuzan, 7. viii. 1967 (A. Nakaniishi); 1 ♂, Kurodake, Mts. Taisetsuzan, 12. viii. 1967; 4 ♂♂ 2 ♀♀, Nagayamadake, Mts. Taisetsuzan, 13. viii. 1967 (H. Shima); 4 ♀♀, Numanotaira, 1400 m, Mts. Taisetsuzan, 22. viii. 1977 (K. Ôhara); 1 ♀, Mt. Rausudake, Shari, 3. viii. 1967 (A. Nakanishi); 3 ♀♀, same locality (1 ♀ : 200-900 m; 2 ♀♀: 900-1400 m), 4. viii. 1967 (T. Saigusa); 3 ♂♂ 1 ♀, Nukabira-Upepesanke, 550-800 m, 12. vi. 1967; 1 ♂ 2 ♀♀, Nukabira, 13. vi. 1967; 5 ♂♂, same locality, 14. vi. 1967; 1 ♂ 4 ♀♀, same locality, 20. vii. 1967 (T. Saigusa); 2 ♂♂ 2 ♀♀, Yubaridake, 6. vii. 1967 (A. Na-

kanishi) ; 1♂, Mt. Soranumadake, 27. vii. 1965 (K. Kusigemati) ; 4♀♀, Mt. Muine, 400-1000 m, Sapporo City, 13. viii. 1977 (K. Ôhara), (HONSHU) 1♂1♀ ; Mt. Norikura, Nagano Pref., 22. vii. 1973 (K. Setoya) ; 5♂♂6♀♀, Mt. Shiro-uma dake, 1700 m, Nagano Pref., 15. ix. 1978 ; 17♂♂1♀, Kamikochi, 1500 m, Nagano Pref., 16. ix. 1978 ; 29♂♂63♀♀, Shirasawa, Kamikochi, Nagano Pref., 17. ix. 1978 ; 1♂4♀♀, Mt. Nishihotaka, 2000 m, Nagano Pref., 18. ix. 1978 ; 1♂, Norikura-kôgen, 1500 m, Nagano Pref., 19. ix. 1978 (T. Gotô) ; 1♀, Tokusa-tôge, Yamanashi Pref., 2. viii. 1975 ; 1♂, Kanayama, Yamanashi Pref., 28. vii. 1975 (J. Emoto) ; 2♂♂, Nigorigo Spa, Gifu Pref., 29. viii. 1976 (K. Yano) ; 1♂, Mt. Ontake, Gifu Pref., 22. viii. 1976 (K. Ueda) ; 1♂, Futatsuya, Hida-kawai, Gifu Pref., 21. v. 1977 (J. Emoto). (SHIKOKU) 1♀, Oonogahara, 1000 m, Ehime Pref., 6. viii. 1976 (K. Ôhara). (KYUSHU) 1♀, Mt. Hikosan, Fukuoka Pref., 29 iv. 1978 (T. Gotô) ; 2♀♀, Mt. Daisen, Mts. Kuju. Oita Pref., 7. vii. 1978 (M. T. Chûjô) ; 1♀, same locality, 19. vii. 1978 (K. Setoya) ; 3♀♀, same locality and date, (K. Maetô) ; 7♂♂20♀♀, Mt. Sobo, Oita Pref., 23. vii. 1978 ; 1♂, same locality, 24. vii. 1978 (K. Maetô) ; 1♂, Mt. Myoken, Unzen, Nagasaki Pref., 31. viii. 1975 ; 1♂, same locality, 15. ix. 1975 ; 1♀, Nitatoge, Unzen, Nagasaki Pref., 15. ix. 1975 ; 1♀, same locality, 5. ix. 1976 (Y. Ikezaki) ; 1♀, Kusasenri, Mt. Aso, Kumamoto Pref., 11. v. 1978 (Y. Yoshiyasu) ; 1♂, same locality and date, (H. Makihara) ; 6♀♀, Mt. Hakuchôzan, 1300 m, Izumimura, Kumamoto Pref., 19. vii. 1977 ; 1♂1♀, same locality, 30. vii. 1977 ; 8♂♂5♀♀, same locality, 17. v. 1978 ; 1♂5♀♀, same locality, 26. v. 1978 ; 2♂♂4♀♀, same locality, 9. vii. 1978 ; 3♀♀, same locality, 10. vii. 1978 (K. Ôhara) ; 6♂♂6♀♀, same locality, 17. v. 1978 ; 1♀, same locality, 9. vii. 1978 (T. Saigusa) ; 1♂2♀♀, same locality, 17. v. 1978 ; 1♂4♀♀, same locality, 26. v. 1978 ; 1♂, same locality, 9. vii. 1978 ; 3♀♀, same locality, 11. vii. 1978 (T. Gotô) ; 1♀, same locality, 29. vii. 1977 (Y. Yoshiyasu) ; 3♂♂, same locality, 17. v. 1978 (N. Kôda) ; 3♂♂9♀♀, same locality and date, (M. Yamamoto) ; 1♂, Kuruson-kyo, Ebino City, Miyazaki Pref., 19. iv. 1977 (K. Ôhara) ; 1♀, Mt. Takachiho, Kagoshima Pref., 17. vi. 1968 (A. Nakanishi).

REMARKS: This species might be considered at first glance only as a variety of the Holarctic *albimanus* (Fabricius, 1781). I have studied a long series of specimens of *urakawensis* obtained from various localities throughout Japan. Consequently I found that *urakawensis* has the much produced posterodistal corner of the male front tibia and the more enlarged 1st tarsomere of the male front tarsus, but the male genitalia are not different from those of *albimanus*. Moreover I could not find any good character distinguishing *urakawensis* from *albimanus* in the female.

This species is also obviously allied to *formosanus* Shiraki from Taiwan. The female of *urakawensis* is very similar to that of *formosanus* in general appearance except the blackish front and middle femora, but in the male of *formosanus* the front leg and its ornamental hairs are much modified; the

posterior surface of front femur with pennate bristles on basal 1/2 and 3 outstanding long bristly hairs, subapical one of which is not illustrated by Shiraki (1930) but present in all of 20 males I examined; and the posterodistal corner of the tibia and the anterodistal corner of its 1st tarsomere much produced. I could not find any difference in the male genitalia between these species.

Platycheirus peltatus (Meigen, 1822)

Syrphus peltatus Meigen, 1822, Syst. Besch., 3: 334.

Platycheirus peltatus: Verrall, 1901, Syrphidae, British Flies 8: 274.

Platycheirus peltatus: Lundbeck, 1916, Syrphidae, Diptera Danica 5 : 200.

Platycheirus peltatus: Sack, 1930, Syrphidae, Die Fliegen 31: 152.

Male : Head (Figs. 2. C; 5. C) black in ground color ; frons and face grayish brown pollinose ; occiput densely grayish brown pollinose; 1st and 2nd antennal segments black, 3rd segment and arista dark brown, ventral surface of 3rd segment pale. Hairs on ocellar tubercle, those on frons and face entirely black; occipital hairs dark brown to black above, yellowish brown to pale yellow below. Lunula not produced; central knob and epistoma moderately produced; face with a weak median carina above central knob. Third antennal segment longer than wide; arista thickened on its basal 1/3 (Fig. 4. E).

Thorax black in ground color ; mesonotum and scutellum brownish pollinose ; pleura grayish brown pollinose. Hairs on mesonotum and scutellum black, marginal ones on scutellum yellowish; mesopleural hairs yellowish brown, mixed with black ones, strongly curled at apices.

Wing hyaline, slightly tinged with brown. Veins dark brown to black, stigma yellowish brown ; squama and its fringe pale brown; wing membrane entirely trichose. Halter brown.

Legs blackish; all coxae and trochanters black. All femora black, yellowish brown at tip; apical 1/2 of anterior surface of front femur brown, ventral surface of the femur with a large subbasal pale patch. Anterior 1/2 of dorsal surface of front tibia dark yellowish brown, blackish on posterior 1/2 except base and apical 1/5; ventral surface of front tibia dark brown on basal 1/2, this dark area expanding apically along anterior surface, pale brown on apical 1/2, a circular pale patch appearing at subapical portion of dark brown area, an oblique dark band extending from subapical portion of posterior margin to near anterodistal corner, apical border darkened and bearing comb of setulae. Dorsal surface of 1st and 2nd tarsomere of front tarsus yellowish white, those of 3rd to 5th tarsomeres yellowish brown to dark yellowish brown. Anterior 1/2 of ventral surface of 1st tarsomere of front tarsus darkened, with a narrow pale yellowish brown transverse band which arises

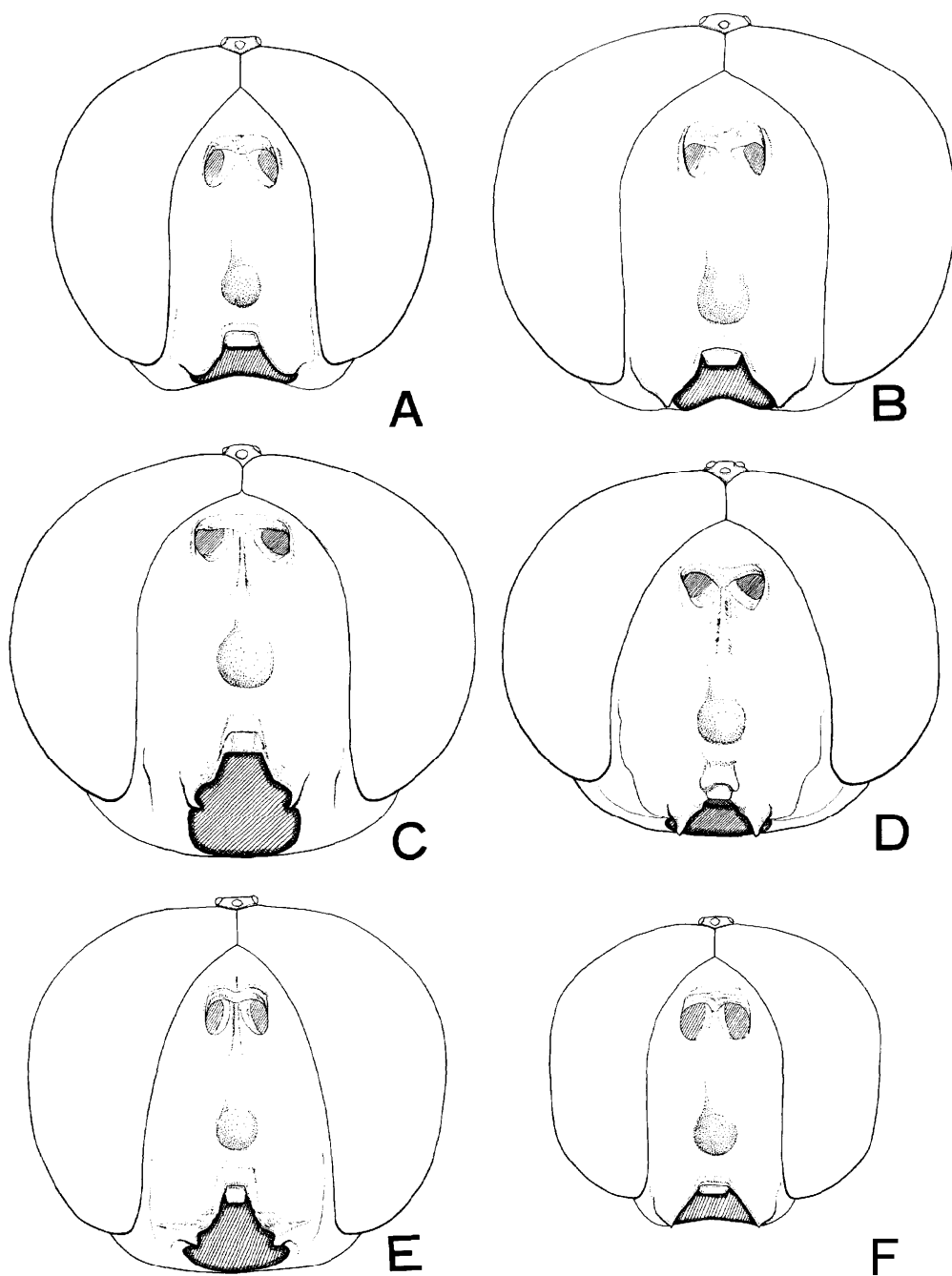


Fig. 5. Male heads in frontal view (hairs are omitted). A: *P. scutatus*; B: *P. urakawensis*; C : *P. peltatus*; D : *P. complicatus*; E : *P. subcomplicatus* sp. nov. ; F : *P. clypeatus*.

from anterior subapical margin and extends to middle of the tarsomere, posterior 1/2 of the surface brownish yellow, darkened on subbasal 1/4-1/3, and with a median subapical small brownish spots and 2 short narrow brownish bands apically. Ventral surfaces of 2nd to 5th tarsomeres of front tarsus yellowish brown; 2nd tarsomere with a narrow brownish median streak; 3rd to 5th tarsomeres each with 2 basal black dots. Middle femur yellowish brown on its apex and apical 1/3 of anterior surface. Middle tibia dark brown, anterior surface except apical 1/4 yellowish brown, ventral surface somewhat pale at middle. Middle tarsus dark brown above, yellowish brown below. Hind tibia almost black except yellowish base. Hind tarsus black.

Front trochanter with many short black hairs on ventral surface. Front femur clothed with weakly sub-pennate bristles on posterior surface; ventral surface of the femur more or less flattened and with 2 rows of a few short erect bristles on basal 1/2, densely whitish pruinose on apical 1/2. Front tibia flattened and dilated on apical 1/5, straight on apical margin, weakly emarginate on apical 1/2 of posterior margin; posterior surface of the tibia clothed with short black hairs on basal 2/3, short pale yellow hairs on apical 1/3, some of these hairs recurrent, tip of the tibia about 2x as wide as its base. First tarsomere of front tarsus remarkably large, dilated and flattened, about 2x as long as wide or as long as 2nd to 5th tarsomeres together, strongly produced anterodistally. Second tarsomere of front tarsus small, about 1/4x as long as 1st, and about 1/2x as wide as 1st; 3rd to 5th tarsomeres normal. Middle femur characteristically excavated on middle 1/3 of anterior surface, the excavated portion fringed with a row of short black spines (decreasing their length apically) along its ventral margin, a similar row of shorter spines at apical portion of its dorsal margin, and furnished with a clump of black recurrent hairs at apical border, posterior surface of the femur clothed with black hairs. Middle tibia curved ventrally, remarkably excavated on apical 1/2, strongly thickened apically, anterior to anteroventral surfaces with many curled dark brown hairs, longish on basal 1/2, recurrent on apical thickened portion; basal 1/2 of posterior to posteroventral surfaces with many short stiff black hairs, and with a few pale yellow posterior hairs beyond middle. First tarsomere of middle tarsus weakly compressed laterally. Hind femur weakly compressed laterally, anterior surface with longish pale brown and black hairs on apical 1/3-1/2, posterior surface clothed with shorter pale yellow hairs. Hind tibia clothed with short black hairs on anterior surface, yellowish ones on posterior surface, anterodorsal black hairs stiff and erect. First tarsomere of hind tarsus slightly thickened, about as long as 2nd to 5th tarsomeres together.

Abdomen black in ground color, dark brown pollinose; 2nd to 5th terga each with a pair of lateral yellowish spots; those on 2nd tergum small, situated at middle, 1/3x as long as the tergum; those on 3rd and 4th terga sub-

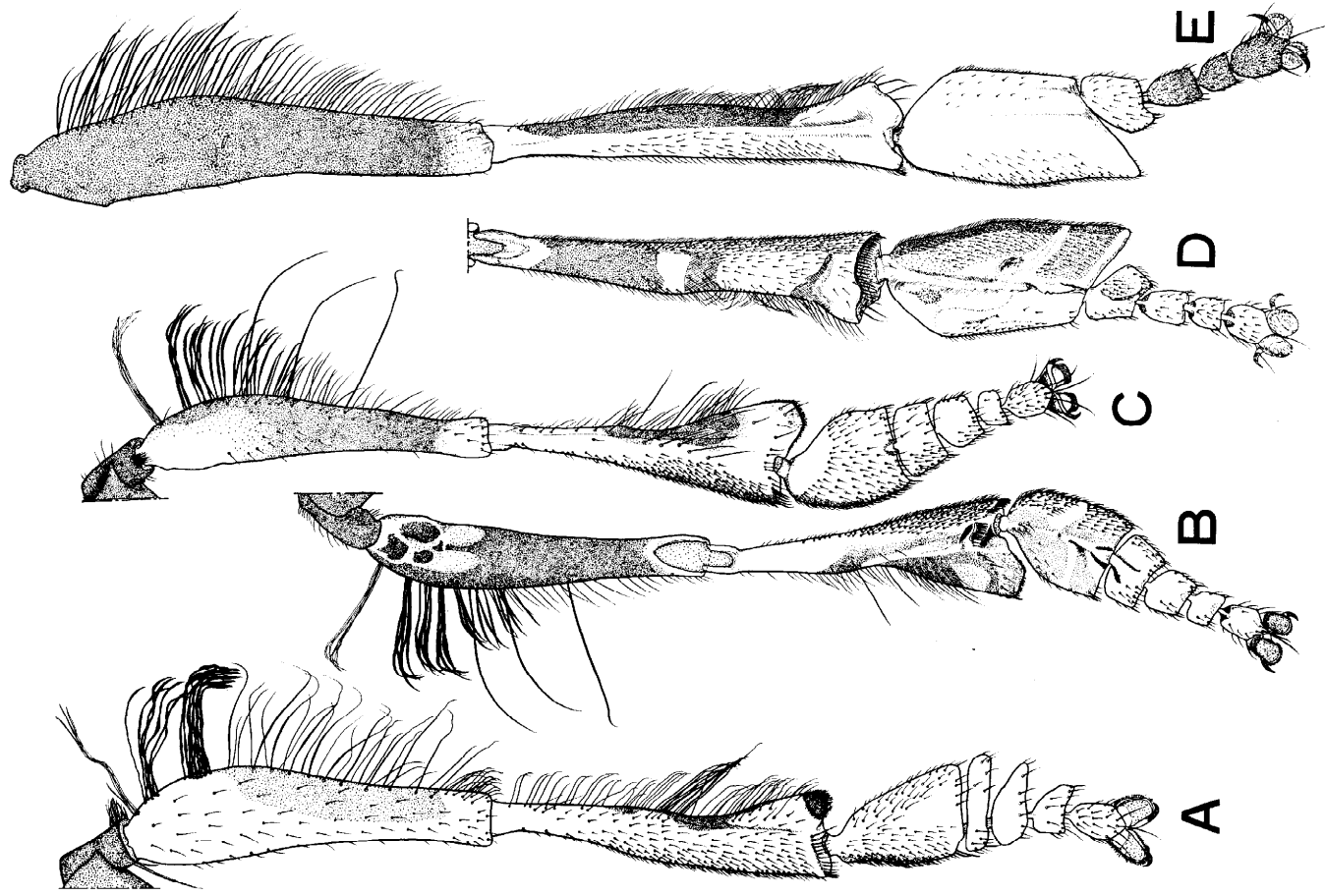


Fig. 6. Male left front legs. A: *P. scutatus*; B, C: *P. urakawensis*; D, E: *P. peltatus*. A, C, E: dorsal view; B, D: ventral view.

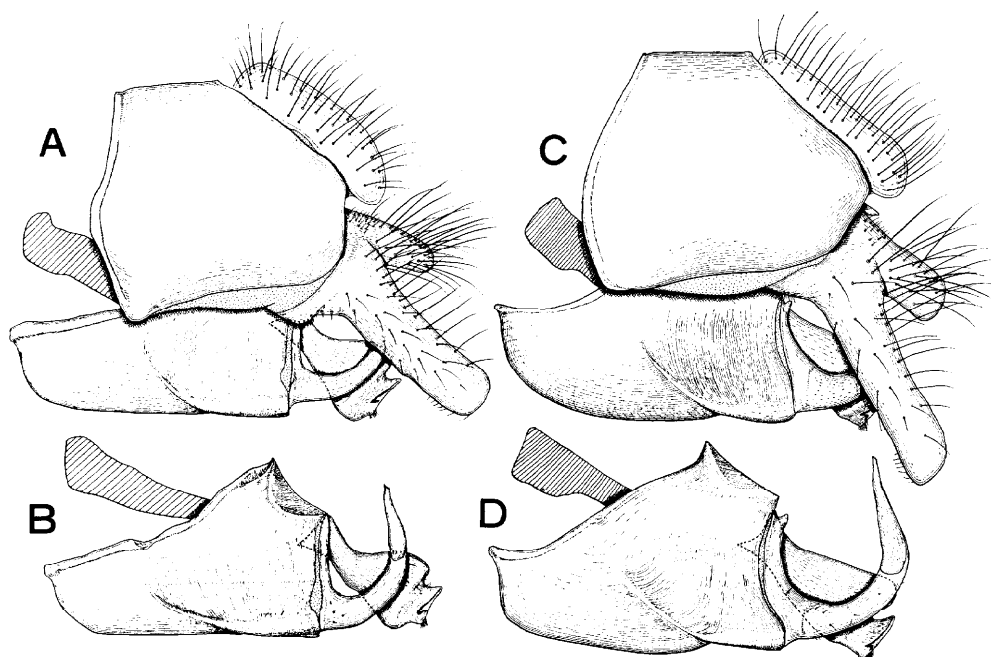


Fig. 7. Male genitalia in lateral view. A, B: *P. peltatus*; C, D: *P. complicatus*. A, C: whole genitalia; B, D: hypandrium, superior lobe and aedeagus.

quadrate in shape, close to narrow black anterior margin, $1/2\times$ as long as each tergum; those on 5th tergum small. First sternum black, densely grayish brown pollinose; following sterna pale brown, subshining, pale yellow haired. Abdominal terga clothed with dense short black hairs above, yellow and dark brown hairs at sides.

Male genitalia (Figs. 7. A, B): Surstylus short, subparallel. Hypandrium excavated on posterolateral $1/2$. Superior lobe separated from hypandrium by a slender membranous area, without a dorsoproximal projection. Aedeagus slender on basal $1/2$, its dorsal swelling weak.

Length: Body 11.0 mm; wing 9.5 mm.

Female: Unknown to me.

GEOGRAPHICAL DISTRIBUTION: This species is widely distributed in the Holarctic Region, and in Japan it is known only from the alpine region of Honshu. This is the first record of this species from Japan.

SPECIMEN EXAMINED: (HONSHU) 1♂, Karasawa, Mt. Hotakadake, Nagano Pref., 10. vii. 1963 (T. Saigusa).

REMARKS: I compared the Japanese specimen described above with a European one which was kindly sent by Dr. T. R. Nielsen. This European specimen differs from ours in the following characters: hairs on face and thorax entirely pale yellow; halter pale yellowish brown; legs more extensively yellow.

lowed; and abdominal spots much larger.

***Platycheirus complicatus* Becker, 1889**

Platycheirus complicatus Becker, 1889, Berl. ent. Zeit. 33: 172.

Platycheirus complicatus: Sack, 1930, Syrphidae, Die Fliegen 31: 146.

Male: Head (Figs. 2. D; 5. D) black in ground color; frons and face grayish brown pollinose; lunula, central knob, epistoma and cheek shining black; occiput densely gray pollinose; ocellar tubercle black, thinly brown pollinose; antenna and arista dark brown. Ocellar tubercle and frons with many black hairs; lunula not produced; central knob and epistoma moderately produced. Face with a weak median carina above central knob; facial hairs rather abundant, entirely black; occipital hairs black above, yellowish below. Third antennal segment longer than wide; arista thickened on its basal 1/3-1/2 (Fig. 4. F).

Thorax black in ground color; mesonotum and scutellum densely brown pollinose; pleura dull yellowish brown pollinose. Mesonotum and scutellum with many black hairs; mesopleural hairs almost dark brown, curled at apices.

Wing hyaline, slightly tinged with brown. Veins dark brown, costa blackish; stigma pale brown; squama and its fringe brown; wing membrane entirely trichose. Halter pale brown.

Legs almost black, tip of front femur, base and apex of front tibia, extreme tip of middle femur and basal 1/3 of middle tibia yellowish brown. First and 2nd tarsomeres of front tarsus yellowish white, ventral surface of 1st tarsomere with an oblique dark band extending from basal 1/2 of posterior margin to apical 1/2 of anterior margin, much darkened at middle and interrupted by a longitudinal streak near posterior submargin, and with a triangular dark spot at posterodistal corner, middle portion of distal margin with a yellow marking which is thinly bordered with black proximally, ventral surface of 2nd tarsomere dark brown marginally, yellow at middle.

Front femur with an anterior row of 7-8 short black spines on apical 2/3, and with 2-3 ventral rows of longer black spines at middle; posterior surface of front femur with irregular rows of many long black bristly hairs, those on apical 1/2 longer than basal ones, slightly curled. Front tibia scarcely dilated even at tip, with a posterior row of about 10 black bristly hairs. First and 2nd tarsomeres of front tarsus flattened and gradually dilated apically, 1st tarsomere about 1.5× as long as wide; 2nd tarsomere about 0.3× as long as 1st. Anterior surface of middle femur with 10-12 curled recurrent blackish hairs apically; ventral and posteroventral surfaces of the femur with many black bristly hairs which are curled at apices. Anterior surface of middle tibia with a row of shorter black hairs subbasally, and with a posterior row

of black hairs, longer apically. Hind femur sparsely clothed with long black and yellow hairs on anterior and ventral surfaces. Hind tibia with an anterior row of short black hairs which are longer on middle 1/4. First tar-

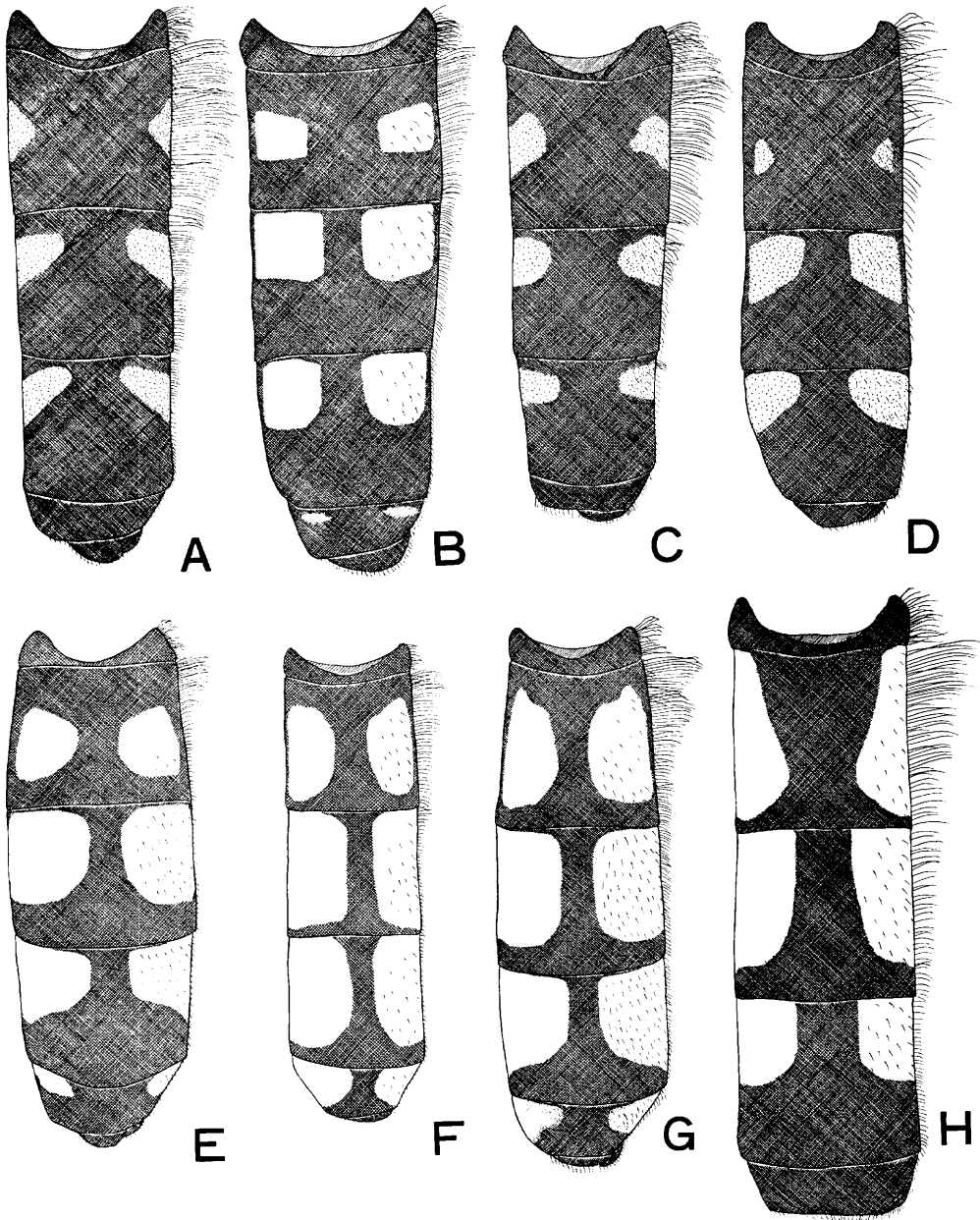


Fig. 8. Male abdominal patterns in dorsal view. A: *P. urakawensis*; B: *P. peltatus*; C: *P. complicatus*; D: *P. subcomplicatus* sp. nov.; E: *P. clypeatus*; F: *P. perpallidus*; G: *P. pennipes* sp. nov.; H: *P. dux*.

somere of hind tarsus slightly thickened, as long as 2nd to 5th tarsomeres together.

Abdomen black, dark brown pollinose; 2nd to 4th terga each with a pair of lateral yellowish brown spots which are covered with yellowish gray pollinosity, subquadrate in shape, shorter than $1/2$ length of each tergum, and close to black anterior margin of each tergum; sterna blackish brown, grayish brown pollinose. Abdominal terga clothed with short black and pale yellow hairs above, long yellow hairs at sides, in some specimens hairs on posterolateral margin of each tergum black.

Male genitalia (Figs. 7. C, D) : Surstylus long and slender, subparallel throughout its length, its thumb-like process large; hypandrium slightly excavated posterolaterally ; superior lobe separated from hypandrium by a slender membranous area, dorsoproximal part of superior lobe projecting into a small process ; aedeagus thick, almost straight on dorsal margin, strongly constricted subapically.

Length : Body 8.4-9.0 mm ; wing 7.7-8.4 mm.

Female: Similar to male. Head black; frons yellowish brown pollinose ; lunula and side of ocellar tubercle subshining black; face yellowish brown pollinose, shining on central knob and epistoma. Hairs on frons almost black; facial hairs yellow ; occipital hairs yellowish and mixed with some black ones above, whitish below. Central knob and epistoma moderately produced; median carina of face weaker than in male. Antenna and arista almost as in male.

Thorax black in ground color ; mesonotum subshining black, thinly grayish brown pollinose. Hairs on mesonotum and scutellum almost yellow, shorter than in male. Wing almost as in male; squama and its fringe pale yellow.

Legs almost black with following areas yellowish brown: base and apical $1/3$ of front femur, basal $1/3$ and tip of front tibia, ventral surfaces of 1st and 2nd tarsomeres of front tarsus, base and apical $2/5$ of middle femur, basal $1/3-1/2$ of middle tibia, tip of hind femur and base of hind tibia,

Front femur sparsely clothed with short yellowish hairs, front tibia and tarsus simple; posterior surface of middle femur clothed with longish yellow hairs, mixed with black ones on apical $1/2$; other parts of legs only short haired. First tarsomere of hind tarsus as thick as apex of hind tibia.

Abdomen almost as in male, but slightly ovate. Sterna yellowish brown, middle part of 1st to 4th sterna dark brown. Abdominal spots almost as in male but shorter; 5th tergum sometimes with a pair of small spots.

Length : Body 7.0-7.5 mm ; wing 7.0-7.1 mm.

GEOGRAPHICAL DISTRIBUTION: This species has been known from Europe. In Japan it is known from the alpine region of Hokkaido and Honshu. This is the first record of this species from Japan.

SPECIMENS EXAMINED: (HOKKAIDO) 1 ♂, Mt. Taisetsuzan, 12. vii. 1960 (K.

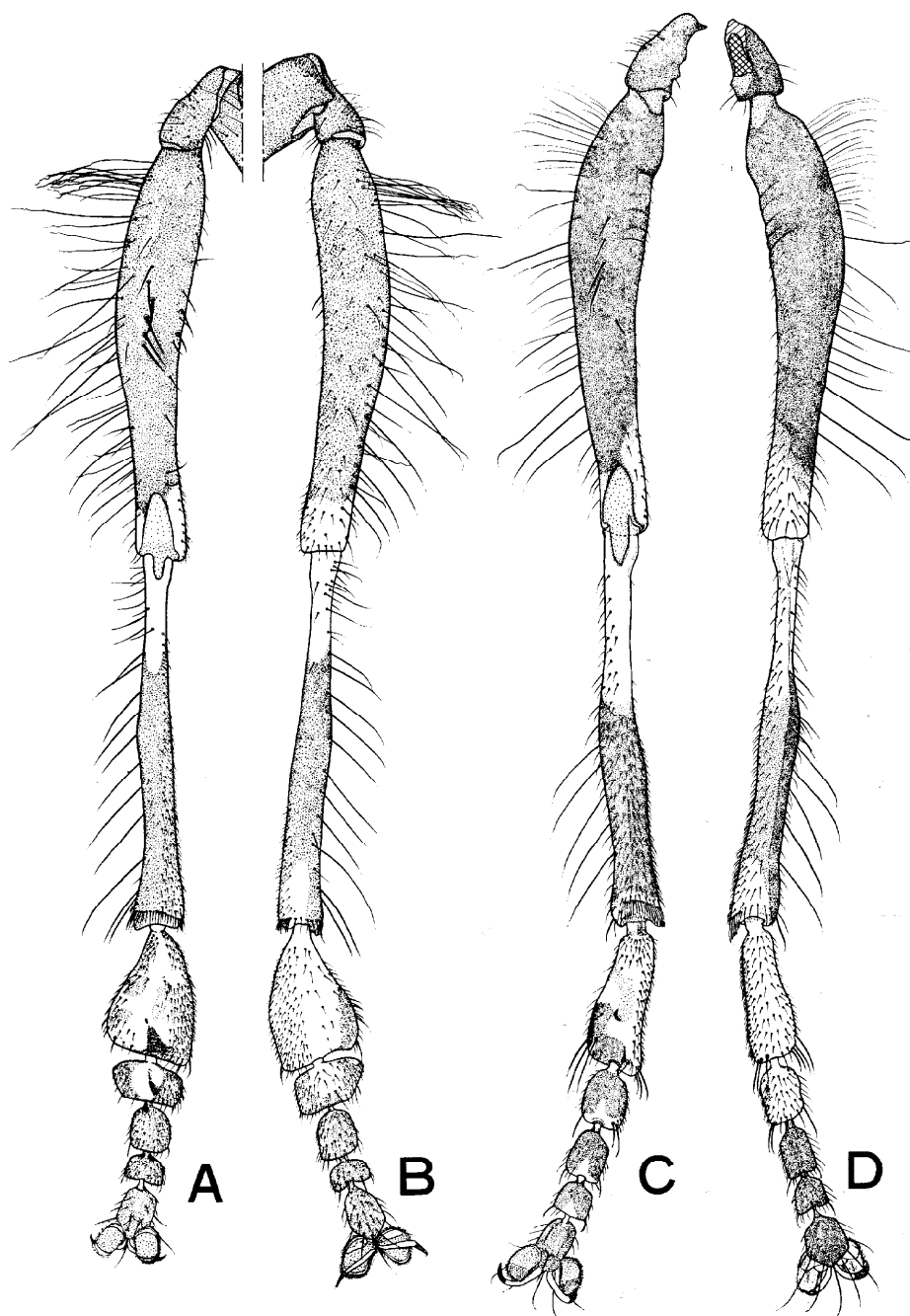


Fig. 9. Male left front legs. A, B: *P. complicatus*; C, D: *P. subcomplicatus* sp. nov. A, C: ventral view; B, D: dorsal view.

Kamijo) ; 1♂, Nagayamadake, Mts. Taisetsuzan, 2. viii. 1966 (T. Kumata) ; 1♀, Mt. Taisetsuzan, 20. vii. 1968 (M. Suwa) ; 1♂, Yukomanbetsu, Mts. Taisetsuzan, 25. vi. 1967; 1♂, Aizankei-Ginmeisui, Mts. Taisetsuzan, 7. vii. 1967; 1♂, Nagayamadake, Mts. Taisetsuzan, 10. vii. 1967; 1♂, Kurodake, Mts. Taisetsuzan, same date, (T. Saigusa) ; 2♂♂, Akadake, 1800-2000 m, Taisetsuzan, 16-23. vii. 1975 (M. Suwa, M. Furukawa, M. Kiuchi & T. Sunose) ; 1♂, Goshikigahara, 1700-1800 m, Taisetsuzan, same date and collectors ; 2♂♂ 1♀, Hakuun-dake, 1900-2200 m, Taisetsuzan, 28. vii.-3. viii. 1975 (M. Suwa, T. Hattori, T. Sunose & A. Sakai) ; 2♂♂, Takanegahara, 1700-1900 m, Taisetsuzan, same date and collectors. (HONSHU) 1♂, Mt. Norikura, Nagano Pref., 22. vii. 1973 (K. Setoya) ; 2♂♂, Mt. Norikura, 2700-2800 m, Nagano Pref., 26. vii. 1979 (K. Ôhara).

Platycheirus subcomplicatus sp. nov.

Male: Head (Figs. 2. E; 5. E) black in ground color ; frons and face grayish brown pollinose ; ventral margin of lunula, central knob and epistoma subshining black; occiput densely yellowish gray pollinose ; ocellar tubercle black, thinly grayish brown pollinose ; antenna and arista brownish black. Frons with many black hairs ; facial hairs sparse, almost black, a few yellowish hairs mixed; occipital hairs almost yellow, a few black hairs mixed on dorsal portion of occiput. Lunula not produced; central knob and epistoma moderately produced; face with a weak median carina above central knob. Third antennal segment longer than wide ; arista thickened on its basal 1/2 (Fig. 4. G).

Thorax black in ground color; mesonotum and scutellum subshining black, brown pollinose ; pleura brown pollinose, Hairs on mesonotum yellowish brown and black, pale yellow on scutellum; mesopleural hairs pale yellow, curled at apices.

Wing hyaline, slightly tinged with brown. Veins blackish brown; stigma yellowish brown ; wing membrane entirely trichose. Halter brownish yellow.

Legs mostly black with following areas yellowish brown : apical 1/5 of front femur, basal 1/2 and tip of front tibia, 1st and 2nd tarsomeres of front tarsus, apical 1/5 of middle femur, basal 1/2 of middle tibia, base and tip of 1st tarsomere of middle tarsus, tip of hind femur, basal 1/6 of hind tibia. Ventral surface of 1st tarsomere of front tarsus slightly darkened at middle, and with a posterior subapical spot 1/4x as long as its length and a minute anterior subapical spot; ventral surface of 2nd tarsomere mostly black, except apical margin.

Front femur with a ventral row of 4-5 short spines before middle, and with a posterior row of black bristly hairs, longer on apical 1/2. Front tibia scarcely dilated, with a posterodorsal row of black hairs, longer and bristly on apical 1/2. Front tarsus slightly dilated; 1st tarsomere about 2.3~ as long as wide; 2nd tarsomere 0.4x as long as 1st. Middle femur with irregu-

lar rows of black bristly hairs on posterior surface, and with anteroventral row of 4-5 bristly hairs on basal 1/2. Middle tibia with a few long black posterodorsal hairs at middle. Hind femur sparsely clothed with long yellowish hairs on anterior and ventral surfaces. Hind tibia with a weak black anterodorsal hairs beyond the middle. First tarsomere of hind tarsus not thickened, and about as long as 2nd to 5th tarsomeres together.

Abdomen black in ground color; dark brown pollinose ; 2nd to 4th terga each with a pair of lateral yellowish brown spots which are covered with yellowish pollinosity ; those on 2nd tergum small and circular, situated at middle; those on 3rd and 4th terga subquadrate in shape, about as long as 1/2 length of each tergum and situated on anterior 1/2 of each tergum. Abdominal terga clothed with short black hairs above, long pale yellow hairs at sides. Sterna black, thinly yellowish brown pollinose, yellow haired.

Male genitalia (Figs. 10. A, B) : Surstylus rather short, subparallel to apex, its thumb-like process short and wide; hypandrium excavated posterolaterally; superior lobe separated from hypandrium by a slender membranous area, twisted apically, dorsoproximal part of superior lobe projecting into a minute process ; aedeagus straight, slender basally, gradually dilating toward weak dorsal swelling.

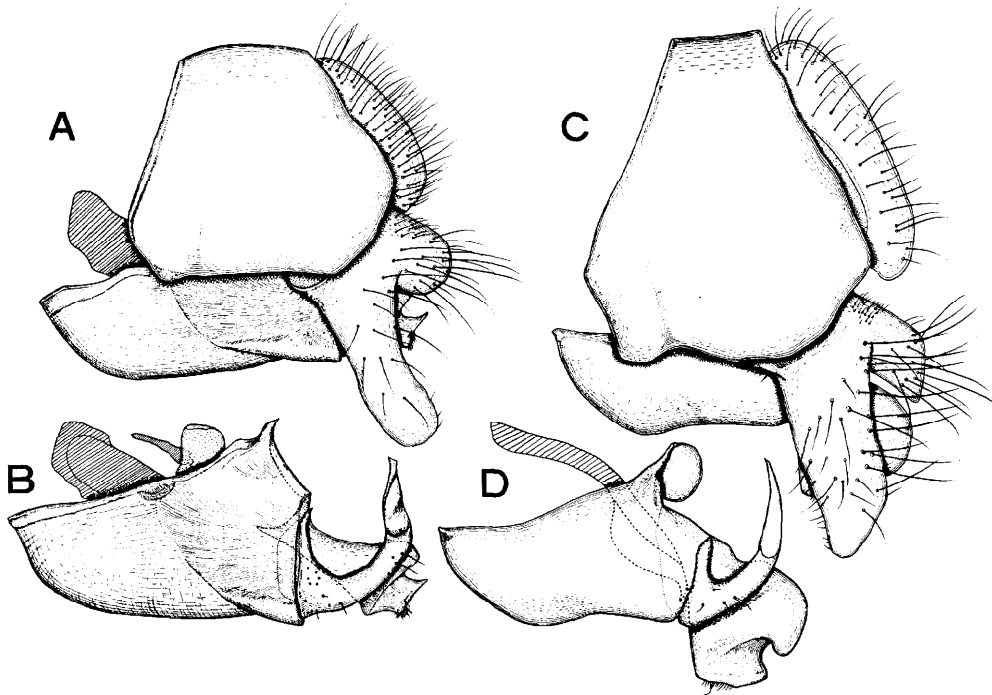


Fig. 10. Male genitalia in lateral view. A, B: *P. subcomplicatus* sp. nov. ; C, D: *P. perpallidus*.
A, C: whole genitalia ; B, D: hypandrium, superior lobe and aedeagus.

Length: Body 9.2 mm; wing 8.3 mm.

Female: Unknown to me.

TYPE-LOCALITY: Mt. Tairoku (950 m), Furano, Kamikawa, Hokkaido, Japan.

GEOGRAPHICAL DISTRIBUTION: This species is known only from the mountain region of the type-locality.

TYPE MATERIAL: Holotype ♂ (Type No. 2207, Kyushu Univ.), Mt. Tairoku, Furano, 4. vii. 1977 (K. Yamagishi).

TYPE DEPOSITORY: Holotype is preserved in the collection of the Entomological Laboratory, Faculty of Agriculture, Kyushu University.

REMARKS: This species appears to be related to *complicatus* Becker, but in the male the shape of 1st tarsomere of the front tarsus, absence of curled recurrent hairs on anterodistal portion of the middle femur, and the distinctive genitalia with twisted superior lobe will at once distinguish it.

***Platycheirus clypeatus* (Meigen, 1822)**

Syrphus clypeatus Meigen, 1822, Syst. Besch., 3: 335.

Platycheirus clypeatus: Staeger, 1842, Naturhist. Tidsskr., 4: 323.

Platycheirus clypeatus: Verrall, 1901, Syrphidae, British Flies 8: 293.

Platycheirus clypeatus: Lundbeck, 1916, Syrphidae, Diptera Danica 5: 216.

Platycheirus clypeatus: Sack, 1930, Syrphidae, Die Fliegen 31: 146.

Male : Head (Figs. 2. F; 5. F) black in ground color ; frons and face gray pollinose; lunula, central knob and epistoma subshining black; occiput densely gray pollinose ; ocellar tubercle black, thinly yellowish gray pollinose ; antenna and arista black. Ocellar tubercle with many brownish hairs, those on anterior portion black ; frons with many black hairs, a few yellowish hairs sometimes mixed; facial hairs abundant, black above, yellowish below; occipital hairs yellow to yellowish white. Third antennal segment longer than wide ; arista thickened on its basal 1/3-1/2 (Fig. 4. H).

Thorax black in ground color ; mesonotum and scutellum subshining black; pleura yellowish gray pollinose. Hairs on mesonotum and scutellum almost yellowish brown ; mesopleural hairs yellowish brown and dark brown; sternopleuron with several black bristly hairs in front near ventromedian line.

Wing hyaline, slightly tinged with brown, darkened at middle. Veins dark brown ; stigma yellowish brown ; squama and its fringe pale brown; wing membrane entirely trichose. Halter yellowish brown.

Legs yellowish brown. All coxae and trochanters black, grayish brown pollinose. Basal 1/3 of ventral surface and subbasal 1/3 of posterior surface of front femur dark brown, these blackish areas sometimes expanded; apical 1/2 of front tibia yellowish white, ventral surface of the tibia with 3 oblique narrow short blackish stripes subapically, of which apical 2 stripes are shifted apically at posterior submargin, middle one of these stripes bearing comb of

setulae which are weaker than in *perpallidus*. Ventral surface of 1st tarsomere of front tarsus pale yellow and with a subapical circular black patch, antero-proximal portion darkened, posteroproximal portion yellowish white except slightly darkened hind margin; 2nd and 3rd tarsomeres with median black patches; ventral surfaces of 3rd to 5th tarsomeres each with small black basal dots. Basal $2/3$ of dorsal and ventral surfaces of middle femur black; middle tibia slightly darkened at median $1/3$. Median $2/3$ of hind femur, median $1/2$ of hind tibia, basal $4/5$ of 1st tarsomere except tip, and 4th and 5th tarsomeres of hind tarsus black.

Front femur with a small posterior tuft of 3-4 long curled silky white hairs near base, and with 3-4 long black bristly posterior hairs subbasally, basal $1/2$ of ventral and posteroventral surfaces of the femur sparsely clothed with shorter black hairs. Front tibia gradually flattened and dilated toward apical $1/3$ which are parallel sided, posterodistal corner produced, and with a few short black hairs on posteroventral surface before middle. Front tarsus flattened and dilated; 1st tarsomere of front tarsus slightly narrower than tip of the tibia, about $1.6\times$ as long as wide, weakly arched on anterior margin, dilated to the middle on posterior margin; 2nd tarsomere slightly narrower than 1st, and about $1/3\times$ as long as 1st. Middle femur with irregular posterior rows of black hairs throughout its length, a ventral row of 3-4 black bristly hairs before middle and a few black anteroventral bristly hairs at middle. Middle tibia with anteroventral and posteroventral rows of black hairs on basal $1/3-1/2$, anteroventral hairs longer than posteroventral ones, these hairs curled at apices. Anterior and posterior surfaces of hind femur sparsely clothed with yellowish hairs, anterior hairs longer on basal $1/2$. Hind tibia with an irregular row of anterodorsal hairs, which are longish and black on middle $1/3$. First tarsomere of hind tarsus slightly thickened, about as long as 2nd to 4th tarsomeres together.

Abdomen black in ground color, dark brown pollinose; 2nd to 5th terga each with a pair of lateral yellowish brown spots, which are covered with grayish yellow pollinosity; those on 2nd tergum small, circular, shorter than $1/2$ length of the tergum, situated on posterior $3/5$; those on 3rd and 4th terga subquadrate in shape, extending just before anterior margin of each tergum, $2/3-3/4$ length of each tergum; those on 5th tergum small and obscure. Abdominal terga clothed with short black hairs above, long yellow hairs at sides. First sternum dark brown, gray pollinose; 2nd to 5th sterna yellowish brown, 2nd sternum darkened at middle in some specimens; sterna short pale yellow haired.

Male genitalia (Figs. 15. A, B) : Surstylus short and wide, gradually tapering toward apex, its thumb-like process large. Dorsomedian portion of hypandrium projecting into small rounded plate; superior lobe weakly fused with hypandrium; aedeagus thick, its dorsal swelling large and strong.

Length : Body 8.4-9.6 mm ; wing 6.8-7.4 mm.

Female: Similar to male ; coloration almost as in male.

Head black in ground color ; frons subshining black, with a pair of large triangular grayish brown pollinose markings at middle; face grayish brown pollinose, subshining on lunula, central knob and epistoma. Hairs on frons and face pale yellow, those on occiput yellowish above, whitish below.

Thorax almost as in male ; hairs on thorax shorter than in male; sternopleuron without distinct bristly hairs.

Legs yellowish brown ; all coxae and trochanters black, grayish brown pollinose; middle of hind tibia, basal 3/4 of 1st tarsomere and 4th and 5th tarsomeres of hind tarsus blackish brown; hind femur darkened beyond middle in some specimens.

Front femur with a small posterior tuft of 2-3 silky white hairs near base, which are shorter than in male; basal 1/3 of ventral and posterior surfaces of the femur sparsely clothed with yellowish hairs ; front tarsus slightly dilated. Middle femur with irregular posterior rows of black and yellowish brown hairs. Hind femur short haired; 1st tarsomere of hind tarsus scarcely thickened and about as long as 2nd to 5th tarsomeres together.

Abdominal spots shorter (shorter than 1/2 length of each tergum).

Length : Body 8.7-10.4 mm ; wing 8.0-8.3 mm.

GEOGRAPHICAL DISTRIBUTION: This species is widely distributed in the Holarctic Region, and in Japan it is known from the marshy places (high moor, river bank and coastal marsh) of Hokkaido and Honshu. This is the first record of this species from Japan.

SPECIMENS EXAMINED : (HOKKAIDO) 2♂♂, Yukomanbetsu, 1040 m, Mts. Taisetsuzan, 25. vi. 1967; 1♂, Aizankei, 1100 m, Mts. Taisetsuzan, 9. vii. 1967 (T. Saigusa) ; 1♀, Numanotaira, 1400 m, Mts. Taisetsuzan, 22. viii. 1977 (S. Ôhara); 11♂♂8♀♀, same locality and date, (K. Ôhara); 2♂♂, Ginmeisui-Rausudaira, Mt. Rausudake, 4. viii. 1967 (T. Saigusa) ; 2♂♂2♀♀, Bonto, Akkeshi, 10. vii. 1977 (K. Yamagishi) ; 1♂, Odaito, on beach, Betsukai, 1. viii. 1967; Onbetsu, on beach, Onbetsu, 31. vii. 1967 (T. Saigusa) ; 3♂♂1♀, Tôro-ko, Kamikawagun, Kushiro, 26. viii. 1977 (K. Ôhara); 1♂, Nukabira-Upepesanke, 550-800 m, 12. vi. 1967; 1♀, Nukabira, 13. vi. 1967; 2♂♂1♀, Berabonai, 200 m, Ashoro, 16. vi. 1967; 1♂, Shotoshibetsu, 340 m, Rikubetsu, 17. vi. 1967 (T. Saigusa) ; 3♀♀, Koshunai, Bibai, 30. vi. 1977 (K. Yamagishi) ; 1♂5♀♀, Mt. Muine, 400-1000 m, Sapporo City, 13. viii. 1977 (K. Ôhara); 1♂1♀, Hokkaido Univ. Exp. Forest, Tomakomai, 18. viii. 1977; 3♂♂1♀, same locality, 19. viii. 1977 (S. Ôhara); 2♂♂4♀♀, same locality, 18. viii. 1977 ; 8♂♂2♀♀, same locality, 19. viii. 1977 (K. Ôhara). (HONSHU) 1♂, Sabishiro beach, Shimokita, Aomori Pref., 20. vi. 1977 (M. Yamamoto) ; 3♂♂3♀♀, same locality and date, (K. Ôhara); 1♀, Mt. Iide, 1700 m, Yamagata Pref., 20. vii. 1975; 1♂, Ozegahara, Gunma Pref., 16. vii. 1975 (O. Yata) ; 4♂♂4♀♀, Senjô-ga-hara, 1400 m, Oku-nikko, Tochigi Pref.,

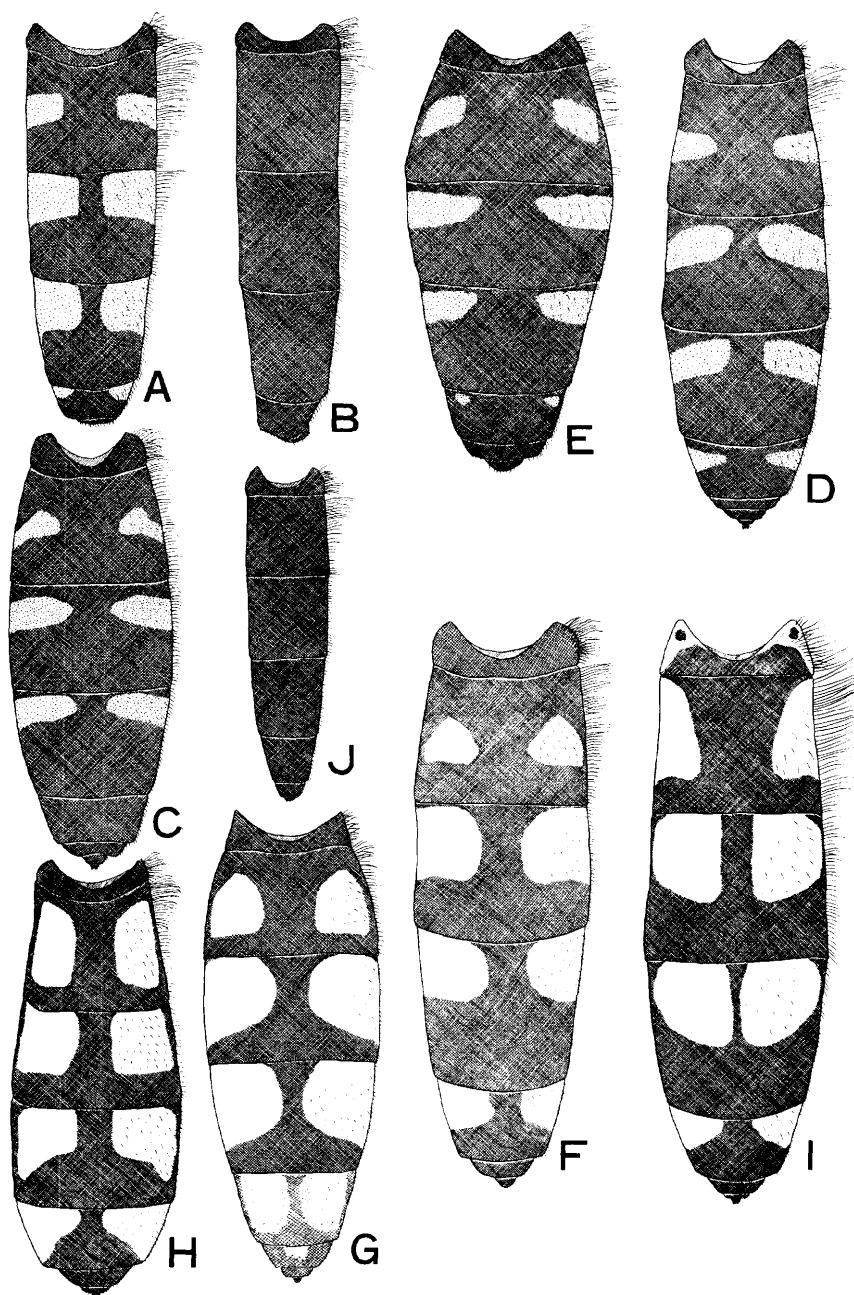


Fig. 11. Male and female abdominal patterns in dorsal view. A, B: male ; C-J: female. A : *P. ambiguus*; B: *P. immaculatus* sp. nov.; C: *P. scutatus*; D: *P. urakawensis*; E: *P. complicatus*; F: *P. clypeatus*; G: *P. perpallidus*; H: *P. pennipes* sp. nov.; I: *P. dux*; J: *P. immaculatus* sp. nov.

19. vi. 1977 (M. Yamamoto) ; 9 ♂♂ 20 ♀♀, same locality and date, (K. Ôhara); 2 ♂♂, Shiga-kôgen, Nagano Pref., 30. v. 1975 (T. Saigusa) ; 1 ♀, Kanayama, Yamanashi Pref., 17. vi. 1975 ; 1 ♂ 1 ♀, same locality, 23. vi. 1975; 5 ♀♀ same locality, 30. vi. 1975 (J. Emoto) ; 1 ♂, Nigorigo Spa, Gifu Pref., 29. viii. 1975 (K. Yano) ; 3 ♂♂, Amô, 1400 m, Hida-kawai, Gifu Pref., 10. vi. 1977; 2 ♀♀, same locality, 12. vi. 1977 (M. Yamamoto) ; 12 ♂♂ 35 ♀♀, same locality, 10. vi. 1977; 5 ♂♂ 17 ♀♀, same locality, 12. vi. 1977 (K. Ôhara); 5 ♂♂ 8 ♀♀, Danto-uradani, 900 m, Kitashidara, Aichi Pref., 15. vi. 1977 (K. Ôhara).

REMARKS: This species is undoubtedly allied to *perpallidus* Verrall, from which, however, it can be distinguished by its 3-4 long black bristly hairs on the posterior surface of front femur in the male, blackish legs and smaller abdominal spots in both sexes.

***Platycheirus perpallidus* Verrall, 1901**

Platycheirus perpallidus Verrall, 1901, Syrphidae, British Flies 8: 290.

Platycheirus perpallidus: Sack, 1930, Syrphidae, Die Fliegen 31: 153.

Male : Head (Figs. 2. G; 13. A) black in ground color ; frons and face densely grayish brown pollinose ; lunula, central knob and cheek subshining black ; occiput densely grayish yellow pollinose ; ocellar tubercle black, grayish brown pollinose ; antenna and arista brownish black. Hairs on frons black; those on ocellar tubercle yellowish brown, and a few blackish hairs mixed on anterior portion ; lunula and central knob very slightly produced; facial hairs abundant and almost pale yellow; occipital hairs yellow to yellowish brown ; 3rd antennal segment slightly longer than wide; arista short, thickened on its basal 1/3 (Fig. 4. I).

Thorax black in ground color; mesonotum and scutellum subshining black; pleura densely grayish brown pollinose. Hairs on mesonotum and scutellum yellowish brown; mesopleural hairs yellowish brown, curled at apices.

Wing hyaline, slightly tinged with brown. Veins brown ; stigma yellowish brown ; squama and its fringe yellowish brown to yellowish white ; wing membrane entirely trichose. Halter yellowish brown.

Legs almost yellowish brown, all coxae and trochanters and 1st tarsomere except tip and 4th and 5th tarsomeres of hind tarsus dark brown to blackish brown; subapical 1/3 of hind femur darkened. Apical 1/3 of front tibia and dorsal surface of 1st tarsomere of front tarsus yellowish white; ventral surface of front tibia almost yellowish brown, slightly darkened apically, apical portion of ventral surface with 3 blackish stripes arising from anterodistal corner, apical 2 of them extending to posterior submargin on subapical portion, 3rd stripe arising just before apical 2 stripes, gradually tapering and hardly extending to subapical portion of anterior submargin, middle one of these stripes

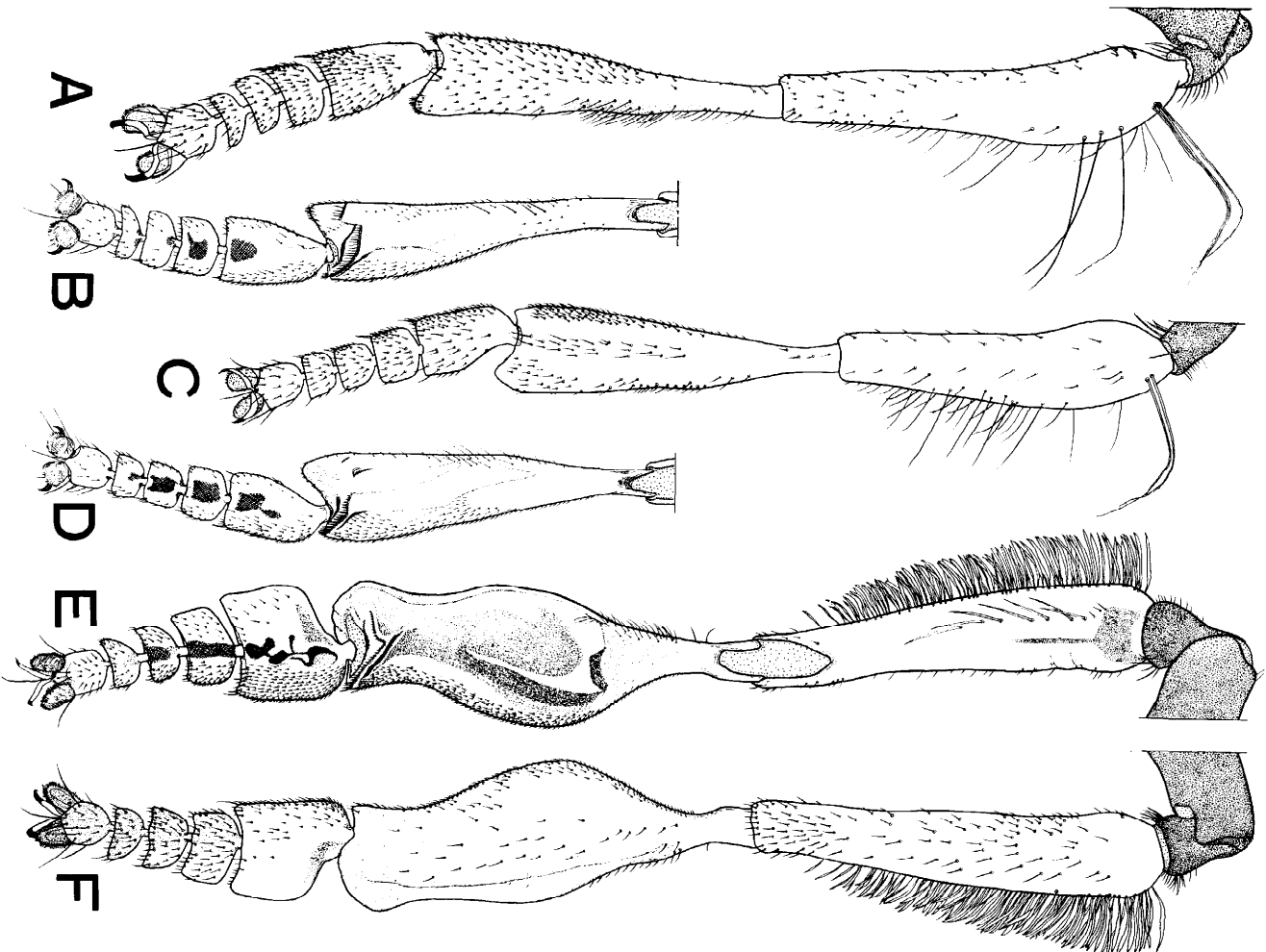


Fig. 12. Male left front legs. A, B: *P. clypeatus*; C, D: *P. perpallidus*; E, F: *P. pennipes* sp. nov. A, C, F: dorsal view; B, D, E: ventral view

bearing comb of setulae; posteroventral portion of front tibia pale yellow to yellowish white on apical 1/2; ventral surfaces of 1st to 4th tarsomeres of front tarsus darkened at middle, 3rd to 5th tarsomeres each with 2 black basal dots.

Front femur with a small posterior tuft of 2-3 curled silky white hairs near base; posterior and posteroventral surfaces of the femur sparsely clothed with long yellowish brown hairs. Front tibia gradually flattened and dilated from base to apex, widest just before tip. Front tarsus flattened and dilated, widest at apex of 1st tarsomere, gradually narrowing apically; 1st tarsomere narrower than tip of tibia, about $1.5\times$ as long as wide, dilated to the middle on posterior margin; 2nd tarsomere slightly narrower than 1st, and about $1/2\times$ as long as 1st. Middle femur with an anteroventral row of 5-6 black recurrent hairs and 1-2 similar posteroventral hairs subapically; posteroventral and posterior surfaces sparsely clothed with long yellowish brown hairs on basal 1/2, those on apical 1/2 blackish. Middle tibia with an anteroventral row of yellowish brown curled decumbent hairs on basal 2/3, which are tangled with each other at apices. Anterior and posterior surfaces of hind femur clothed with short yellowish brown hairs. First tarsomere of hind tarsus slightly thickened, about as long as 2nd to 4th tarsomeres together.

Abdomen black in ground color, dark brown pollinose; 2nd to 5th terga each with a pair of large lateral yellowish brown spots, which are covered with grayish yellow pollinosity; those on 2nd tergum extending from anterior 1/4 to posterior submargin of tergum; those on 3rd and 4th terga subquadrate in shape, extending from anterior margin to posterior submargin of each tergum. Sterna dark yellowish brown, short yellow haired. Abdominal terga clothed with short yellowish brown hairs above, long yellowish hairs at sides.

Male genitalia (Figs. 10. C, D) : Much resembling those of *clypeatus*.

Length : Body 7. O-S. 2 mm; wing 5.2-6.5 mm.

Female: Very similar to male, differing as follows : frons shining black on dorsal 1/2, yellowish brown pollinose on ventral 1/2, subshining at middle; face grayish brown pollinose, central knob and epistoma subshining; occiput densely grayish brown pollinose; hairs on frons and face pale yellow; mesopleural hairs pale yellow to whitish; hairs on head and thorax shorter than in male.

Legs almost yellowish brown; all coxae and trochanters black; 1st tarsomere except tip and 4th and 5th tarsomeres of hind tarsus darkened. Front femur with a small posterior tuft of 2-3 silky white hairs near base, which are shorter than in male; front tarsus slightly dilated. Abdominal spots shorter.

Length : Body 7.0-8.5 mm; wing 5.5-7.2 mm.

GEOGRAPHICAL DISTRIBUTION: This species is widely distributed in the Hol-

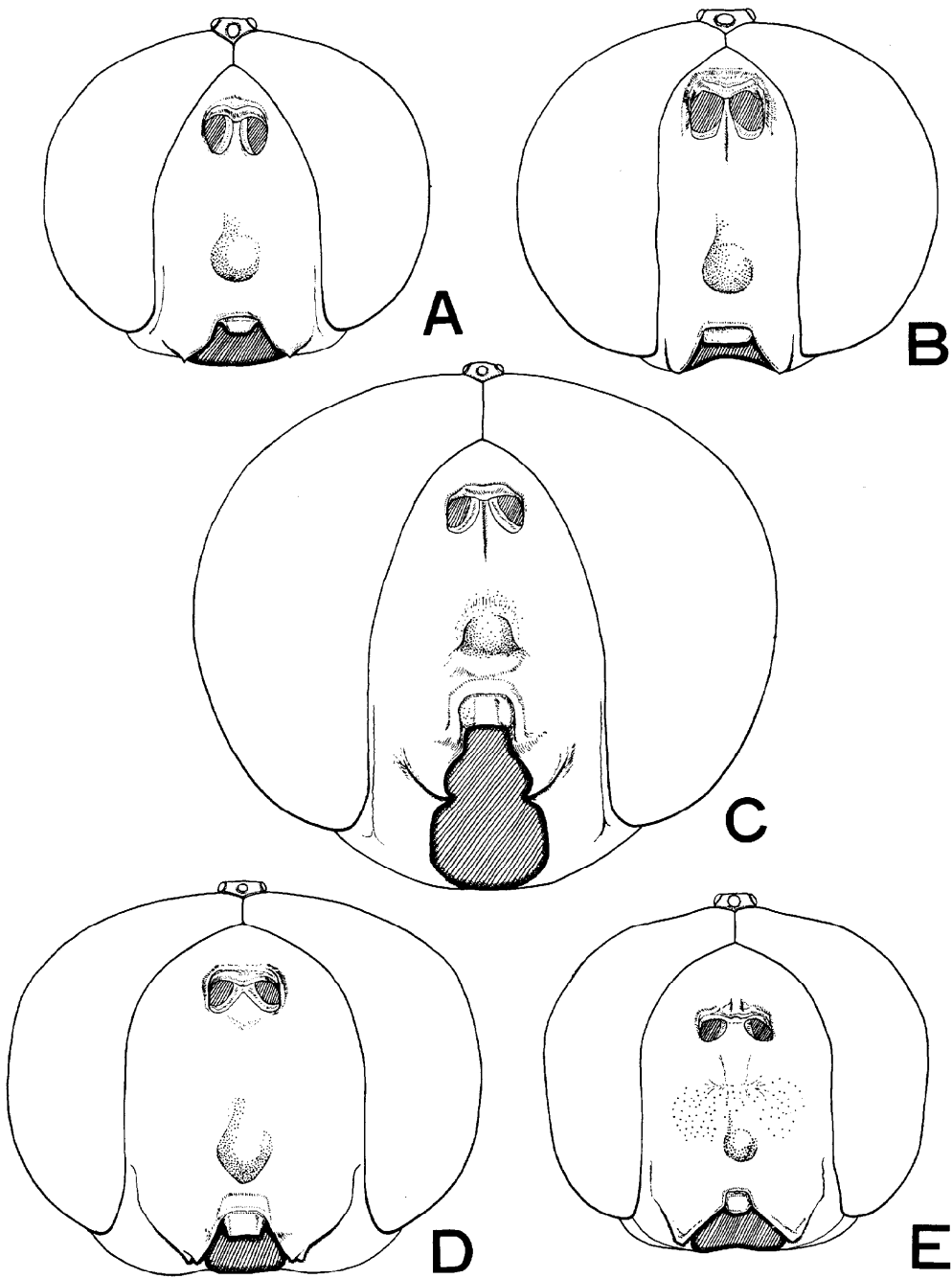


Fig. 13. Male heads in frontal view (hairs are omitted). A : *P. perpallidus*; B: *P. pennipes* sp. nov. ; C: *P. dux*; D: *P. ambiguus*; E: *P. immaculatus* sp. nov.

arctic Region, and in Japan it is known from the coastal marsh of Hokkaido. This is the first record of this species from Japan.

SPECIMENS EXAMINED: (HOKKAIDO) 2♂♂ 1♀, Onbetsu, on beach, Onbetsu, 31. vii. 1967; 3♂♂ 1♀, Hamakoshimizu, on beach, Shari, 3. viii. 1967 (T. Saigusa).

***Platycheirus pennipes* sp. nov.**

Male: Head (Figs. 2. H; 13. B) black in ground color; frons yellowish gray pollinose; face light gray pollinose; lunula, central knob and epistoma subshining black; occiput densely gray pollinose; antenna and arista entirely black. Hairs on frons short and yellow, blackish on anterolateral portion; ocellar tubercle with yellow hairs, a few blackish hairs sometimes mixed on its anterior portion; lunula much produced; central knob and epistoma slightly produced; facial hairs abundant and entirely pale yellow; occipital hairs yellowish brown above, yellowish white below; 3rd antennal segment as long as wide; arista short and rather thick, thickened on its basal 2/3 (Fig. 4. J).

Thorax black in ground color; mesonotum and scutellum shining black on disk, yellowish gray pollinose at sides; pleura yellowish brown pollinose. Hairs on mesonotum and scutellum yellowish brown; mesopleural hairs yellow, curled at apices.

Wing hyaline, slightly tinged with yellowish brown, darkened at middle, darker than in *clypeatus*. Veins dark brown to yellowish brown; stigma yellowish brown; squama and its fringe pale yellowish brown; wing membrane entirely trichose except 1st costal cell. Halter yellowish brown to pale brown.

Legs almost yellowish brown, following areas black: all coxae and trochanters, basal 1/2-2/3 of ventral surface of middle femur, 5th tarsomere of middle tarsus, middle 1/3-1/2 of hind tibia, 1st tarsomere of hind tarsus except tip, 4th and 5th tarsomeres of hind tarsus. Dorsal surface of front tibia and basal 3 tarsomeres of front tarsus whitish yellow, the former darkened along anterior submargin; ventral surface of front tibia yellowish brown, with a moderately broad dark brown band on apical 2/3, the band bordered basally with a transverse orange brown stria, apically with an oblique slender brown stria and striated with longitudinal white stripe on basal 3/5, the ventral surface also with a small dark spot on posterodistal portion; ventral surfaces of 1st to 3rd tarsomeres of front tarsus with a median dark stripe which may disappear on 3rd tarsomere.

Front femur with characteristic posterior fringe of many yellowish brown sub-pennate bristles and a ventral row of yellowish white stiff hairs on basal 1/2. Front tibia much flattened and dilated on apical 2/3, widest at middle, with posterior submarginal ridge on apical 2/3. Front tarsus flattened and dilated, widest at middle of 1st tarsomere, 1st tarsomere subequal in width to tip of tibia, about as long as wide, expanded anteroproximally, and strongly

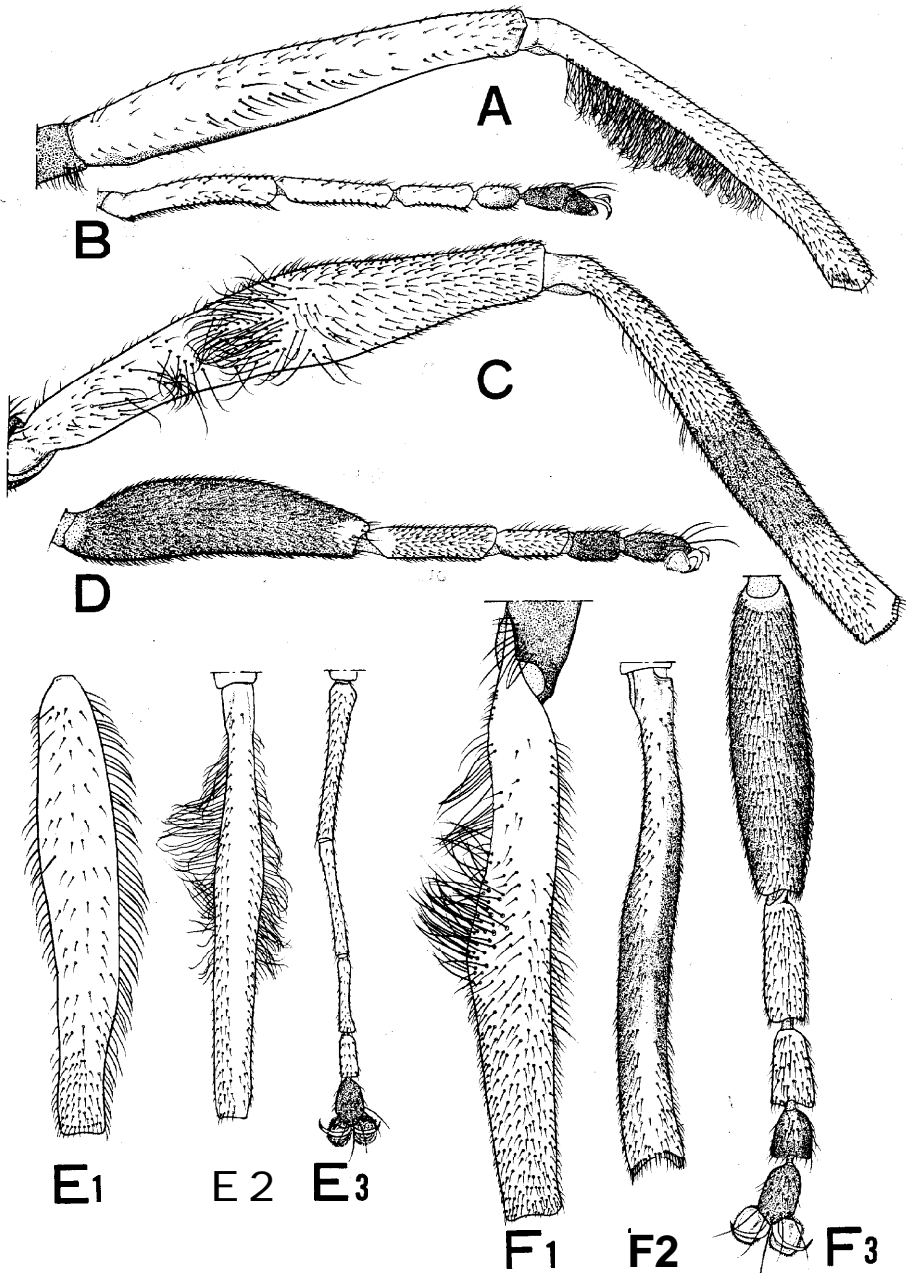


Fig. 14. Male left middle and hind legs of *P. pennipes* sp. nov. A, B, E₁-E₃: middle leg; C, D, F₁-F₃: hind leg. A-D: frontal view; E₁-E₃, F₁-F₃: dorsal view.

dilated to the basal $1/3$ on posterior margin; 2nd tarsomere about $1/3 \times$ as long as 1st. Middle femur with an anterior row of short black spine-like hairs which are longer at middle, and with a posterior row of short yellowish brown bristly hairs. Middle tibia slightly curved ventrally, its ventral surface densely clothed with long curled yellowish brown hairs, mixed with a few black hairs at middle of posteroventral surface. Middle tarsus compressed laterally except apical tarsomere. Hind femur moderately thickened beyond middle, basal $3/5$ of anterior surface with long yellow hairs which are curled at apices and compose of a large hair mass at middle, and with short yellow hairs on basal $4/5$ of posterior surface. Hind tibia bisinuate, only short haired, slender on basal $1/3$, and slightly thickened on apical $2/3$. First tarsomere of hind tarsus remarkably thickened, about as long as 2nd to 5th tarsomeres together.

Abdomen black in ground color, dark brown pollinose; 2nd to 5th terga each with a pair of lateral yellowish brown spots; those on 2nd tergum extending from anterior submargin to posterior submargin; those on 3rd and 4th terga subquadrate in shape, extending from anterior margin to posterior submargin of each tergum; those on 5th tergum small. Abdominal terga clothed with short black and yellow hairs above, long pale yellow hairs at sides. First sternum black, densely grayish yellow pollinose; 2nd to 5th sterna yellowish brown, thinly gray pollinose.

Male genitalia (Figs. 15. C, D) : Much resembling those of *clypeatus*.

Length : Body 8.0-9.1 mm ; wing 6.2-7.3 mm.

Female : Similar to male. Head differing as follows : frons subshining black, with a pair of large gray pollinose markings at middle ; hairs on frons entirely pale yellow; hairs on head shorter.

Thorax differing as follows : mesopleural pollinosity yellowish gray; hairs on thorax shorter; squama and its fringe pale yellow to yellowish white; halter yellowish brown.

Legs yellowish brown ; all coxae and trochanters black, 5th tarsomere of middle tarsus, middle of hind tibia, basal $2/5$ of 1st tarsomere and whole of 4th and 5th tarsomeres of hind tarsus blackish.

Front femur with short yellowish white hairs on posterior surface. Front tibia and tarsus slightly dilated. Posterior surface of middle femur with 2-3 posterior rows of short yellowish hairs, a number of black hairs mixed on apical $1/2$; middle tarsus slightly compressed laterally on 2 basal tarsomeres. Hind femur moderately thickened at middle, basal $2/3$ of anterior and posterior surfaces of the femur with many short whitish hairs; 1st tarsomere of hind tarsus scarcely thickened, about as long as 2nd to 5th tarsomeres together.

Abdomen : lateral spots smaller; lateral hairs shorter and pale yellow to whitish ; sterna almost yellowish brown.

Length : Body 9.1-9.6 mm ; wing 6.9-7.2 mm.

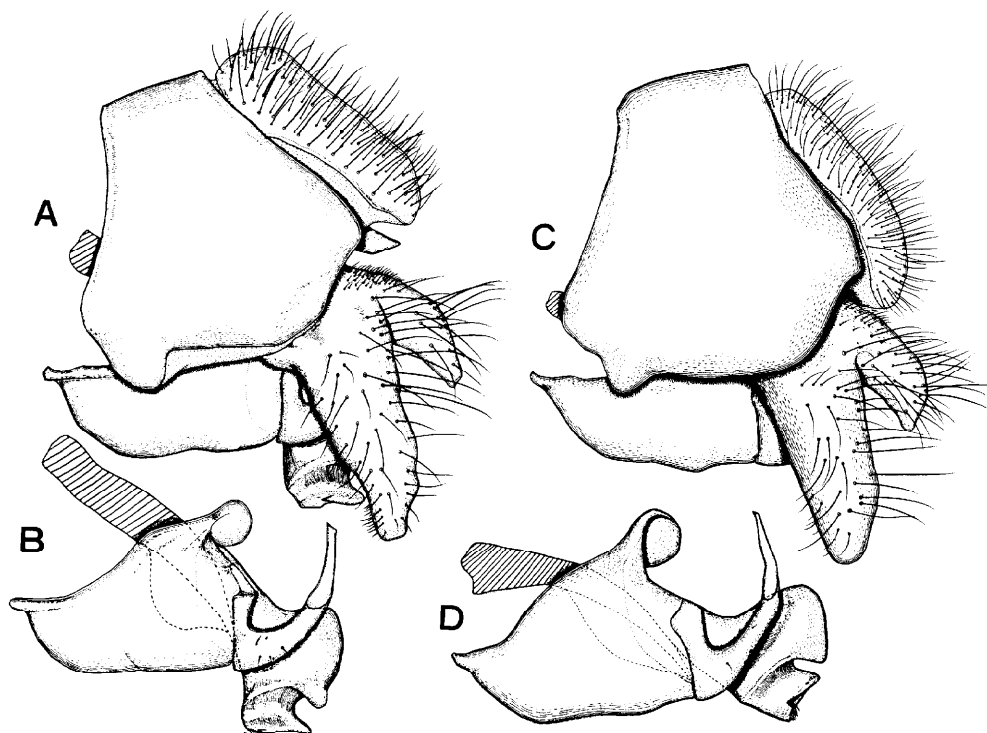


Fig. 15. Male genitalia in lateral view. A, B: *P. clypeatus*; C, D: *P. pennipes* sp. nov. A, C: whole genitalia; B, D: hypandrium, superior lobe and aedeagus.

TYPE-LOCALITY: Tsuchiura, Tsuchiura City, Ibaraki Pref., Honshu, Japan.

GEOGRAPHICAL DISTRIBUTION: This species is known from marshy places, such as high moor, river bank and coastal marsh, of Honshu and Kyushu.

TYPE MATERIAL: Holotype ♂ (Type No. 2208, Kyushu Univ.), Tsuchiura, Ibaraki Pref., 17. vi. 1977 (K. Ôhara). Paratypes: 1♂, Kasumigaura, Tsuchiura City, Ibaraki Pref., 11. v. 1977; 1♂4♀♀, same locality and date as holotype, (M. Yamamoto); 2♂♂4♀♀, same data as holotype; 2♂♂1♀, Senjô-ga-hara (1400 m), Oku-nikko, Tochigi Pref., 19. vi. 1977 (K. Ôhara); 12♂♂36♀♀, Sabisshiro beach, Shimokita, Aomori Pref., 20. vi. 1977 (M. Yamamoto); 6♂♂45♀♀, same locality and date, (K. Ôhara); 1♂2♀♀, Onga river bank, Onga-gun, Fukuoka Pref., 8. vi. 1974 (M. Yamamoto).

TYPE DEPOSITORY: Holotype is preserved in the collection of Entomological Laboratory, Faculty of Agriculture, Kyushu University.

REMARKS: This new species is quite distinct from any other Japanese species by reason of its posterior fringe of sub-pennate bristles on the male front femur. This species appears to be related to *clypeatus* and *perpallidus*, as the male genitalia of these three species are quite similar to each other. But the new species can be easily distinguished from allied species by its rounded

3rd antennal segment and much produced lunula in both sexes, and strongly dilated front tibia and compressed middle tarsus in the male.

***Platycheirus dux* Violovitsh, 1957**

***Platycheirus dux* Violovitsh, 1957, Rev. Ent. URSS. 36: 749. (*Platycheirus*)**

Male : Head (Figs. 2. I; 13. C) black in ground color ; frons and face yellow pollinose; lunula, central knob, epistoma and cheek subshining black; occiput densely yellowish gray pollinose ; ocellar tubercle black, thinly yellowish brown pollinose; antenna brownish black, 3rd segment paler than basal 2 segments, arista dark brown. Frons and ocellar tubercle with black hairs; lunula not produced; central knob and epistoma conspicuously produced. Facial hairs sparse, pale yellow to yellow, sometimes a few black hairs mixed.; occipital hairs almost yellow, a few black hairs mixed above. Third antennal segment longer than wide; arista rather long and slender, thickened on its basal 1/4 (Fig. 4. K).

Thorax black in ground color; mesonotum and scutellum subshining black; pleura grayish brown **pollinose**. Hairs on mesonotum black and yellowish brown; those on scutellum yellowish brown ; mesopleural hairs yellowish brown. Hairs on thorax not curled at apices.

Wing hyaline, slightly tinged with brown. Veins dark brown, costa darker; stigma yellowish brown; squama and its fringe pale yellow to yellowish brown; wing membrane entirely trichose except 1st costal cell. Halter pale yellow to yellowish brown.

Legs almost brownish yellow with following areas black: all coxae and trochanters, 3rd and 4th tarsomeres of front and middle tarsi, subapical 1/3 of hind femur except apex, apical 2/3 of hind tibia and hind tarsus.

Front leg simple, tibia and tarsus not dilated. Front and middle femora with long yellow and black hairs on posterior surfaces; front and middle tibiae and tarsi short haired. Anterior surface of hind femur sparsely clothed with longer yellowish hairs on basal 2/3; hind tibia with several anterodorsal longish hairs beyond middle; 1st tarsomere of hind tarsus slender, about as long as 2nd to 5th tarsomeres together.

Abdomen black in ground color, dark brown pollinose; 2nd to 4th terga each with a pair of lateral yellowish brown spots, which expand to anterior margin of each tergum, those on 2nd tergum elongate, widest at posterior 1/3, reaching to posterior submargin; those on 3rd and 4th terga subquadrate in shape, those on 3rd tergum about 4/5 length of the tergum, those on 4th tergum about 1/2 length of the tergum. First to 4th sterna subshining yellowish brown, yellow haired. Abdominal terga clothed with short black hairs above, long pale yellow hairs at sides.

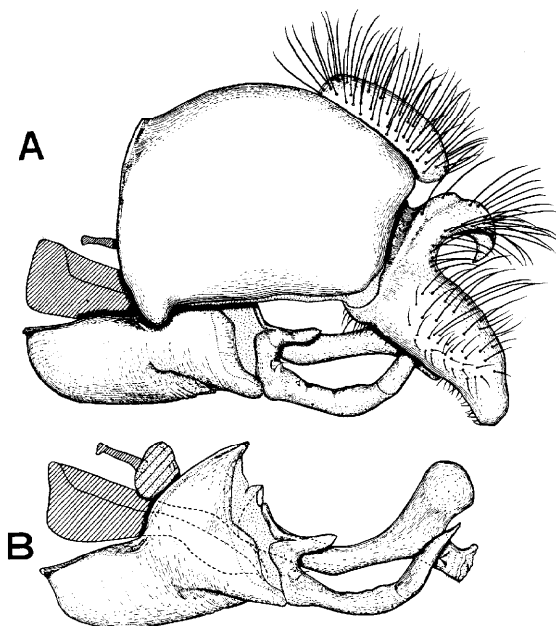


Fig. 16. Male genitalia of *P. dux* in lateral view. A: whole genitalia; B: hypandrium, superior lobe and aedeagus.

Male genitalia (Figs. 16. A, B) : Surstylus short and wide, gradually tapering toward apex, its thumb-like process large, strongly curved ventrally; superior lobe long and weakly curved dorsally, dorsoproximal portion projecting into large process, broadly separated from hypandrium by a membranous area; aedeagus long and slender, dorsal swelling large, a pair of small denticles situated subapically, gonopore not sclerotized but membranous.

Length : Body 11.4-12.2 mm ; wing 10.5-11.0 mm.

Female : Very similar to male, but differing as follows : hairs on head and thorax shorter than in male; wing veins paler; following areas of wing membrane without microtrichia, 1st costal cell, basal 1/3 of 2nd basal cell and anal cell narrowly behind anal vein as far as the level of fork of Rs; hairs on front and hind femora shorter; abdominal spots shorter, posteroproximal angle of each spots produced; lateral portion of 1st abdominal tergum yellowish brown; 5th abdominal tergum with a pair of small lateral spots.

Length : Body 11.1-11.6 mm ; wing 9.5-10.0 mm.

GEOGRAPHICAL DISTRIBUTION: This species is distributed in Eastern Asia- including the Kurile Islands, and in Japan it is known from the mountain region and sub-alpine region of Hokkaido, Honshu and Shikoku. This is the first record of this species from Japan.

SPECIMENS EXAMINED : (HOKKAIDO) 1 ♂, Aizankei-Ginmeisui, Mts. Taisetsuzan, 7. viii. 1967 (T. Saigusa) ; 1 ♀, Mt. Yubaridake, Sorachi, 16. viii. 1967 (H. Shi-

ma). (HONSHU) 1♂, Mt. Iide (1700 m), Yamagata Pref., 20. vii. 1975 (O. Yata); 1♂3♀♀, Amô (1400 m), Hida-kawai, Gifu Pref., 12. vi. 1977 (K. Ôhara); 1♂, same locality and date, (M. Yamamoto), [SHIKOKU] 182♀♀, Mt. Tsurugisan, Tokushima Pref., 23. v. 1979 (Y. Shôno).

REMARKS: This species is distinct from any other species in the following characters : strongly produced face, simple male front leg, absence of any ornamental hairs on legs and slender aedeagus of male genitalia with subapical small denticles and membranous gonopore.

Platycheirus ambiguus (Fallen, 1817)

Scaeva ambigua Fallén, 1817, Dipt. Suec. Syrph., 47: 21.

Melanostoma ambiguus: Verrall, 1901, Syrphidae, British Flies 8: 304.

Melanostoma ambiguus: Lundbeck, 1916, Syrphidae, Diptera Danica 5: 229.

Melanostoma ambiguus: Sack, 1930, Syrphidae, Die Fliegen 31: 158.

Melanostoma ambiguus: Kimura, 1953, Kontyû no Kagaku 1(2): 10.

Platycheirus ambiguus: Andersson, 1970, Ent. scand. 1: 237.

Platycheirus ambiguus: Nielsen, 1974, Norsk. ent. Tidsskr. 21: 170.

Melanostoma ambiguus: Hara, 1978, Fauna of Saitama Pref.: 59.

Male : Head (Figs. 4. A; 13. D) black in ground color ; frons and face densely pale gray pollinose; lunula, central knob, epistoma and cheek subshining black ; occiput densely gray pollinose ; ocellar tubercle black, thinly gray pollinose ; antenna and arista dark brown, ventral surface of 3rd segment yellowish brown. Hairs on frons and face black, a few yellowish hairs mixed; lunula not produced ; central knob and epistoma slightly produced; occipital hairs almost yellow, a few black hairs mixed on dorsal portion of occiput, Third antennal segment longer than wide ; arista short, thickened on its basal 1/3 (Fig. 4. L).

Thorax black in ground color; mesonotum and scutellum subshining black, thinly grayish brown pollinose; pleura densely grayish brown pollinose. Hairs on mesonotum and scutellum pale yellow, curled at apices, a few blackish hairs mixed; mesopleural hairs pale yellow, curled at apices.

Wing hyaline, slightly tinged with brown, and following areas without microtrichia : 1st costal cell, base of 2nd costal cell, basal 1/4 of cell R₁, 1st basal cell as far as the level of node of supracubital vein except base, anterior 1/2 of 2nd basal cell as far as the level of node of supracubital vein. Veins dark brown, costa more darkened ; stigma brownish yellow; squama and its fringe yellowish white. Halter yellowish brown.

Legs mostly brownish black with following areas yellowish brown: front femur, basal 1/3 of front tibia, ventral surfaces of 1st to 4th tarsomeres and entire 5th tarsomere of front tarsus, base and apical 1/2 of middle femur, basal 1/3 and tip of middle tibia, base and tip of hind femur, basal 1/4 of

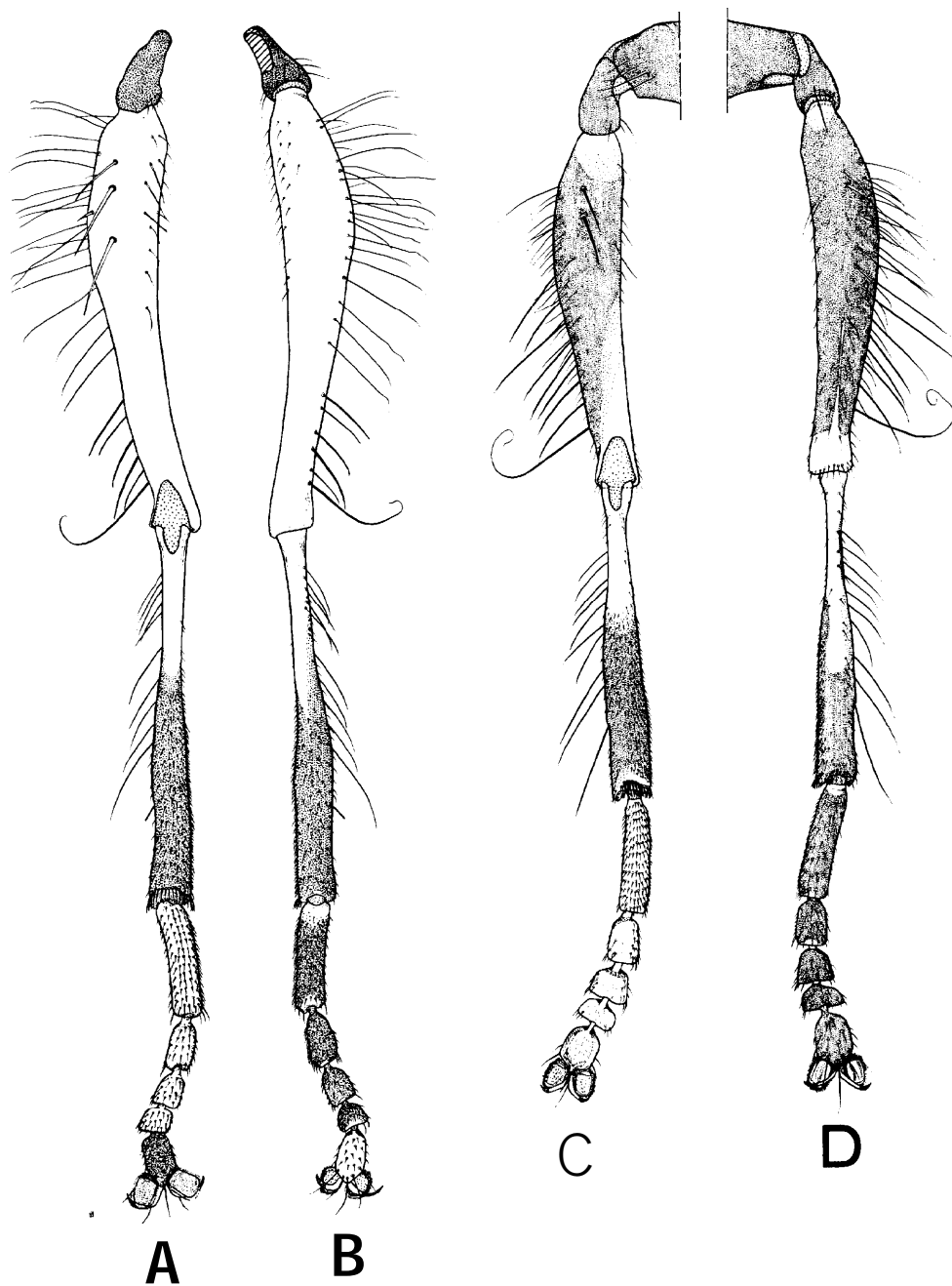


Fig. 17. Male left front legs. A, B: *P. ambiguus*; C, D: *P. immaculatus* sp. nov. A, C: ventral view; B, D: dorsal view.

hind tibia.

Front femur with 3-4 long yellow ventral bristles on basal 1/2, posterior surface of the femur clothed with blackish hairs on basal 1/3, and bearing a posterior row of 7-8 shorter black bristles on apical 1/3, apical one of these bristles longest and strongly curved proximally at apical 1/2, other bristles blunt ended; front tibia scarcely dilated, with a posterior row of about 10 black bristly hairs on basal 2/3; front tarsus not dilated. Middle femur with a ventral yellow bristle before middle, and with irregular rows of black and yellowish hairs, which are curled at apices; middle tibia with a posterodorsal row of decumbent black hairs which are tangled with each other at apices. Anterior and anteroventral surfaces of hind femur sparsely clothed with long yellowish hairs, which are curled at apices; hind tibia with an anterodorsal row of black hairs; 1st tarsomere of hind tarsus moderately thickened, about as long as 2nd to 5th tarsomeres together.

Abdomen black in ground color; dark brown pollinose ; 2nd to 4th terga each with a pair of lateral bluish gray pollinose markings, those on 2nd tergum of small transverse bar, those on 3rd and 4th terga subquadrate in shape, occupying anterior 1/2 of each tergum, narrowly expanding posteriorly along lateral margin ; sterna black, dark grayish brown pollinose. Abdominal hair pale yellow, longer and curled at apices at sides of terga.

Male genitalia (Figs. 18. A, B) : Surstylus long, tapered near apex, its thumb-like process moderately thick; hypandrium slightly excavated at lateral portions; superior lobe rather short, separated from hypandrium by a slender membranous area, and with a small triangular keel at apical excavated portion; aedeagus short, strongly dilated toward prominent dorsal swelling.

Length : Body 8.4 mm; wing 6.9 mm.

Female: Unknown to me.

GEOGRAPHICAL DISTRIBUTION: This species is widely distributed in the Holarctic Region, and in Japan it is known from Honshu.

SPECIMEN EXAMINED: (HONSHU) 18, Kyoto, Kibune, 19. iv. 1953 (T. Kimura).

***Platycheirus immaculatus* sp. nov.**

Male : Head (Figs. 4. B; 13. E) black in ground color ; frons and ocellar tubercle densely brown pollinose ; lunula subshining black ; face subshining black, thinly yellowish gray pollinose at side ; occiput gray pollinose; antenna and arista dark brown, 1st and 2nd segments black, ventral 1/3 of 3rd segment yellowish brown. Hairs on frons, ocellar tubercle and face black; lunula not produced; central knob and epistoma moderately produced; occipital hairs black above, yellowish brown below. Third antennal segment longer than wide, arista short, thickened on its basal 3/5 (Fig. 4. M).

Thorax black in ground color; mesonotum and scutellum subshining black, dark brown pollinose; pleura thinly grayish brown pollinose. Hairs on mesonotum and scutellum dark brown to black; mesopleural hairs dark brown to yellowish brown.

Wing hyaline, tinged with brown. Veins blackish brown; stigma brown to dark brown; squama and its fringe dark brown; wing membrane entirely trichose. Halter dark brown.

Legs mostly brownish black with following areas yellowish brown: bases and apices of all femora, basal 1/2 and tip of front tibia, ventral surface of front tarsus and bases and apices of middle and hind tibiae.

Front femur with 2-3 stiff brownish ventral bristles subbasally, posterior surface of the femur clothed with long black hairs on basal 1/2, and bearing a posterior row of 8-9 long black bristles on apical 1/2, apical one of these bristles longest, strongly curved apically, other bristles pointed. Front tibia scarcely dilated, with a posterior row of about 10 long black bristly hairs on basal 2/3. Front tarsus not dilated. Middle femur with a posteroventral row of black hairs and many short brownish hairs on basal 1/2 of anterodorsal surface, without a distinct ventral bristle. Middle tibia with a posterodorsal row of decumbent black hairs on basal 3/4, which are tangled with each other at apices. Anterior surface of hind femur sparsely clothed with long pale yellow hairs on basal 3/4, mixed with a few black hairs; posterior surface of the femur clothed with short pale yellow hairs. Hind tibia with a row of short black anterodorsal hairs becoming longer beyond the middle. First tarsomere of hind tarsus slightly thickened, about as long as 2nd to 4th tarsomeres together.

Abdomen black in ground color, dark brown pollinose; abdominal terga without any lateral spot or marking; sterna subshining dark brown. Abdominal terga sparsely clothed with short black hairs above, long pale yellow hairs at sides. Abdomen narrower than in *ambiguus*.

Male genitalia (Figs. 18, C, D) : Surstylus long, tapered near apex, its thumb-like process slender; hypandrium strongly excavated at lateral portions; superior lobe rather short, separated from hypandrium by a slender membranous area, and with a small triangular keel at apical excavated portion, which is broader than in *ambiguus*; aedeagus short, evenly dilated toward weak dorsal swelling.

Length : Body 7.0-7.7 mm ; wing 5.6-5.9 mm.

Female: Very similar to male but differing as follows : frons shining black, with a pair of small triangular gray pollinose markings at middle; hairs on face pale yellow; occipital hairs almost pale yellow, a few blackish hairs mixed above; squama and its fringe paler; halter yellowish brown to brown.

Legs almost yellowish brown with the following areas dark brown to brown: all coxae and trochanters, apical 1/2 of hind femur ; basal 3/4 of hind

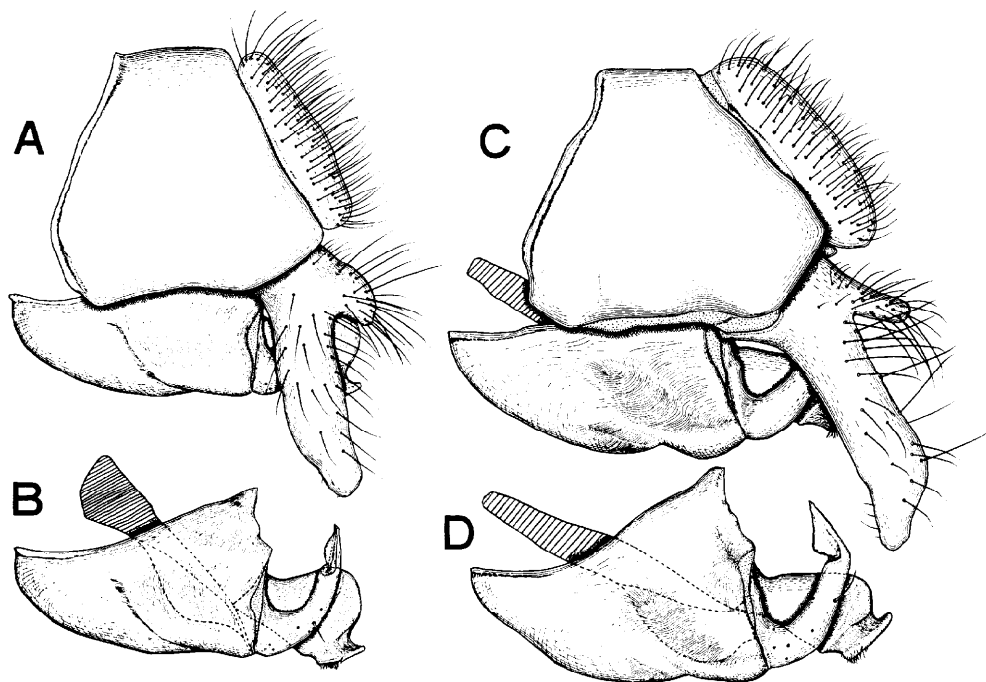


Fig. 18. Male genitalia in lateral view. A, B: *P. ambiguus*; C, D: *P. immaculatus* sp. nov.
A, C: whole genitalia; B, D: hypandrium, superior lobe and aedeagus.

tibia, hind tarsus. Middle of front femur, apical 1/2 of front tibia, middle femur and middle tibia sometimes darkened. Front femur with many short pale yellow hairs on posterior surface. Middle femur clothed with short yellowish and a few black hairs on posterior surface. Hind femur clothed with short yellow hairs on anterior and posterior surfaces. All tibiae short haired.

Length : Body 6.7-7.2 mm ; wing 5.4-5.7 mm.

TYPE-LOCALITY: Kuruson-kyo, Ebino City, Miyazaki Pref., Kyushu, Japan.

GEOGRAPHICAL DISTRIBUTION: This species is known from Honshu and Kyushu.

TYPE MATERIAL: Holotype ♂ (Type No. 2209, Kyushu Univ.), Kuruson-kyo, Miyazaki Pref., 22. iv. 1976 (K. Ôhara). Paratypes : 4 ♀♀, Kanayama, Masutomi, Yamanashi Pref., 16. vi. 1975, Malaise Trap, (J. Emoto) ; 1 ♂ 1 ♀, Mt. Hikosan, Fukuoka Pref., 27. iv. 1973 (K. Takeno) ; 2 ♂♂, same locality, 30. iv. 1975 (K. Ôhara) ; 1 ♂ 1 ♀, Mt. Hakuchôzan (1300 m), Izumimura, Kumamoto Pref., 26. v. 1978 (K. Ôhara) ; 1 ♂, Kikuchi, Kumamoto Pref., 27. iv. 1979 (H. Makihara).

TYPE DEPOSITORY: Holotype is preserved in the collection of Entomological Laboratory, Faculty of Agriculture, Kyushu University.

REMARKS: This species is quite distinct from any other species of the genus *Platycheirus* in having the uniformly black abdomen in both sexes. This spe-

cies appears to be related to *ambiguus* (Fallen) and *fjellbergi* Nielsen in the simple male front leg. Although the new species has no abdominal spot or marking, it is quite similar to *ambiguus* in every character except entirely trichose wing membrane and absence of a ventral yellow bristle on ventral surface on **middle femur**.

Acknowledgements

I wish to express my gratitude to Prof. Y. Hirashima and Assoc. Prof. K. Morimoto of the Entomological Laboratory, Kyushu University, for their kind guidances. My cordial thanks are also due to Prof. T. Saigusa and Mr. H. Shima of Biological Laboratory, College of General Education, Kyushu University, for their kind guidances in preparing this manuscript, to Dr. T. R. Nielsen of Norway, for kindness giving me valuable advices and European materials, and to Assoc. Prof. S. Takagi and Dr. M. Suwa of Entomological Institute, Hokkaido University, for their kind permission to examine specimens in the collection of Hokkaido University. The specimens used in this paper were collected by the following entomologists to whom I am much indebted: Prof. T. Saigusa and Messrs. A. Nakanishi, H. Shima and O. Yata (Kyushu University), Dr. K. Kusigemati (Kagoshima University), Dr. T. Kimura (Kyoto City), Dr. K. Yano (Yamaguchi University), Assoc. Prof. M. T. Chûjô and Mr. K. Takeno (Hikosan Biological Laboratory, Kyushu University), Mr. Y. Ikezaki (Nagasaki City), Mr. J. Emoto (Nanzan University), Mr. Y. Yoshiyasu (Kyoto Prefectural University), Dr. M. Hayashi (Saitama University), Mr. K. Ueda (Kitakyushu Museum of Natural History), Messrs. H. Makihara, M. Yamamoto, T. Gotô, K. Yamagishi, K. Setoya, N. Kôda, K. Maetô, H. Takemoto and Y. Shôno (Entomological Laboratory, Kyushu University) and Mr. S. Ikudome (Kagoshima City).

References

- Andersson, H., 1970. Taxonomic notes on the genera *Platycheirus* and *Melanostoma* (Dipt., Syrphidae), with lectotype designations. *Ent. scand.*, **1**: 236-240.
- Bañkowska, R., 1963. Syrphidae. *Klucze Oznac. Owad. Pol.* **27**(34): 1-236.
- Becker, T., 1889. Beiträge zur Kenntnis der Dipteren-Fauna von St. Moritz. *Berl. ent. Zeit.* **33**(1): 169-191.
- , 1915. Résultats scientifiques de l'Expédition des frères Kuznecov (Kouznetzov) à l'Oural Arctique en 1909, sous la direction de H. Backlund. Dipt., Syrphidae. *Mém. Ac. Sc.* **28**(7): 60-62.
- Coe, R. L., 1953. Diptera. Family Syrphidae. *Handbr. Ident. Br. Insects* **10**(1): 1-98.
- Curran, C. H., 1927. Synopsis of male of the genus *Platycheirus* St. Fargeau and Serville with descriptions of new Syrphidae (Diptera). *Am. Mus. Novit.* **247**: 1-13.
- Dunn, J. A., 1949. A parasite and predators of potato aphids. *Bull. ent. Res.* **40**(1): 97-122.
- Dušek J., and P. Láská, 1960. Weitere Unbekannte Syrphidenlarven (Diptera, Syrphidae).

- Cas. *Čsl. Spol. Ent.* **57**(4): 371-380.
- Fluke, C. L., 1957. A study of the male genitalia of the Melanostomini (Diptera-Syrphidae). *Trans. Wis. Acad. Sci. Arts Lett.* **46**: 261-277.
- Hara, K., 1978. Diptera of Saitama. *The Fauna of Saitama Prefecture*: 139-176. (In Japanese).
- Ikezaki, Y., 1978. "Notes on the Syrphidae of Kyushu". *Bull. Nagasaki Nishi High School* **5**: 55-66. (In Japanese).
- Kertész, C., 1910. Catalogus Dipteriorum. Syrphidae. *Mus. Nat. Hung.* **7**: 1-367.
- Kimura, T., 1953. "Notes on the Syrphidae of Kyoto". *Kontyû no Kagaku* **1**(2): 9-12. (In Japanese).
- Knutson, L., Thompson, F. C., and J. R. Vockeroth, 1975. Syrphidae. pp. 307-374. In Delfinado, M. D. and D. E. Hardy, *A catalog of the Diptera of the Oriental Region*. II. Honolulu.
- Kuwayama, S., 1967. Familia Syrphidae. *Insect Fauna of the Southern Kurile Islands*: 112-122. (In Japanese).
- Lundbeck, W., 1916. Syrphidae. *Diptera Danica* **5**: 18-594.
- Matsumura, S. and J. Adachi, 1919. Synopsis of the Economic Syrphidae of Japan (IV). *Ent. Mag. Kyoto* **3**(3, 4): 128-144.
- Meigen, J. W., 1822. Familie: Syrphici. *Syst. Besch.*, **3**: 155-339.
- Miller, D., 1921. Material for a monograph on the Diptera fauna of New Zealand: Part II, Family Syrphidae. *Trans. N. Z. Inst.* **53**: 289-333.
- Minamikawa, J. and N. Fukuhara, 1964. On the Syrphid larvae attacking the aphid, *Myzus persicae* Sulzer. *Kontyû* **32**(2): 225. (In Japanese).
- Nielsen, T. R., 1971. Syrphidae (Dipt.) from Jaeren, Norway, I. with description of two new species. *Norsk. ent. Tidsskr.* **18**: 53-73.
- , 1972. *Platycheirus monticolus* nov. sp., a Northern species confused with *P. discimanus* Loew (Dipt., Syrphidae). *Ibid.* **19**: 91-98.
- , 1974. Notes of two northern species of the genus *Platycheirus* St.-Farg. et Serv. (Dipt., Syrphidae). *Ibid.* **21**: 167-172.
- Sack, P., 1932. Syrphidae. In Lindner's "*Die Fliegen palaearkt. Reg.*" **31**: 1-451.
- Séguy, E., 1961. Diptères Syrphides de l'Europe Occidentale. *Mém. Mus. natn. Hist. nat.*, Paris. **23**: 1-248.
- Shiraki, T., 1930. Die Syrphiden des japanischen Kaiserreichs, mit Berticksichtigung benachbarter Gebiete. *Mem. Fac. Agric. Taihoku imp. Univ.*, **1**: i-xx, 1-446.
- Thompson, F. C., 1972. A new *Platycheirus* from New Zealand, first record of a Melanostomine Syrphid fly associated with ants. *N. Z. Jour. Sci.* **15**: 77-84.
- Verrall, G. H., 1901. Syrphidae. *British Flies* **8**: pp. 691+121.
- Violovitsh, N. A., 1957. New palaearctic Syrphidae (Diptera) from the Far Eastern territory of the USSR. *Rev. Ent. URSS*, **36**(3): 748-755. (In Russian).
- , 1960. A contribution to the knowledge of the hover flies fauna (Diptera, Syrphidae) of Sachalin and the Kuril isl. *Horae Soc. ent. Uni. Sov.*: 217-272. (In Russian).
- Vockeroth, J. R., 1969. A revision of the genera of the Syrphini (Syrphidae). *Mem. ent. Soc. Can.* **62**: 1-176.
- Wirth, W. W., Y. S. Sedmann, and H. V. Weems, 1965. Syrphidae. pp. 557-625. In A. Stone et al., *A catalog of the Diptera of America North of Mexico*. Washington.