

New species of the genus *Diostracus* from Eastern Asia (Insecta, Diptera, Dolichopodidae)

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New species of the genus *Diostracus* from Eastern Asia (Insecta, Diptera, Dolichopodidae)*

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Keywords: Taxonomy, zoogeography, Eastern Asia, new species, Insecta, Diptera, Dolichopodidae, *Diostracus*.

Abstract: The following 7 new species of the genus *Diostracus* of the family Dolichopodidae are described from Eastern Asia, and their phylogenetic relationships and zoogeography are discussed: *D. latipennis* of the *tarsalis* group and *D. aristalis* of the *antennalis* group from Japan, *D. nishiyamai* representing its own group from Sichuan, China, *D. bisinuatus* of the *unisetosus* group, *D. janssonorum* of the *quadrisetosus* group, *D. burmanicus* of the *nebulosus* group and *D. malaisei* of the *unipunctatus* group from Kambaiti, Burma.

Introduction

The genus *Diostracus* Loew, 1861, belonging to the subfamily Hydrophorinae, the family Dolichopodidae, had long been supposed to be North American in distribution. In 1968 it was recorded from Asia (Japan and Taiwan) for the first time by Takagi, and then from Nepal Himalaya (Takagi, 1972; Saigusa, 1984), Ussuri (Negrobov, 1980), Saghalin (Negrobov, 1978) and Baikal (Negrobov, 1973, as *Aphrosylus*). In addition, the European *Liancalus leucostomus* Loew, 1861, the type species of *Asphyrotarsus* Oldenberg, 1916, was transferred to the genus (Negrobov, 1991). Thus, up to the present, the genus has been represented by 3 species from North America, 1 from Saghalin, 3 from Ussuri, 1 from Baikal, 10 from Japan, 3 from Taiwan, 37 (and 1 unnamed species) from Nepal Himalaya, and 1 from the European Alps. In the present state of knowledge, the genus is almost restricted to Asia and North America in distribution. All of these species are known to be endemic to each area mentioned above except for some Nepalese species which were recently collected by me in Eastern and Central Bhutan as stated in the following lines. The flies of the genus are all torrenticolous in habitat.

Based on the known distributional ranges of the genus *Diostracus*, Saigusa (1984) presumed its occurrence

in a wide area of Asia including Assam, Bhutan, Northern Burma and Western China. Recently I have had the opportunities to examine the Diptera collections from Kambaiti in N. E. Burma made by R. Malaise, which are now housed in the Zoological Museum, University of Helsinki and the Naturhistoriska Riskmuseet of Stockholm, and some dolichopodid specimens collected in Northern Pakistan by Assoc. Prof. K. Kanmiya, in W. China by Mr. Y. Nishiyama, and in Southern Korea by Assoc. Prof. K. Yamagishi, and found the genus from all these localities. In the summer of 1993, I surveyed dipterous insects of Western to Central Bhutan and collected there many specimens of *Diostracus* belonging to 10 species, most of which are common to Eastern Nepal. Moreover, four undescribed species have been discovered in Japan.

In this paper I present the result of my taxonomic study on the material from Kambaiti, Western China and Japan, and describe 7 new species of the genus from these areas. The following descriptions of the species are mainly based on the external features. The male genital structure is illustrated only for *D. burmanicus*, sp. nov. that is critically important to separate this species from *D. nebulosus* Takagi, 1972. I hope to make a detailed study on the genitalia in a comprehensive work on the genus.

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

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Descriptions

Diostracus latipennis Saigusa, sp. nov.

Diagnosis. Medium-sized, very characteristic species presumably related to *D. tarsalis* Takagi, 1968, from Japan; male with distally dilated basitarsi and basally hooked 2nd tarsomeres of front legs, very long yellow ventral setae on basal 1/2 of middle tibiae, wings broadest at about apical 1/3, then narrowed to tip rather abruptly, the posterior margin there being almost straight or a little emarginate, posteriorly bilobed 4th abdominal sternum armed with strong spines and bristles sublaterally and posteriorly, and long, slender, curved, and long-setose cerci.

Description. Male. Head dull dark bluish green, fairly densely pollinose, the pollinosity dark brown on vertex, frons and face, dark greyish brown on occiput; clypeus yellowish green with greyish pollinosity thinner and whiter towards lateral margins. Face $0.23-0.24 \times$ as wide as head, almost as long as wide; ocellar bristles strong, $0.45 \times$ as long as eye height, vertical and postvertical bristles almost 1/2 as long as ocellar bristle; postocular ciliation black, strong, $2/3$ as long as postvertical on upper 1/2, finer and yellowish below; ventral 1/2 of cranium clothed with many long thick yellow hairs, most of which are $0.6 \times$ as long as head height, almost as thick as vertical bristle and more or less curled apically. Antenna: First segment slightly longer than $2 \times$ apical thickness, entirely bare; 2nd segment 1/2 as long as the 1st; 3rd segment nearly $2 \times$ as long as 2nd, $1.2 \times$ as long as thick, with dorsal margin constricted at basal 1/3 (there arista arises) ventral margin even, apical margin broadly rounded; arista simple, arising from basal 1/3 of dorsal margin of 3rd segment. Palpus $2.5-2.8 \times$ as long as wide, $2/3$ as long as eye height, gradually dilated to the middle, tapered beyond the apical 1/5 to rounded ventrodistal corner, so that dorsal margin arched and ventral margin almost straight; palpus brown in ground colour, glittering bluish silvery by pollinosity, bearing moderately long black setae on outer side and along margin. Rostrum moderately large for the genus.

Thorax dark green; mesoscutum thinly greyish pollinose on disc, coppery or purplish brown at sublateral portions; when viewed from above mesoscutum with a pair of blackish subdorsal stripes $2/3$ as wide as ground colored acrostichal stripe, blackish brown to blackish on sublateral portion, and densely white pollinose on humerus, notopleural depression and postalar callus; pleura and postnotum densely greyish pollinose. Chaetotaxy: Thoracic bristles fairly long; 6 dorsocentrals, 3rd dorsocentral $1.3 \times$ as long as scutellum, the 6th $1.2-1.5 \times$ as long as the 3rd, often curved apically; 1 humeral with 1-2 short setae in front, 1 posthumeral, 2 notopleurals, 1 sutural, 1 postsutural, 1 supra-alar, 1 postalar; humeral, posthumeral and pos-

terior notopleural as strong as anterior dorsocentrals, anterior notopleural and supra-alar longer than anterior dorsocentrals; sutural and postsutural weaker than anterior dorsocentrals, postalar as strong as the 6th dorsocentral; scutellum with a pair of strong scutellars and an outer pair of much weak setae; pro-episternum with 2-4 yellow setae on its lower portion and rarely with 1 similar seta on its upper portion.

Legs rather long, black with a slight greenish or bluish tinge on coxae and femora; front trochanter entirely and middle trochanter partly yellowish brown; coxae densely greyish pollinose as pleura. Front leg: cx_1 only slightly concave on anterior surface towards tip, there clothed with yellow fine hairs, which become longer towards subbasal portion (the longest ones as long as thickness of cx_1); cx_1 also with a row of short black setae on anterodistal margin; f_1 moderately thick, $4.7-4.8 \times$ as long as thick, thickest at $2/5$, then tapered to tip; f_1 short setose above, with a row of short, fine, black posteroventral setae, of which those on basal 1/2 of f_1 tend to recline proximally; t_1 thick, 1/2 as thick as f_1 , bearing several anterodorsal, posterodorsal, and posteroventral bristles $1.0-1.5 \times$ as long as t_1 thickness; tar_1 (Fig.1,A) modified, metatarsus distinctly clavate, subapically thicker than $3 \times$ its subbasal thickness, ventrodistally short bilobed, concave on posterodistal surface, densely short setose above and beneath, and bearing 2 strong apical bristles on posterior surface; 2nd tarsomere curved ventrally and constricted at the middle, projected into a short, proximally curved posteroventral hook at subbasal portion, bearing strong bristles dorsally and posteriorly towards tip; 3rd to 5th tarsomeres slender and straight, the 3rd with rather stiff longish dorsal setae, 2nd to 4th tarsomeres completely free from setae on silvery pollinose ventral surface; relative lengths of t_1 and 5 tarsomeres being 100:47:26:42:26:15; unguis 1/2 as long as 5th tarsomere; pulvillus moderately broad, $2/3$ as long as unguis, empodium well developed, slender and as long as pulvillus, with long setae. Middle leg: cx_2 with several strong, weakly curved bristles in a mass at anterodistally pointed portion; f_2 short setose above, beneath with rather dense long yellow hairs and setae on anterior to posteroventral surfaces of its basal 1/2, the vestiture slightly darker on anterior surface, very long on posteroventral surface towards the middle, the longest posteroventral setae 1/2 as long as f_2 , apical 1/2 of f_2 almost bare beneath, and bearing 1-2 anterior bristles near the tip; t_2 straight, short setose, with several anterodorsal and posterodorsal bristles and preapical bristles longer than posterodorsals, $1.5 \times$ as long as t_2 thickness; tar_2 slender, simple and short setose. Hind leg: cx_3 bearing sparse short yellow hairs outside, 0-1 black outer marginal bristle and a few brown to black longish bristles on anterodistal margin; f_3 $10 \times$ as long as thick, only slightly tapered apically, much weakly curved ventrally, short-black setose above,

and clothed beneath with fine yellow hairs on its basal 1/2 which are variable in length locally ($1.0-1.5 \times$ as long as f_3 thickness); the hairs often curved distally; ventral setae of apical 1/2 of f_3 usually black; t_3 slender, bearing several longish bristles ($1.5 \times t_1$ thickness) on anterodorsal and posterodorsal surfaces and shorter ones on anteroventral and posteroventral surfaces; tar_3 slender and simple, basitarsus with a few short anteroventral bristles and a few finer longer dorsal setae.

Wing (Fig.1,B) $0.35-0.38 \times$ as wide as long, peculiar in shape, being dilated posteriorly to form a broad deltoid, broadest at about apical 1/3, then narrowed to tip rather abruptly, with margin gently rounded at the apex of the deltoid; slightly greyish; entirely clear in the specimens from Kamikôchi, Central Honshu, the northernmost locality; apical 1/10 distinctly darkened between the posterior 1/2 of cell r_1 and cell r_{4+5} in the specimens from Kyushu, the darkened area more restricted and paler in the specimens from Shikoku and the Kii Peninsula, Honshu; veins dark brown, no special modification in venation, vein R_{2+3} and vein R_{4+5} weakly sinuate posteriorly and almost parallel with each other, vein M_1 divergent from vein R_{4+5} to the discal crossvein, then gradually convergent to the latter; tip of vein R_{4+5} equidistant from those of vein R_{2+3} and vein M_1 , or slightly nearer to the latter; discal cell rather strongly and uniformly widened apically, anterodistal corner of discal cell rectangular, posterodistal corner rectangular to slightly acuter, discal crossvein almost straight or very weakly curved outwards on its posterior 1/3; apical section of vein M_4 $0.35-0.56 \times$ as long as discal crossvein (shorter in specimens from southern localities). Halter

yellowish white.

Abdomen nearly $1.5 \times$ as long as thorax, dark brown with a weak dark green tinge; terga rather densely bluish grey pollinose laterally, similarly but more thinly pollinose dorsally; each tergum with a densely dark brown pollinose posterior band, which is tapered laterally; terga sparsely short black setose; 1st tergum rather densely with longish setae, and ciliated with long bristles on posterior margin; 2nd and 3rd sterna sparsely with very short yellow hairs; 4th sternum with a deep wedge-shaped notch on posterior margin, so that each posterolateral corner of the sternum produced into a process, which is variable in length locally, and slightly weakened along ventromedian longitudinal line; the 4th sternum bearing submarginally rows of strong spine-like bristles along lateral margins; in the specimens from Kyushu and the Kii Peninsula the bristles on anterior 3/4 of sterna becoming longer; in the specimens other than those from Central Honshu the posterodistal process of the sternum is mixed with dense long curved bristlelike hairs towards its apex. Genitalia moderately large, posterodorsal portion of genital capsule moderately produced roundly, cercus as long as genital capsule, slender, greyish brown, densely ciliated with long yellow setae along inner margin; surstylus polished brown, almost semicircular.

Length: Body 4.9–5.8 mm; wing 5.9–6.9 mm.

Female. Very similar to female of *D. tarsalis*, but differing as follows. Mesonotum darker, less greenish than in *tarsalis*; cx_1 with anterior surface much sparsely short haired except some longish hairs on anterolateral vertical zone (in *tarsalis*, cx_1 densely and uniformly

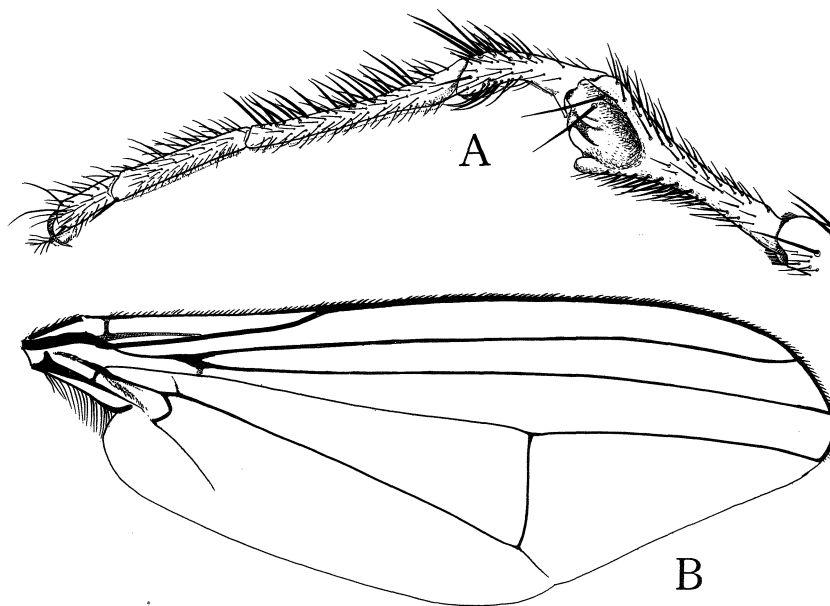


Fig. 1. *Diostracus latipennis* Saigusa, sp. nov., ♂ (Kamikôchi, Nagano Pref., Honshu).
A. Left front tarsus, posterior aspect. B. Wing.

clothed with longish yellow hairs on its entire anterior surface); wing distinctly dilated, but not so strongly as in male (in *tarsalis* wing shape quite normal); posterodistal corner of discal cell of wing rectangular to obtuse (more or less produced posterodistally and acute in *tarsalis*). Most of the characters other than those concerned in sexual dimorphism similar to those of the male.

Length: Body 4.9–6.4 mm; wing 6.5–7.9 mm.

Distribution: Japan (Chûbu district and the Kii Peninsula, Honshu; Shikoku; Kyushu).

Type locality: Futamata–Iwanadome, Shimashimadani, Azumi-mura, Nagano Pref., Honshu, Japan.

Holotype ♂, Futamata–Iwanadome, Shimashimadani, Nagano Pref., Honshu, 7. vi. 1975, T. Saigusa (in Saigusa's collection at Kyushu University).

Paratypes. [HONSHU] 4♂2♀, same data as holotype; 1♂3♀, same locality (800–1300 m) 22. v. 1975, A. Nakanishi & J. Emoto (Malaise's trap); 1♂, same locality, 23. vi. 1975, same collectors (Malaise's trap); 3♂1♀, same locality (800–1300 m), 8. vi. 1975, T. Saigusa & J. Emoto (Malaise's trap); 5♂5♀, same locality, 9. vi. 1975, J. Emoto; 2♂, Ôdaigahara, Nara Pref., 5. vi. 1981, T. Gotô. [SHIKOKU] 14♂7♀, Minokoshi, Tsurugisan, Tokushima Pref., 4. vi. 1981, K. Ôhara; 1♂1♀, same data, T. Gotô; 1♂, same locality, 7. v. 1987, T. Saigusa; 1♂, same locality, 18. v. 1988, T. Saigusa; 1♂1♀, same locality, 21. vi. 1988, T. Saigusa; 2♂1♀, Tochikubodani, Tônomaru, Mts. Tsurugisan, 22. vi. 1988, T. Saigusa; 1♂1♀, Inodani, Tônomaru, Mts. Tsurugisan, 21–22. vi. 1988, T. Saigusa; 1♂, Omogokei, Ishizuchisan, Ehime Pref., 26. v. 1988, T. Saigusa. [KYUSHU] 9♂9♀, Haki, Izumimura, Kumamoto Pref., 18. vi. 1978, T. Saigusa; 1♂1♀, same locality, 21–22. iv. 1980, T. Saigusa; 1♂, Ichifusayama, Yunomae-chô, Kumamoto Pref., 19. v. 1974, T. Saigusa; 1♂1♀, same locality (800–1300 m), 26. v. 1974, H. Shima.

Remarks: *D. latipennis* seems to be closely related to *D. tarsalis* Takagi, 1968, having the following male characters: 1st antennal segment elongate and free from setae; maxillary palpus slender and glittering bluish silvery; front basitarsus distinctly enlarged apically; middle femur furnished beneath with long setae towards base; 4th sternum deeply emarginated with a wedge-shaped notch and with a weak ventromedial longitudinal line; genital capsule massive, weakly and roundly produced posterodorsally; cercus tending to be elongate. However, *D. latipennis* is easily distinguished from *tarsalis* by the apically weakly bilobed male front metatarsus, the peculiar basal hook of the 2nd tarsomere of the male front leg, the male middle femur with very long and dense bristles on the ventral surface, and, above all, the extremely enlarged male wing.

As stated in the description, this new species is variable locally in several male features, especially the apical cloud of the wing, the density and length of the ventral

bristles of the middle femur, and the vestiture of the 4th abdominal sternum. A detailed analysis of the local variations and the local forms may be discussed, when more material is obtained.

***Diostracus aristalis* Saigusa, sp. nov.**

Diagnosis. Sister species of *D. yukawai* Takagi, 1968, differing in ventrally emarginate front femur in the male; indistinguishable from *yukawai* in the female.

Description. **Male.** Similar to *D. yukawai* in most morphological characters. Front femur (Fig. 2, A, B), viewed from side, bisinuate, curved down subbasally (at basal 1/5), strongly emarginate ventrally for basal 2/3, where it is 3/4 as thick as the thickest part, then weakly curved up about the middle; viewed from above slightly curved anteriorly at basal 1/5; densely clothed with brown hairs on basal 1/2 of posteroventral surface, the hairs denser on subbasal and middle portions, mixed with some hairs of which apical portions are curved distally; bearing similar hairs also anteroventrally near its middle. Vestiture of t_3 similar to that of *yukawai*, but ventral setae distinctly lengthened on distal 1/4–1/3; on the other hand, posteroventral to ventral setae around the middle shorter than the ventral setae on apical portion; no distinct differences between the two species in long posterior ciliation of t_3 .

Length: Body 4.6–5.0 mm; wing 5.3–5.8 mm.

Female. Indistinguishable from the female of *yukawai*; easily distinguishable from the female of *D. antennalis* Takagi, 1968, by characters of cx_1 , t_3 and 1st abdominal sternum. Front coxa with densely long-haired area confined to anterior portion much anterior to the line connecting pleuro-coxal condyle and the outermost apical bristle, and vestiture close to the line including 2–4 black long setae on subbasal portion and very sparse short hairs on apical 1/2 of the cx_1 ; anterodistal margin of cx_1 distinctly produced, but not so strongly projected as in the male, marginal bristles of cx_1 irregular in position and length, more densely set towards the produced portion of the margin. First abdominal sternum simple, without a distinct middle projection.

Length: Body 4.8–5.2 mm (M: 5.0 mm); wing 5.9–6.4 mm (M: 6.1 mm).

Distribution: Shikoku, Japan.

Type locality: Inodani, Mts. Tsurugisan, Tokushima Pref., Shikoku, Japan.

Holotype: ♂, Inodani, Tônomaru, Mts. Tsurugisan, Tokushima Pref., Honshu, 21. vi. 1988, T. Saigusa (in the collection of Tokushima Prefectural Museum, Tokushima-shi, Shikoku, Japan).

Paratypes: [SHIKOKU] 5♂2♀, same data as holotype; 1♂, Minokoshi, Tsurugisan, Tokushima Pref., 12. vii. 1988, T. Saigusa; 1♂, Tochikubodani, Tônomaru, Mts. Tsurugisan, 22. vi. 1988, T. Saigusa; 1♂, Sasakeikoku, Monobe-mura, Kôchi Pref., 14. vii. 1988, T. Saigusa; 1♀, Tengukôgen, Yuzuhara-mura,

Kôchi Pref., 17. vii. 1988, T. Saigusa; 1♀, Nametoko, Uwajima-shi, Ehime Pref., 23. v. 1988, T. Saigusa; 1♀, Omogo, Ehime Pref., 28. v. 1967, A. Nakanishi.

Remarks. *D. aristalis* is considered here to be the vicariant sister species of *Diostracus yukawai* Takagi, 1968, by reason of their shared advanced characters and geographical distributions. Takagi (1968) considered that the combination of *D. antennalis* and *D. yukawai* is almost the only case for which a close relationship can be pointed out to a certainty in the genus *Diostracus*. The *antennalis* group now consists of the three species characterized by the male antennal arista having a lamellate oval termination in addition to the generalized habitus including the plain wings and complete thoracic chaetotaxy, the long-haired male hind tibiae, extensively yellow portions of the legs especially around the articulations between podites, and the compact male genitalia. As stated in the description, *D. aristalis* is evidently more closely related to *yukawai* than to *antennalis* agreeing with the latter in every adult structure, especially in the advanced male characters such as the uniquely produced anterodistal portion of the front coxa furnished with curved bristles, the middle femur strongly emarginate dorsally on its basal 2/3, and the ornamented middle metatarsus which is thickened basally, strongly curved ventrally, and adorned with subpennate strong bristles dorsally and ventrally. When Takagi (1968) described *antennalis* and *yukawai*, they seemed to be allopatric sister species, the former occurring in Kyushu and the latter in the Chûbu district, Honshu.

However, the discovery of *aristalis* in Shikoku, in sympatry with *D. antennalis* as given below, clearly indicates that the true sister species of *yukawai* is not *antennalis* but *aristalis*. *D. antennalis* is here recorded for the first time from Shikoku: Inodani (3♂, 21.vi. 1988, T. Saigusa) and Tochikubodani (1♂, 22. vi. 1988, T. Saigusa) of Mts. Tsurugisan and Omogokei (1♂, 14. vii. 1973, K. Kanmiya) of Mt. Ishizuchisan. In addition, a female specimen closely agreeing with females of *antennalis* from Kyushu was collected at Sandankyô, the Chûgoku district (western part), Honshu, located just opposite Shikoku and separated from the latter by the Setonaikai Straits. Thus *antennalis* occurs at lower to middle altitudes (200–1400 m) in Kyushu, Shikoku, and the Chûgoku district, Honshu. On the other hand, *D. yukawai* is here newly recorded from Mt. Ôtôsan (3♂, Yasukawakeikoku, 7. vi. 1993, T. Yasunaga), Wakayama Pref., the Kii Peninsula, Honshu, located just east of Shikoku and separated from the latter by the Kii-suidô Straits. No distinct differences were found between the specimens of *yukawai* from the Chûbu district and the Kii Peninsula in all external characters including externally observable male genital processes. In addition to its occurrence in the Kii Peninsula, *yukawai* is also distributed in Shimashimadani (2♂, 5. vi. 1975, J. Emoto; 2♂1♀, 9. vi. 1975, J. Emoto), the Hida Range, some 70 km NW of the known ranges (Takagi, 1968) of the species. Thus the range of *yukawai* now covers the middle and southern Chûbu district and the Kii Peninsula, Honshu; the speci-

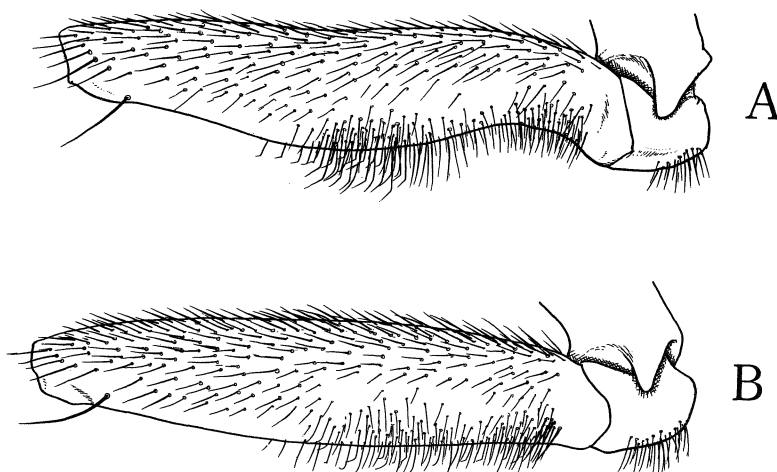


Fig. 2. *Diostracus aristalis* Saigusa, sp. nov. ♂ (Tsurugisan, Shikoku) and *D. yukawai* Takagi ♂ (Shimashimadani, Nagano Pref., Honshu). A. *D. aristalis*, left front femur, posterior aspect. B. *D. yukawai*, left front femur, posterior aspect.

mens were collected at altitudes of 350–1400 m. The distributional data and the morphological characters evidently support the view that *D. yukawai* and *aristalis* are allopatric sister species forming a monophyletic group (*yukawai* subgroup), of which the adelphotaxon is *D. antennalis* occurring sympatrically with the southern representative, *aristalis*, of the *yukawai* subgroup. I also examined a female specimen collected at Hinoemata near Oze, Fukushima Pref., Honshu (17. vii. 1975, O. Yata), a locality on the boundary between the Tôhoku and the Kantô districts. The specimen is characterized by the combination of the front coxae similar to those of *antennalis* and the simple first abdominal sternum. It almost certainly represents a fourth species of the *antennalis* group. It should be described and named after the male material has been taken.

***Diostracus nishiyamai* Saigusa, sp. nov.**

Diagnosis. Medium-sized, generalized species characterized by bicolored legs with 3 pairs of femora and front coxae yellow, a few longish ventral setae on middle femur towards base, 6 pairs of dorsocentral bristles, infuscated wing without special ornamentations, and small, simple and short-setose cercus in the male.

Description. Male. Head moderately large; frons, vertex and occiput green, rather densely greyish pollinose; viewed anteriorly vertex dull greyish brown, and ventral 1/2 of face bright greyish brown; clypeus subshining yellowish green, thinly greyish brown pollinose; face narrowest at the middle, where it is slightly narrower than 1/5 the head width. Vertical bristle $0.7 \times$ as long as ocellar bristle, and slightly longer than postvertical; postocular ciliation entirely black, lower occipital setae short, simple and yellow. Antenna short and blackish brown, slightly brownish on 2nd segment and apical portion of the 1st; combined length of 3 antennal segments equal to 0.4 length of head; 1st segment short, viewed from outside $1.3 \times$ as long as its apical thickness, its inner length $1.3 \times$ of outside length, the segment without distinct setae; 2nd segment globular, almost as long as thick, slightly shorter (5/6) than outer length of 1st segment, with a circlet of short black setulae; 3rd segment as long as 2nd, slightly thicker than long, viewed from side dilated to the middle, then tapered to rounded tip; arista dorsal, arising from basal 1/2 of dorsal margin, simple, but short pilose throughout its length, and apically tapered into fine tip. Palpus $0.6 \times$ as long as head, $2 \times$ as long as wide, basally (at eye margin) 1/2 as wide as the widest middle portion, gradually dilating, more strongly arched along dorsal margin than along ventral one, then gradually tapered to rounded apex; palpus orange-brown in ground colour, with silky orange-yellow pollinosity, which glitters bluish when viewed laterally to subapically; palpus sparsely short black setose on outer surface. Proboscis moderately large, with a few longish setae along ventral

margin of labellum.

Thorax green on sclerites but brown on supra-alar area and postalar callus brown; mesoscutum thinly greyish brown pollinose, with lateral portion of scutum (except for notopleural depression), acrostichal stripe and prescutellar depression more or less coppery to brownish green, the acrostichal stripe bordered with darker subdorsal stripes; scutellum purplish on disc; pleura thinly brownish grey to light grey pollinose. Chaetotaxy: Six dorsocentral bristles, the 3rd one $1.4 \times$ as long as scutellum, and $2.5 \times$ as long as vertical length of anterior thoracic spiracle, the 6th the longest; 1 humeral with 1–2 minute pale setulae in front, 1 posthumeral, 1 anterior notopleural and 1 (shorter) posterior notopleural, 1 supra-alar, 1 postalar bristles all strong; posterior notopleural $0.7 \times$ as long as anterior notopleural, sutural and postsutural bristles absent; scutellum with 2 strong scutellars, basal distance of which is slightly more than that between 5th dorsocentrals; scutellum clothed with a few fine short yellow hairs at sides and along posterior margin; propisternum with some 20 short fine yellow hairs scattering on entire surface in addition to a strong black bristle; mesopleuron (meso-anepisternum) and sternopleuron (meso-katepisternum and meso-preepisternum) with a few fine yellow hairs along their dorsal margins; a group of similar hairs on sclerite in front of posterior thoracic spiracle, and also on lower portion of metathoracic pleura.

Legs bicolored, cx_1 , all trochanters and femora yellow, cx_2 and cx_3 yellowish brown distally, darkened to brown to purplish brown proximally; coxae thinly whitish pollinose; all tibiae and tarsi black; basal 1/4 of t_2 and also of t_3 pale to yellowish brown, the pale portion extending towards the middle of tibiae on ventral surface, t_3 brownish at extreme base; extreme bases and apices of basal tarsomeres of tar_1 brownish. Legs rather short and thick; f_3 slightly shorter than $1.2 \times$ thoracic length measured from anterior margin of mesoscutum to that of 1st abdominal tergum; no special modifications found in shapes and vestiture of podites except for longish pale ventral setae on femora; tibiae and tarsi all short setose with a few bristles as described in the following lines. Front leg: cx_1 rather densely clothed with fine erect pale yellow hairs ($1/5$ – $1/4$ as long as cx_1 thickness) on anterior surface, similar black hairs on proximal 1.3 of anterior inner surface, and bearing a row of anterodistal setae, of which the outermost one and 1–2 innermost ones are black and much stronger than others, which are short, weak and brownish; tr_1 only microscopically pilose; f_1 gradually tapered beyond its $2/5$, short setose above, with almost uniserial anteroventral and posteroventral rows of short, fine, yellow hairs, which are $1/3$ as long as f_1 thickness, but a few subbasal anteroventral hairs 0.5 – $0.7 \times$ as long as f_1 thickness, f_1 also with 2–3 anteroventral black setae at tip, of which

most distal one is strong and bristle-like; t_1 with 1 anterodorsal bristle (at basal 1/3), 4 posterodorsal bristles including an apical one, and 2-4 shorter posterior setae; tar_1 slender, simple, short setose, 2nd to 5th tarsomeres ventrally microscopically pilose; unguis $0.5 \times$ as long as 5th tarsomere, pulvilli $0.5 \times$ as long as unguis, empodium developed, and with hairs extending to the level of apex of unguis. Middle leg: cx_2 clothed with much sparse, fine, yellow hairs on anterior outer surface, longer and darker hairs along inner anterior margin, and bearing a simple row of longish black submarginal setae along anterodistal margin; tr_2 with very short fine pile apically; f_2 gradually tapered apically beyond 2/5, short setose above, with an anteroventral and a posteroventral row of very fine, short, yellow hairs and bearing 6-7 long, erect, yellow setae, which are $1.5-1.8 \times$ as long as f_2 thickness and scattered on subbasal portion of ventral surface, 1 apical anteroventral and 1 apical posterodorsal bristles; t_2 with 4 anterodorsal bristles, of which middle 3 are strong and $2.5 \times$ as long as t_1 thickness, 4-5 posterodorsal bristles shorter than anterodorsal, 3 similar anteroventral bristles and an apical pair of anteroventral and posteroventral bristles; tar_2 similar to tar_1 , but with a small ventral bristle beneath. Hind leg: cx_3 with a few minute pale hairs on outer surface; f_3 $8.1 \times$ as long as thick, thickest slightly before the middle, short black setose above, beneath with short, fine, yellow hairs which are more or less irregularly arranged in rows, the hairs on basal 1/2 of f_3 being as long as f_3 thickness; t_3 slender, short setose, bearing 3-4 anterodorsal and 3-4 posterodorsal bristles ($2.5-2.7 \times$ as long as t_3 thickness) besides some apical ones; ventral setae of t_3 somewhat longer and more erect than dorsal ones, apical anteroventral bristle as strong as posterodorsals; tar_3 similar to tar_2 .

Wing somewhat similar to that of the *Diostracus yukawai* male, $3.2 \times$ as long as wide, distinctly and uniformly brownish, with dark veins; no prominent specializations in wing shape, marking and venation; R_{2+3} weakly sinuate, R_{4+5} more strongly sinuate than R_{2+3} , almost parallel with the latter on basal 3/4, then gradually divergent from the latter towards the tip; distance between tips of R_{2+3} and R_{4+5} $2.2 \times$ as long as that between tips of R_{4+5} and M_1 ; discal crossvein situated at 0.6 of wing, almost straight, slightly arched outwards at posterior 1/3, anterodistal corner of discal cell rectangular, posterodistal corner of the cell slightly acute. Halter yellow.

Abdomen moderately long, slightly shorter than $1.2 \times$ thoracic length, dark green with thin brownish grey pollinosity on terga, thicker and whitish grey pollinosity on sides of terga and entire sterna; terga short black setose, 1st tergum with a row of moderately long bristles, and succeeding terga with a few weaker bristles longer than tergal setae, on hind margin; 2nd to 4th sterna sparsely with fine short erect yellow hairs; 1st ster-

num angulately produced posteromedially, in lateral aspect vertical length of the projection $0.4 \times$ as long as lateral margin of 2nd sternum; middle 1/3 of posterior margin of 4th sternum short produced into a truncate projection. Genitalia: Cercus short, broad, and black, $1/7$ as long as abdomen, $2 \times$ as long as wide, oblique on distal margin, roundly produced at outer distal corner, ciliated marginally with yellow setae, which are longest and $2/3$ as long as cercus along posterior margin.

Length: Body 5.0 mm; wing 6.1 mm.

Distribution: Sichuan, China.

Type locality: Qingchen Shan, Sichuan, China.

Holotype: ♂. Qingchen Shan (青城山) Sichuan, 1. Aug. 1980, Y. Nishiyama leg (in Saigusa's collection at Kyushu University).

Remarks: *D. nishiyamai* is much generalized in habitus, and no prominent specializations are detected in the head, most of the notal bristles, the wing shape and venation, the shape and vestiture of legs, the abdominal sterna and the genital cercus in the male. However, the new species is easily distinguished from the known species of the genus by having fine yellow hairs on several portions of meso- and metathoracic pleura as stated above. This species is also unique in having many (some 15) fine yellow hairs on the posterior margin of the scutellum in addition to the ordinary pair of scutellar bristles. A similar vestiture of the scutellum is found in the Japanese *Diostracus genualis* Takagi, 1968, from which the new species is easily distinguished by the extensively yellow legs. The absence of the sutural and the postsutural bristles is also a specialization in this species. There is no named species closely allied to this new species, which comprises its own group, the *nishiyamai* group.

Diostracus bisinuatus Saigusa, sp. nov.

Diagnosis. Closely related to *Diostracus nigrilineatus* Saigusa, 1984, of the *unisetosus* group from Nepal, but differing in having equally strong 5 dorsocentral bristles, several strong spinelike bristles on basal 1/4 of middle femur, strongly produced posterodistal sinuation of discal crossvein of wing, and shorter cercus in the male.

Description. **Male**. As the holotype, the only available specimen, is covered with thin greasy or smear-like coating probably caused by moistening, the following description on the coloration and pollinosity of most parts of body and legs should be read not to indicate the fresh state.

Head. Almost as in *nigrilineatus*; vertex and occiput blackish brown with a slight bronze or dark green tinge, the former densely blackish brown pollinose, the latter more thinly brownish grey pollinose; face and clypeus green, much thinly greyish pollinose, so that the former almost shining green; lateral margin of face very narrowly dull black; the narrowest portion of face $0.16 \times$ as wide as head (as in *nigrilineatus*); vertical bristle weak,

0.55 $\times$ as long as postvertical bristle, and 1/4 as long as ocellar bristle, somewhat stronger than in *nigrilineatus* and in comparison with other bristles; lower occipital hairs slightly longer than in *nigrilineatus* and apical 1/4 of most hairs weakly curled. Antenna: Third antennal segments with aristae broken off in the holotype, 1st and 2nd segments as in *nigrilineatus*. Palpus 0.54 $\times$ as long as eye height, 2.4 $\times$ as long as wide, moderately dilating to the middle, then very weakly tapering to apical margin which is almost straight, slightly oblique and roundly produced at ventrodistal corner; the palpus brownish yellow, with golden to bluish grey glittering, but the true coloration of its pollinosity is unknown owing to the coating stated above.

Thorax. Mesonotum dark green, humerus partly and postalar callus mostly yellowish, subdorsal stripe and sublateral area of scutum dark bronze, scutum and scutellum thinly greyish brown pollinose; lateral part from humerus to notopleural depression light grey pollinose; pleura dark brown, and greyish pollinose, but at least most part of mesopleura (anepisternum) greenish. Chaetotaxy: Five dorsocentrals (6 in the known species of the *unisetosus* group), 4 anterior dorsocentrals subequally weak, 2 $\times$ as long as vertical length of anterior thoracic spiracle; 1 humeral and 1-2 minute setulae in front, 1 posthumeral, 1 posterior notopleural, 1 supraalar, 1 postalar bristle present, all seeming to be strong (posthumeral and posterior notopleural are broken off) no anterior notopleural (no socket present); 2 strong scutellars with a minute setula lateral to the right scutellar; propleura with a brownish bristle and several weak pale hairs on lower portion, no setae on its upper portion.

Legs similar to those of *nigrilineatus* in colour, shape and chaetotaxy: front basitarsus longer, 0.32 $\times$ as long as t_1 , as long as 2nd tarsomere, and subapical por-

tion 2.1 $\times$ as thick as subbasal portion; f_2 with 3-5 spine-like anteroventral bristles on its basal 1/4, 1-3 of which are strong, nearly as long as f_2 thickness; t_2 with 4 anterodorsal, 3 posterodorsal bristles (the longest 3 $\times$ as long as t_2 thickness), and 1 much shorter anteroventral bristle at apical 3/4, and apical circlet of bristles; several much weaker posterior setae which are slightly differentiated from usual setulae in length (5-6 posterior setae differentiated into long fine bristles in *nigrilineatus*; some 15 posterior setae differentiated into a ciliation of erect fine hairs 1-1.5 $\times$ as long as width of t_2 in *D. unisetosus* Saigusa, 1984); middle basitarsus without a posterior ciliation of erect fine hairs (which are seen in *unisetosus*); hind leg as in the two other species of the group, f_3 evenly short setose; t_3 with several anterodorsal and posterodorsal strong bristles and shorter anteroventral and posteroventral bristles.

Wing (Fig. 3) very similar to that of *nigrilineatus*, but different as follows. Anterior part of discal crossvein directing towards wing base, then anastomosing with vein M_1 (anterior vein of discal cell) for a short distance forming a small longitudinally oval areola (cellula); middle longitudinal portion of discal crossvein longer than in *nigrilineatus*, 0.48 $\times$ as long as middle section of M_{3+4} (posterior vein of discal cell); posterior (distal) sinuation of discal crossvein rather acutely produced distally beyond the level of obtuse posterodistal corner of discal cell; distance between vein M_1 and the middle portion of discal crossvein 1/2 as long as that between the latter vein and posterior marginal vein of the discal cell; linear band almost as in *nigrilineatus*, but its apical portion almost touching discal crossvein; wing distinctly darkened along the middle longitudinal portion of discal crossvein, but posterior portion of its distal 1/2 not dark bordered; black oval spot on posterior transverse portion of discal crossvein.

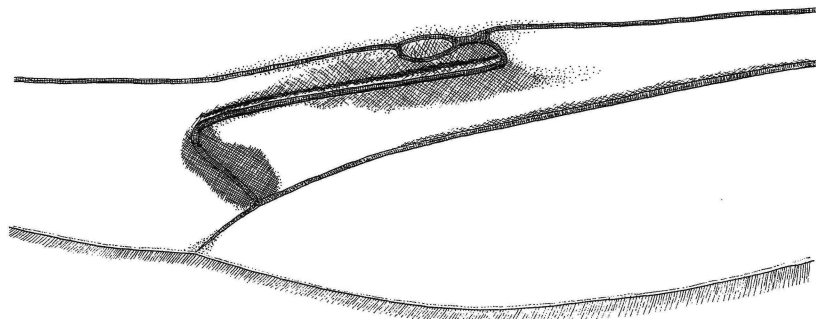


Fig. 3. *Diostracus bisinuatus* Saigusa, sp. nov., holotype σ . Wing around discal crossvein of discal cell.

Abdomen as in *nigrilineatus*; 4th sternum only weakly produced into posterolateral projections which protrude as a short oval pilose process in lateral aspect, but are separated from each other by a shallow V-shaped notch at the middle portion of hind margin of the sternum; cercus short, $3/4$ as long as height of epandrium, broad on its basal $1/2$, then much constricted posteriorly (mesally) to narrow apical portion, ciliated with long yellow setae along inner margin; the setae not so dense on the basal portion as in *nigrilineatus* but tips of the setae from basal broad portion extending distally beyond tip of cercus.

Length: Body 4.0 mm; wing 4.9 mm.

Distribution: Burma.

Type locality: Kambaiti, 2000 m, N. E. Burma.

Holotype: ♂, Kambaiti, 2000 m, N. E. Burma, 12-17/6 34, Malaise (in the collection of the Zoological Museum, University of Helsinki).

Remarks: *D. bisinuatus* belongs to the *unisetosus* group (Saigusa, 1984) represented by the two known species from Nepal, and it is characterized mainly by the absence of the anterior notopleural bristle and the unique sinuation of the discal crossvein accompanying a linear brand. *D. bisinuatus* is undoubtedly more closely related to *D. nigrilineatus* Saigusa, 1984, than to *D. unisetosus* Saigusa, 1984. The males of *bisinuatus* and *nigrilineatus* share some primitive states such as the generalized front coxa, the normally shape wing and the presence of anteroventral bristles on the basal portion of the middle femur, and also the accessory cells on anterodistal portion of the discal cell of the wing, derived character, and the pale-colored palpus and the absence of setae on the upper portion of pro-episternum. On the other hand, the male of *D. bisinuatus* is easily distinguished from those of the two known species of the group by the 5 dorsocentral bristles, the posteroventral setae of the middle tibia weak and not differentiated into neither distinct bristles nor fine erect ciliation, the small generalized cercus, and the different curvature of the discal crossvein. As speculated by Saigusa (1984), the *unisetosus* group seems to inhabit rather low altitudes in the Himalayas to the northern Indochina–W. S. China area.

***Diostracus janssonorum* Saigusa, sp. nov.**

Diagnosis. Small-sized, plain species of the *quadrisetosus* group, with front coxae and all femora yellow, and a dense posteroventral ciliation of suberect short setae on the middle tibia, and lacking in the anterior notopleural bristle in the male.

Description. *Male*. Holotype, the only available specimen, somewhat greasy. Head dull black to blackish brown; occiput with a dark brown tinge in some light; face dark green, dull black along eye margin; clypeus coppery and polished; the narrowest portion of face $0.12 \times$ as wide as head. Vertical bristle absent; ocellar bristle

fairly strong, postvertical bristle short, upper 4–5 postocular bristles black. Antenna black, both the 3rd segments broken off in the holotype. Palpus $1/3$ as long as eye height, $2 \times$ as long as wide, oval in shape, dark brown with coppery reflections, short black setose, and tightly applied on rostrum.

Mesonotum dull dark bronze, with a dull black median stripe which covers acrostichal and subdorsal areas; posterior portion of mesoscutum with a slight greenish tinge; scutellum subshining dark green; pleura dull dark brown with a slight greenish tinge on anterior portion. Chaetotaxy: Four dorsocentrals, of which the anteriormost is slightly longer than vertical diameter of anterior thoracic spiracle, the 2nd and 3rd $2 \times$ as long as the 1st, the 4th longest; 1 humeral with a tiny setula in front, 1 strong posthumeral, no anterior notopleural bristle (its socket absent), 1 posterior notopleural as strong as posthumeral, 1 supra-alar a little shorter than the latter, 1 very strong postalar bristle; scutellum with a pair of strong scutellars; proepisternum with a yellow bristle and a very small seta on its lower portion.

Legs extensively yellow; cx_1 and all femora yellow, cx_2 and cx_3 brown, tibiae and tarsi black, the former yellow basally. Legs long, slender and simple; without deformation and peculiar chaetotaxy except a posteroventral ciliation of t_2 . Front leg: cx_1 clothed on anterior surface with short yellow hairs $1/2$ as long as cx_1 width, with anterodistal ciliation of yellow bristles, mixed with 1–2 black ones posteriorly; f_1 short setose, beneath with anteroventral and posteroventral setae short and yellow; t_1 and tar_1 short setose, the former with 1 anterodorsal, 2 posterodorsal and 1–2 posteroventral bristles; basitarsus $3/5$ as long as t_1 , without special vestiture. Middle leg: f_2 with several short yellow ventral bristles on basal $1/3$, t_2 with 3 anterodorsal and 3 posterodorsal bristles on basal $2/3$, 1 posteroventral bristle at $2/3$, and with a posteroventral ciliation of dense suberect short setae $1/2$ as long as t_2 thickness, these setae quite distinct from normal subdecumbent setae on tibiae. Hind leg: f_3 short setose, and with posteroventral setae also short; t_3 with anterodorsal, posterodorsal, and posteroventral bristles, 3–4 in each series, the dorsal ones long; tar_3 simple.

Wing greyish, its venation and shape normal, distal corners of discal cell right-angled; M_3 $1.2 \times$ as long as discal crossvein. Halter yellow.

Abdomen dull dark brown, greyish brown pollinose on lateral portions of terga; terga short black setose, posterior margin of 1st tergum ciliated with long black bristles. Genitalia small; cercus $0.28 \times$ as long as height of genital capsule, triangular in shape, slightly longer than basal width, pointed apically, and with very short setae.

Length: Body 3.1 mm; wing 4.7 mm.

Distribution: N. E. Burma.

Type locality: Kambaiti, 2000 m, N. E. Burma.

Holotype: ♂, Kambaiti, 2000 m, N. E. Burma, 11/6. 1934 Malaise (in the collection of the Zoological Museum, University of Helsinki).

Remarks: *D. janssonorum* is a small-sized, simple species having 4 dorsocentral bristles, simple legs and wings, and small simple male genitalia. Although the absence of anterior notopleural bristle is shared only with the *unisetosus* group in the genus *Diostracus*, it is almost certain that the species belongs to the *quadrisetosus* group (Saigusa, 1984), which has been represented by 8 species known from Nepal. *D. janssonorum* runs to *D. simplicipes* Saigusa, 1984, from Nepal in Saigusa's key (1984), but it is easily distinguished from the latter by shorter anterior hairs of the front coxae, the shorter and more posteriorly situated first dorsocentral bristle, and the peculiar posteroventral ciliation of the middle tibiae in the male. This species is named after Dr. Antti Jansson and Mrs. Jansson, who much helped me in research work during my stay in Helsinki in 1985.

Diostracus burmanicus Saigusa, sp. nov.

Diagnosis. Burmese vicariant species of *D. nebulosus* Takagi, 1972, from Nepal, but clearly distinguished from the latter by the absence of the ventral bristle on both middle and hind femora, and the different male genitalia.

Description. Male. Extremely similar to *nebulosus*, but differing as follows. Legs: f_1 with ventral bristles on basal $1/2$ stronger and darker; f_2 without the ventral bristle that is always present around the basal $1/3$ in *nebulosus*; f_3 without the anteroventral bristle that is al-

ways present slightly before the middle in *nebulosus*. Genitalia (Fig. 4): Genital capsule larger; cercus only slightly tapered to the subapical portion, then ending in broadly rounded apical margin, which is sparsely clothed with short setae, and which lacks in a long apical seta; "ventral lobe" (Takagi, 1968) with several long bristles besides many short setae on ventral surface; inner margins of ventral lobes almost parallel with each other in ventral aspect and more or less emarginate subapically.

Length: Body 4.2–4.7 mm; wing 6.1–7.0 mm.

Female. Extremely similar to female of *nebulosus*, always lacking in the anteroventral seta or bristle which often occurs in *nebulosus*. This seta sometimes disappears in the *nebulosus* female, so that it is not definitely a character to separate the females of the two species from each other.

Length: Body 4.6–5.2 mm; wing 6.7–7.2 mm.

Distribution: Burma.

Type locality: Kambaiti, 2000 m, N. E. Burma.

Holotype: ♂, Kambaiti, 2000 m, N. E. Burma, 25/4 1934, Malaise (in the collection of the Zoological Museum, University of Helsinki).

Paratypes: 158 ♂ & ♀, the same locality as holotype, (7000 ft or 2000 m), 10/4–12–17/6. 1934, Malaise (or R. Malaise) (Zoological Museum, University of Helsinki, and Naturhistoriska Riksmuseet, Stockholm).

Remarks: *D. burmanicus* is most closely related to *D. nebulosus*, which is widely distributed from the middle to eastern Nepal, and these two are possibly sister species. The males of the two species are easily distinguished from each other by the presence (in *nebulosus*) or absence (in *burmanicus*) of the ventral bristles of the

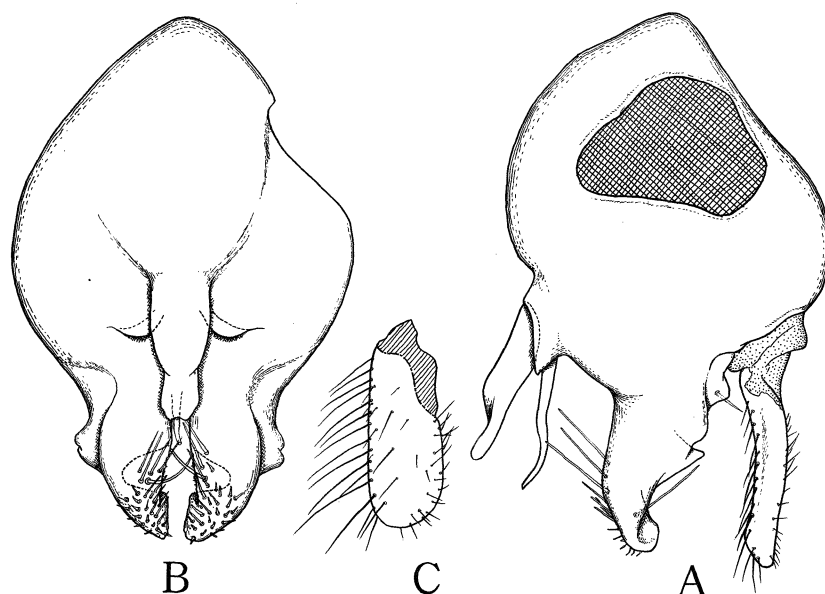


Fig. 4. *Diostracus burmanicus* Saigusa, sp. nov., holotype ♂. A. Genitalia, left lateral aspect. B. Genitalia without cerci, ventral aspect. C. Left cercus, dorsal (posterior) aspect.

middle and hind femora. The male genitalia are also different between the two species: in *nebulosus* the genital capsule is smaller, the cercus distinctly tapered beyond the middle to the roundly pointed apex, which bears a long seta, the ventral lobe bearing beneath only a few short setae including one long seta, and the inner margins of the lobes almost straight, divergent apically beyond the middle and not emarginate subapically.

Diostracus malaisei Saigusa, sp. nov.

Diagnosis. Medium-sized species of the *unipunctatus* group, most closely resembling *Diostracus rotundicornis* Saigusa, 1985, from Nepal, but differing in the longer 3rd antennal segment, much reduced vertical bristle, posterodorsally prominently produced epandrium, and shorter cercus of which apical 1/3 does not bear marginal ciliations.

Description. Male. As the only known specimen, the holotype, is greasy probably owing to moistening, the coloration and pollinosity of body and legs described below probably do not represent the state in fresh specimens, which are presumed to be very similar to those of *rotundicornis*. Head: Vertical bristle extremely reduced, as long as diameter of lateral ocellus, and 1/4 as long as ocellar bristles. Golden yellow hairs on lower occipital area and prementum as in *rotundicornis*, but their apical curling weaker. Antenna: Relative lengths of 3 segments 17:8:15; 1st segment $2.4 \times$ as long as thick, bare; 3rd segment $1.2-1.3 \times$ as long as thick, keeping the same thickness from base to 2/3, then tapered to more or less roundly produced apex; arista dorsal, arising from 2/3 of dorsal margin of 3rd antennal segment. Palpus $2.8 \times$ as long as wide, gradually widening to 2/3, then tapering to bluntly produced apex, blackish brown, glittering dark green, and short black setose.

Thorax. Six dorsocentral bristles, of which 5 anterior ones are longer than in *rotundicornis*, 2nd and 3rd dorsocentrals about 200μ long, as long as vertical length of anterior thoracic spiracle.

Front leg: cx_1 with basal golden yellow hairs dense, as long as cx_1 width, not curled apically as in *rotundicornis* and *unipunctatus*, subapical clump of black setae of cx_1 located distally as in *rotundicornis*; f_1 distinctly flattened on basal 1/4-1/3 of posterior surface, which is oval in shape, free from setae and densely golden pollinose; anteroventral and posteroventral setae of f_2 weaker than in *rotundicornis*, and the former brownish, the latter yellow; f_1 also with 5-6 posteroproximal brownish to black setae in a mass, which includes a yellow hair more distally set than the darker setae; the proximal setae more or less curved towards apex of f_1 ; t_1 with dorsal setae ($1/2 \times t_1$ thickness) towards apex, and with similar ventral setae which are not erect but subdecumbent, bearing several posterodorsal bristles $1.4 \times$ as long as t_1 thickness, a similar posteroventral bristle at each of the middle and apex, and 2 more or

less closely set posteroventral bristles which are $2 \times$ as long as t_1 thickness, weakly curved towards base of t_1 on their apical 1/3, and separated from each other by distance $0.05 \times$ as long as t_1 length or 1/3 as long as distance between the proximal of them and the middle posteroventral bristle; basitarsus $0.48 \times$ as long as t_1 , gradually tapered to 3/4, there $0.6 \times$ as thick as basal portion, then dilating again towards the apex which is slightly thicker than the base; basitarsus with dorsal setae as long as its apical thickness, a posteroventral ciliation of setae which are slightly longer than apical thickness and shorter towards apex, and an anteroventral row of 18-20 short spines, which become shorter towards tip of basitarsus, disappear at the subapical portion, and do not extend to basal portion of 2nd tarsomere. Middle leg: f_2 short setose dorsally, bearing on its basal 1/2 a group of long mostly yellow bristles; these are 2 anteroventral bristles (apical one brownish and $1.5 \times$ as long as f_2 thickness, more basal one yellow, $2.3 \times$ as long as f_2 thickness), 3 yellow ventral bristles ($2.8-3.1 \times f_2$ thickness), and 2 shorter fine posteroventral setae ($1.5 \times f_2$ thickness); f_2 bearing a posteroventral row of short black bristles on its apical 1/2, 3 similar anterior bristles in a longitudinal row at the middle, and an apical anterior bristle; t_2 more or less flattened, $1.6 \times$ as wide as thick, with very short setae, almost bare on dorsal surface between rows of 2 anterodorsal and 2 posterodorsal bristles which are $2 \times$ as long as t_1 width; posterior ciliation of basitarsus longish, $1.3 \times$ as long as its width; 5th tarsomere seeming to be flattened, $3 \times$ as wide as 4th tarsomere (this dilatation may be a secondarily flattened condition of the tarsomere). Hind leg: f_3 ordinarily slender, $11.2 \times$ as long as thick, short setose, with anteroventral and posteroventral setae much finer than in *rotundicornis* (in this species vestiture of f_3 includes a few rather strong anteroventral bristles on basal 1/2), anteroventral to posteroventral setae on basal 1/3 yellowish, and a strong anterior preapical bristle; t_3 and tar_3 almost as in *rotundicornis*.

Wing (Fig. 5) $3.7 \times$ as long as wide, similar to that of *D. saigusai* Takagi, 1968; black nodule at discal crossvein large, with its longest diameter $1.5 \times$ as long as the shortest diameter, or $0.42 \times$ as long as distance between tips of the discal crossvein, with its long axis about at 60° to vein M_1 in discal cell; the nodule occupying an area from slightly before the middle of the discal crossvein (0.44) to the posterior 1/8, so that the posterior straight section of discal crossvein is 1/3 as long as the anterior straight section; anterodistal corner of discal cell slightly acuter than 90° ; its posterodistal corner weakly produced acutely; apical section of M_{3+4} (posterior vein from discal cell) $3/4 \times$ as long as distance between tips of discal crossvein.

Abdomen. Similar to that of *rotundicornis*; 4th abdominal tergum expanded posterolaterally, the maximum distance between its lateral margin and sublateral

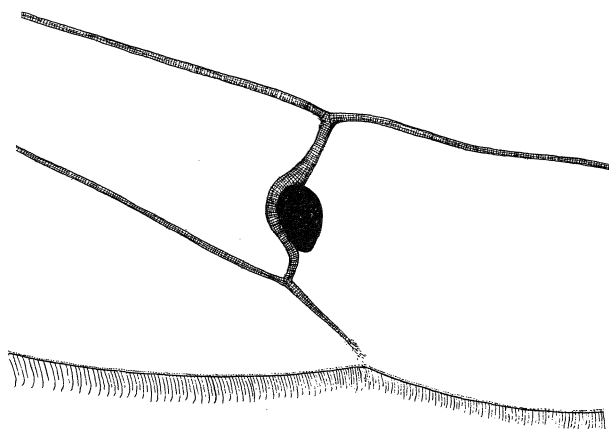


Fig. 5. *Diostracus malaisei* Saigusa, sp. nov. holotype ♂, Wing around discal crossvein.

polished black spots almost as long as f_3 thickness, this expanded portion clothed with some 10 longish yellowish hairs $1.2 \times$ as long as f_3 thickness and curled apically; 3rd sternum clothed posterodistally with a few yellow hairs similar to those on lateral portion of 4th tergum; posterolateral portion of 3rd sternum bearing a few yellow hairs shorter than $1/2$ length of 4th tergum; 4th sternum almost bare, with a moderately raised prominent oval swelling on its posterior $1/3$; the swelling slightly wider than long, $2/3$ as wide as the sternum, only weakly constricted along midventral line, densely microscopically white pubescent, and bearing sparse minute yellow hairs; hairs on lateral portions of 3rd and 5th terga very short. Genitalia: Genital capsule distinctly elongate, prominently produced into posterodorsal tubercle; cercus slightly longer than thickness of genital capsule, ca. $5 \times$ as long as wide, tapered beyond the middle, marginally ciliated with long yellow setae for its basal $2/3$, then almost free from setae to the tip which is furnished with a long apical bristle, a slightly shorter outer distal seta and a very short yellow hair at apex.

Length: Body 5.5 mm; wing 6.4 mm.

Distribution: Burma.

Type locality: Kambaiti, 7000 ft., N. E. Burma.

Holotype: ♂, Kambaiti, 7000 ft., N. E. Burma, 11/5, 1934, Malaise (in the collection of the Zoological Museum, University Helsinki).

Remarks: *D. malaisei* is a typical member of the *unipunctatus* group (Saigusa, 1984), which is recorded from Taiwan (1 sp.) and Eastern Nepal (7 spp. + 2 anomalous spp.). This species seems to be most closely related to *D. saigusai* Takagi, 1968 from Taiwan and *D. rotundicornis* Saigusa, 1984 from Nepal in the less ornamented postabdomen including vestiture and the presence of long yellow ventral setae on the basal portion of the middle tibiae in the male. These three species seem to form a distinct subgroup in the *unipunctatus* group.

The new species is distinguished from *rotundicornis* by the front tibia (which bears several posteroventral bristles regularly arranged in *rotundicornis*), the front femur (without a distinctly flattened posteroventral surface towards the base in *rotundicornis*), the 4th sternum (which is simple in its hind margin in *rotundicornis*) and the cerci (long ciliated along the entire margin in *rotundicornis*). *D. saigusai* is distinguished from the new species by almost the same characters stated above for *rotundicornis*, but in this species the ciliation of the cercus is rather intermediate between *saigusai* and the new species. It is also similar to the new species in the posteroventral bristles of the front tibia.

Discussion

As already stated in the introduction, no species of the genus *Diostracus* has hitherto been recorded from vast area between Japan and Nepal. Saigusa (1984) presumed the occurrence of the genus in this area with topographic and climatic conditions suitable for *Diostracus* flies. The present records of the genus from N. E. Burma and W. China have proved his presumption. Kambaiti, N. E. Burma, is the southernmost locality known for the genus. The empidid fauna of Kambaiti can be considered almost entirely temperate in nature, being represented by many species of the genera *Hilara* and *Empis* and comprising rather subarctic empidid genera such as *Hormopeza* and *Oedalea* (Smith, 1975). The present record of the genus *Diostracus* from Kambaiti has strengthened the temperate nature of the Empidoid fauna of this locality.

It is interesting that all the Kambaiti species of *Diostracus* are included in 4 out of the 9 known species groups of Nepalese *Diostracus*. The Nepalese species groups which are not represented in the Kambaiti collection are the *reticulatus*, the *impulvillatus*, the *nigripilosus*,

the *umbripennis*, and the *tangalensis* group. As the species of the *reticulatus* group seem to be rather rare in lower altitudes, the group will be found in northern Burma in future. The *impulvillatus*, the *nigripilosus*, the *umbripennis*, and the *tangalensis* group comprise high altitude Nepalese species mostly distributed in 3,000–4,500 m. It is unlikely that species of these groups will be discovered in Kambaiti.

The present study has revealed the occurrence of the genus in W. China. The fauna of the family Dolichopodidae in the Continental China is extremely poorly surveyed, and there is in this region a vast area having suitable environments for the genus *Diostracus*. Therefore, we can convincingly assume that there are numerous species of the genus in the continent except for extremely high altitudes or deserts, or the southern plains. It is also expected that some unknown species groups will be discovered in the Continental China; in fact, the only known Chinese species, *nishiyamai*, represents its own species group.

It is noteworthy that we have still at least four undescribed species in Japan. The present study presents some evidence for occurrence of allopatric speciation in the genus within the islands for some species; the *yukawai* subgroup may present an example. *D. latipennis* is apparently differentiated into several local races. The differences in some morphological characters among them seem to be as large as or larger than those between some known species. The local populations of this species seem to be just in the process of allopatric speciation beyond the subspecies level. *D. latipennis* is also interesting in its relationship to *D. tarsalis*. This pair is a second example of close phylogenetic relationship in the Japanese species.

It is also noteworthy that there is no common species group between the Japanese and the Himalaya-China faunas. As I have extensively surveyed *Diostracus* in Kyushu, the southernmost main island of Japan, it is almost unexpected that species belonging to some continental species groups will be found there. On the other hand, the possibility cannot be excluded that some of Japanese species groups will be found in northern mountain regions in China.

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