ACTA ENTOMOLOGICA MUSEI NATIONALIS PRAGAE
Published 15.xi.2016 Volume 56(2), pp. 725–741 ISSN 0374-1036
http://zoobank.org/urn:lsid:zoobank.org:pub:D9281F86-E19D-4EA5-8173-DAB15ED8703B

Review of the genera *Diplopherusa* and *Paracladiscus* (Coleoptera: Cleridae: Tillinae) from Japan and Taiwan, with descriptions of two new species

Hiroyuki MURAKAMI

Entomological Laboratory, Faculty of Agriculture, Ehime University, Tarumi 3-5-7, Matsuyama, 790-8566 Japan; e-mail: hiroyuki068@gmail.com

Abstract. The genera *Diplopherusa* Heller, 1922 and *Paracladiscus* Miyatake, 1965 from Japan and Taiwan are reviewed. Two species, *Diplopherusa yonaguniensis* sp. nov. from Japan and *Paracladiscus choui* sp. nov. from Taiwan, are described as new, and in total six species of both genera occur in the studied area. A key to the species of these genera and a distributional map for Japan and Taiwan are provided.

Key words. Coleoptera, Cleridae, Tillinae, *Diplopherusa*, *Paracladiscus*, taxonomy, key to species, new species, Japan, Taiwan, Palaearctic Region

Introduction

Six genera of the subfamily Tillinae Leach, 1815 (Coleoptera: Cleridae), *Cladiscus* Chevrolat, 1843, *Diplopherusa* Heller, 1922, *Gracilotillus* Pic, 1933, *Egenocladiscus* Corporaal & Wiel, 1949, *Orthocladiscus* Corporaal & Wiel, 1949, and *Paracladiscus* Miyatake, 1965, are regarded to be allied in their general appearance, i.e. elongate body and variously shaped antennae (Corporaal & Wiel 1949, Miyatake 1965). Of those, the closely related genera *Diplopherusa* and *Paracladiscus* are characterized by biramous antennae and swollen hind tibiae in males, and distinguished from one another by the shape of prothorax, labial palpi and male antennae. *Diplopherusa* contains seven species distributed in the Oriental Region, three of them are known to occur in Japan and Taiwan: *D. shibatai* (Miyatake, 1965), *D. kitamurai* Nakane, 1989, and *D. ahsini* Yang & Yang, 2013 (Yang & Yang 2013, Gerstmeier 2015). The remaining four species are distributed in Nepal, India, Borneo and Luzon (Corporaal 1950, Gerstmeier 2015). The genus *Paracladiscus* was until now monotypic containing only *P. atricolor* Miyatake, 1965 known from Japan (Miyatake 1965, 1985).

In this paper, the species of the two morphologically related genera, *Diplopherusa* and *Paracladiscus*, occurring in Japan and Taiwan are reviewed. As a result two species are

described as new to science and in total six species are known to occur in Japan and Taiwan. A key to all species and a distributional map for Taiwan and its adjacent Japanese islands are also provided.

Material and methods

The terminology in this paper follows Opitz (2010). The observation method of pygidium and genitalia follows Murakami & Yamasako (2012), except for the tegmen with phallus which was pulled out with forceps. Illustrations of these parts were made using Adobe Illustrator CS4 based on photographs taken with a HiROX KH-1300 digital microscope and 2D measurement software SHX-13M v2.9.0. Measurements were done using a micrometer eyepiece with a scale.

The following abbreviations are used for measurements: BL – the length of body (PL+EL); EL – the length of elytra measured from basal margin to the apex of suture; EW – the maximum conjoint width of elytra; EyD – the distance between eyes in dorsal view; EyW – the width of eye in a dorsal view; PL – the maximum length of pronotum; PW – the maximum width of pronotum. The length of each antennomere and longer ramus arising from antennomeres III to X were measured in males. The length and width of each antennomere were measured in females.

The data for the type specimens are cited verbatim in the original spelling and are given in single quotation marks (‘’). A single vertical bar (|) separates rows within each label and a double vertical bar separates labels. Additional notes are given in square brackets.

The specimens examined in this study are deposited in following collections:

EUMJ Ehime University Museum, Matsuyama, Japan;
KSTJ Kaoru Sakai collection, Tokyo, Japan;
KUM Kyushu University Museum, Fukuoka, Japan;
NHMI Natural History Museum and Institute, Chiba, Japan;
OMNH Osaka Museum of Natural History, Osaka, Japan;
SSCT Shih Yan Sin collection, Changhua, Taiwan;
TARI Taiwan Agricultural Research Institute, Taichung, Taiwan;
WCTT Wen-I Chou collection, Taitung, Taiwan.

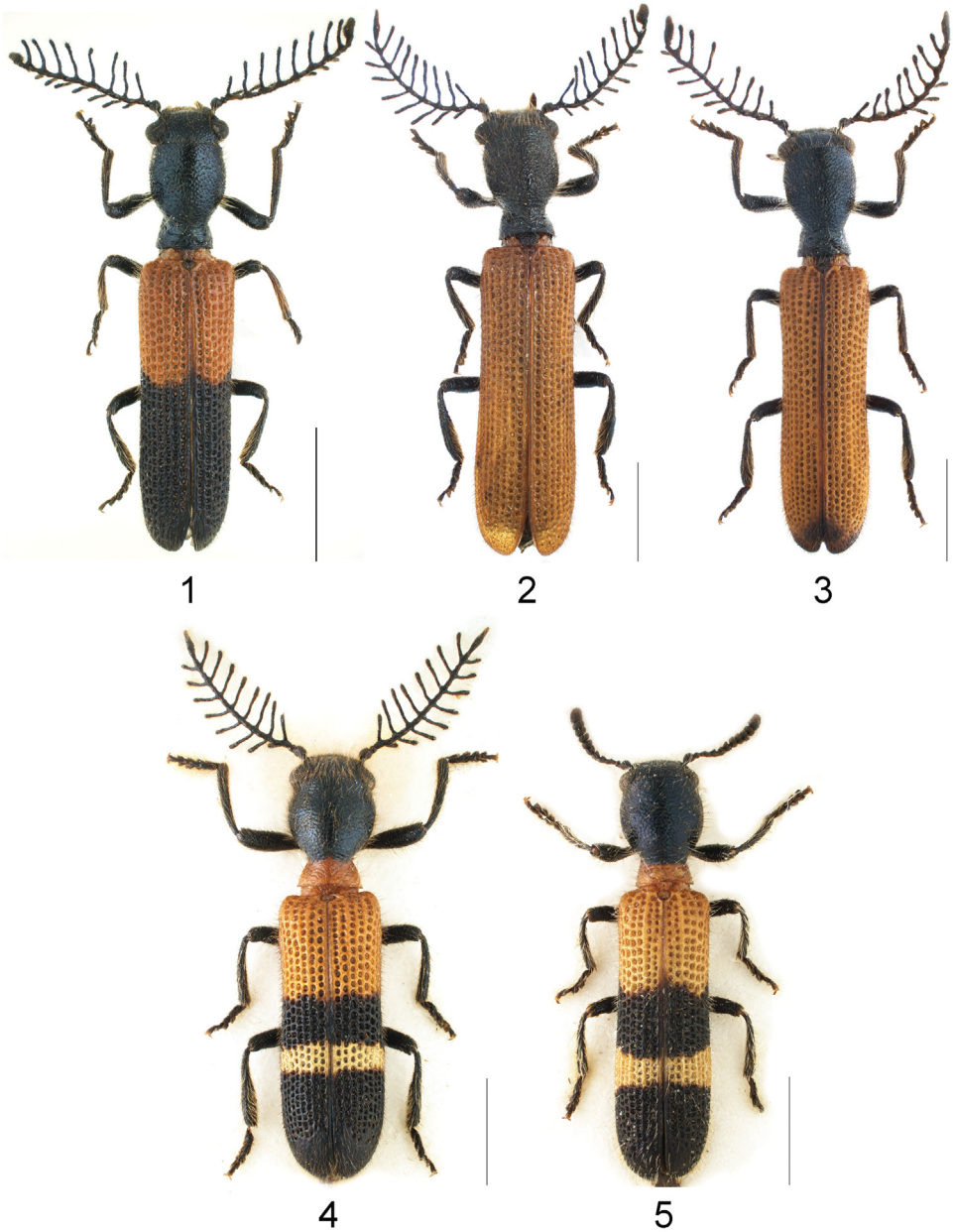
Taxonomy

Diplopherusa Heller, 1922

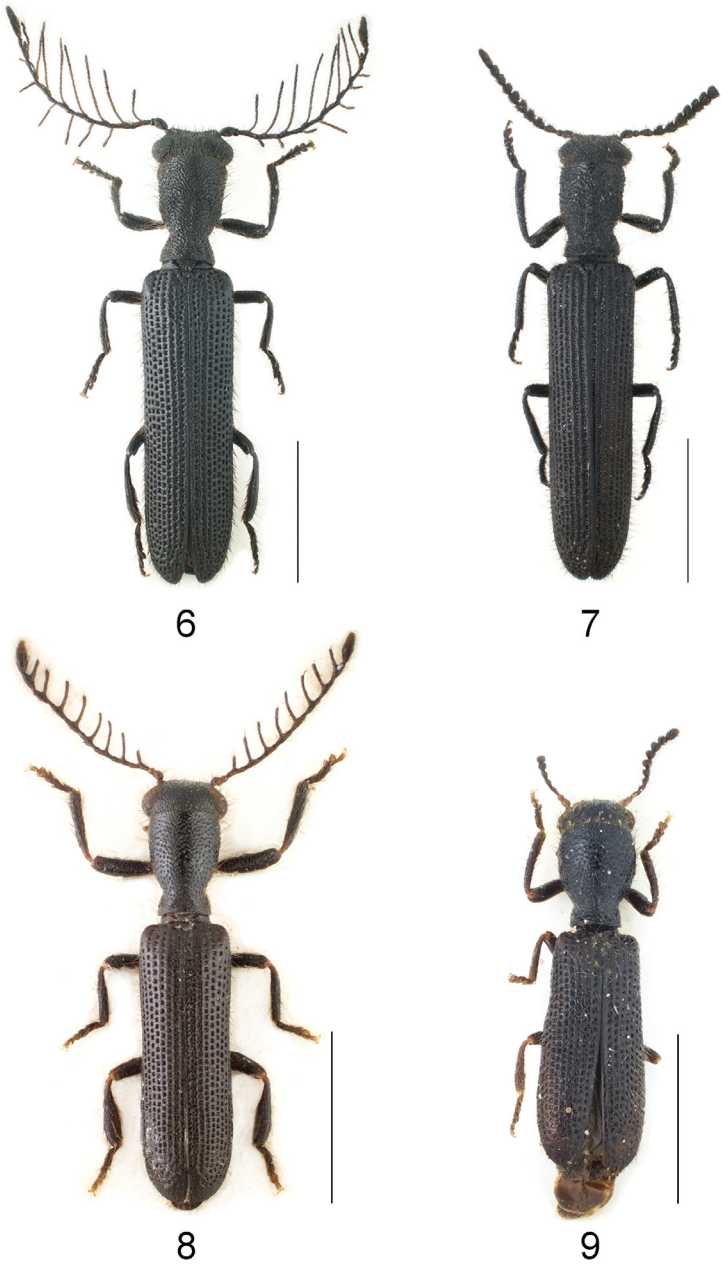
Diplopherusa Heller, 1922: 530 (original description). Corporaal & van der Wiel (1949): 183 (key to species).

Type species. *Diplopherusa tumidipes* Heller, 1922, by monotypy.

Diagnosis (for the Japanese and Taiwanese species). This genus is similar to *Paracladiscus*, but is distinguished from it by the following characters: head and pronotum vested with fine punctation; terminal segments of labial palpi widely triangular, their length equal to 1/3 of width of apical margin of terminal palpomeres (Fig. 19); postgular processes dilated distally at extremities; anterior plate of metendosternite (Fig. 20) wide, slightly extended anteriorly; hind tibiae in male (Fig. 21) swollen posteriorly; phallobasic struts (Figs 44, 46, 48, 50) well developed. This genus is also similar to *Cladiscus*, *Gracilotillus*, *Egenocladiscus*, and



Figs 1–5. Habitus of *Diplopherusa* spp (1–4 – male; 5 – female). 1 – *Diplopherusa yonaguniensis* sp. nov., holotype; 2 – *D. ahsini* Yang & Yang, 2013; 3 – *D. kitamurai* Nakane, 1989; 4–5 – *D. shibatai* (Miyatake, 1965). Scale bars: 2.0 mm.



Figs 6–9. Habitus of *Paracladiscus* spp. (6, 8 – male, holotype; 7, 9 – female). 6–7 – *Paracladiscus choui* sp. nov.; 8–9 – *P. atricolor* Miyatake, 1965. Scale bars: 2.0 mm.

Orthocladiscus, but distinctly differs from these genera in swollen male hind tibiae. A key to these genera was published by Corporaal & van der Wiel (1949).

Diplopherusa yonaguniensis sp. nov.

(Figs 1, 10, 25, 31, 37, 43, 44, 61)

Type locality. Japan, Okinawa Prefecture, Yaeyama Islands, Yonaguni-jima.

Type material. Holotype: ♂, '[JPN: Okinawa] alt. 70m (light) | Mandabaru-shinrinkôen, | Yonaguni-cho, Yaeyama-gun | 24°27′31.77″N 122°58′31.31″E | 2–V–2016 Hiroshi Ikeda leg.' (EUMJ). Paratype: 1 ♂, 'Sonai | Yonaguni-jima | 21. V. 1989 | N. Ohbayashi leg.' (EUMJ).

Description. ***Male*** (Fig. 1). Head, pronotum, pterothorax in ventral view, and femora dark blue and moderately shiny; basal 1/3 of elytra yellow; antennae, apical 2/3 of elytra, tibiae, tarsi brownish-black.

Measurements (n = 2): EyW: 0.30 mm; EyD: 0.70–0.72 mm; BL: 5.87–6.37 mm; PL: 1.55–1.73 mm; PW: 1.13–1.18 mm; EL: 4.32–4.64 mm; EW: 1.40–1.43 mm.

Head convex dorsally, with fine setigerous punctation; EyD/EyW: 2.37–2.40. Terminal palpomeres of maxillary palpi short and digitiform; those of labial palpi widely triangular, their length equal to 1/3 of width of apical margin of terminal palpomeres. Antennae (Fig. 10) longer than total length of head and pronotum combined; antennomere I swollen and bent; II compact; III–X biramous; XI flattened, fusiform. Approximate length ratio of antennomeres (n = 1): 2.3 : 1.0 : 2.8 : 2.6 : 3.1 : 2.8 : 2.8 : 2.8 : 2.8 : 2.6 : 5.6. Relative length ratio of rami of antennomeres III–X (n = 1): 1.0 : 1.3 : 1.6 : 1.5 : 1.5 : 1.4 : 1.4: 1.2.

Pronotum widest before apex, constricted in basal 1/3; surface covered with fine and rather sparsely distributed setigerous punctures; pronotal projections reaching to procoxal projections; PL/PW: 1.37–1.47.

Elytra elongate, mostly parallel-sided, widest at humeri, large and deep punctation arranged in rows of punctures not extended to apex; intervals slightly smaller than puncture diameter and with pubescence; EL/EW: 3.09–3.26, EL/PL: 2.69–2.79, EW/PW: 1.21–1.24.

Unguis with basal denticles; metatibiae apically dilated to near apex, thence weakly narrowed, densely covered with pubescence on posterior inner surface.

Pygidium (Fig. 25) rounded posteriorly; pygidial struts anteriorly extended. Sternite VIII (Fig. 31) semicircular, weakly pigmented in middle. Spicular fork (Fig. 37) with intraspicular plate.

Connecting membrane between tegmen and phallus with fine spines (Figs 43–44); tegmen shorter than phallus; phallobasic struts developed; phallobasic apodeme slightly longer than phallobase.

Female. Unknown.

Differential diagnosis. The new species is similar to *D. kitamurai*, but is distinguished by the following characters: punctation of pronotum sparse; apical half of elytra black; EyD/EyW: 2.40; tibiae brownish black and rather elongate; male pygidial struts extended anteriorly; abdominal sternite VIII semicircular in male.

Etymology. The species name is derived from the type locality, Yonaguni-jima.

Distribution. Japan: Okinawa Prefecture: Yaeyama Islands: Yonaguni-jima (Fig. 61).

Diplopherusa ahsini Yang & Yang, 2013

(Figs 2, 11, 26, 32, 38, 45–46, 61)

Diplopherusa ahsini Yang & Yang, 2013: 168 (original description).

Type locality. Taiwan, Pingtung County, Machia.
Material examined. TAIWAN: Nantou County: Nanshanshi, Renai Township, 1.vi.1973, 1 ♂, unknown collector (EUMJ); Shihtyutou, Renai Township, 10–13.vi.1995, 1 ♂, Y. Arita leg (EUMJ). **Kaohsiung County:** Shanping, Maolin Township, 4.iv.1976, 1 ♂, K. Ushijima leg. (EUMJ); Shihnanshan, near Liukuei, 12.v.1991, 1 ♂, W. Chen leg. (NHMI).

Differential diagnosis. This species is similar to *D. yonaguniensis* sp. nov. and *D. kitamurai*, but is distinguished by the following characters: elytra orange, widest before apex; elytral striae extended to apex; pygidium rather wide; apical margin of sternite VIII incised in middle in males.

Supplementary description. ***Male*** (Fig. 2). For full descriptions see Yang & Yang (2013). Approximate length ratio of antennomeres (n = 1): 5.6 : 1.0 : 6.3 : 5.8 : 5.6 : 5.6 : 5.6 : 5.4 : 5.2 : 4.8 : 12.5. Relative length ratio of rami of antennomeres III–X (n = 1): 1.1 : 1.4 : 1.5 : 1.3 : 1.2 : 1.2 : 1.2 : 1.0.

Measurements (n = 4): EyW: 0.30–0.42 (0.38) mm; EyD: 0.66–0.88 (0.78) mm; BL: 5.77–8.53 (7.68) mm; PL: 1.53–2.20 (1.94) mm; PW: 1.05–1.50 (1.33) mm; EL: 4.24–6.40 (5.74) mm; EW: 1.38–2.03 (1.82) mm. EyD/EyW: 1.95–2.20 (2.06); PL/PW: 1.44–1.47 (1.46); EL/EW: 3.08–3.28 (3.15); EL/PL: 2.76–3.28 (2.96); EW/PW: 1.31–1.46 (1.37).

Anterior plate of metendosternite slightly extended anteriorly. Unguis with basal denticles; metatibiae apically dilated to near apex, thence weakly narrowed towards apex, densely covered with pubescence on posterior inner surface, latter concave but flattened.

Pygidium (Fig. 26) rounded posteriorly; pygidial struts stout, distally extended. Sternite VIII (Fig. 32) weakly pigmented in central portion, slightly incised on apical margin. Spicular fork (Fig. 38) with intraspicular plate.

Connecting membrane between tegmen and phallus in fully extended condition (Figs 45–46) vested with fine spins; tegmen shorter than phallus; phallobase membranous in ventral view; phallobasic struts present; phallobasic apodeme elongate, rounded at apex; phallus divaricate in apical 1/4, dorsally with median orifice, roundly pointed at apex.

Female. Unknown.

Distribution. Taiwan: Nantou Co. and Pingtung Co. (Yang & Yang 2013); Kaohsiung Co. (present paper) (Fig. 61).

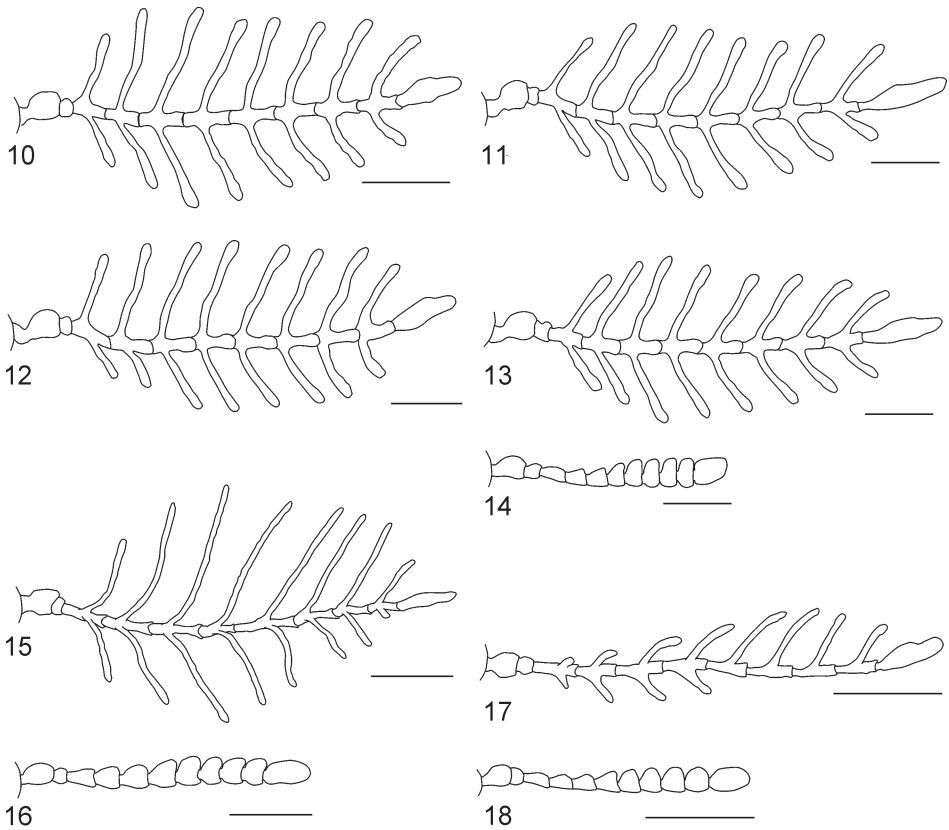
Diplopherusa kitamurai Nakane, 1989

(Figs 3, 12, 19–21, 27, 33, 39, 47–48, 61)

Diplopherusa kitamurai Nakane, 1989: 149 (original description, incl. Figs: pls. 11, 22, 23). Satô (1998): 7 (noted, incl Figs 1–2); Ômomo (1999): 3 (faunistics); Nakamura (2001): 48 (faunistics).

Type locality. Japan, Okinawa Prefecture, Ishigaki Islands, Mt. Banna-dake.
Material examined. JAPAN: Okinawa Prefecture: *Yaeyama Islands*: Ishigaki-jima, Omoto-dake, 10. vi. 1972, 1 ♂, Mizunuma leg. (EUMJ); Ishigaki-jima, Banna-dake, 24.v.1978, 1 ♂, S. Kato leg. (EUMJ).

Supplementary description. ***Male*** (Fig. 3). For full descriptions see Nakane (1989). Approximate length ratio of antennomeres (n = 1): 3.9 : 0.9 : 4.8: 4.5 : 4.7 : 4.7 : 4.7 : 4.8 : 4.8 :



Figs 10–18. Antennae (10–13, 15, 17 – male; 14, 16, 18 – female). 10 – *Diplopherusa yonaguniensis* sp. nov.; 11 – *D. ahsini* Yang & Yang, 2013; 12 – *D. kitamurai* Nakane, 1989; 13–14 – *D. shibatai* (Miyatake, 1965); 15–16 – *Paracladiscus choui* sp. nov.; 17–18 – *P. atricolor* Miyatake, 1965. Scale bars: 0.5 mm.

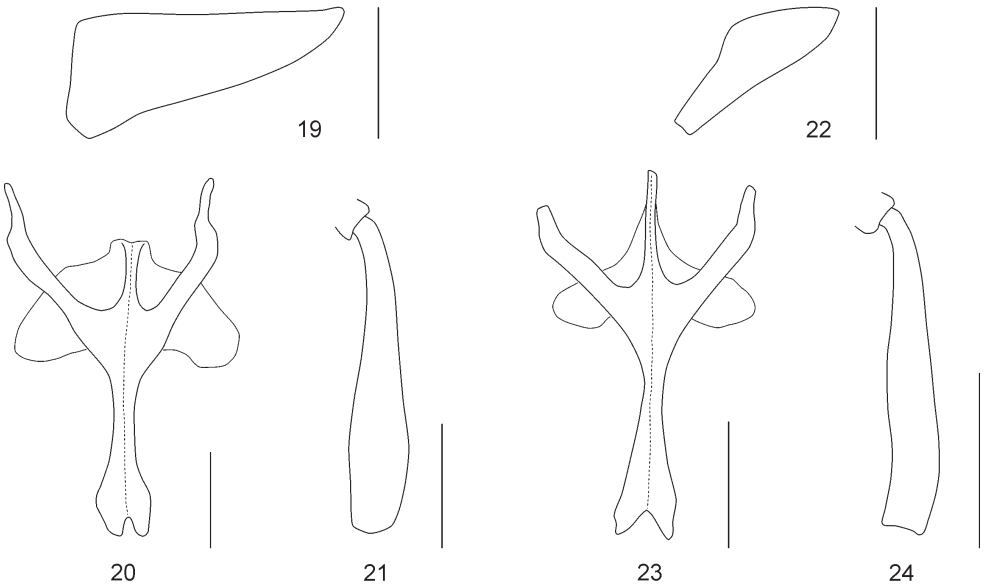
4.7 : 8.1. Relative length ratio of rami of antennomeres III–X (n = 1): 1.0 : 1.3 : 1.4 : 1.4 : 1.3 : 1.3 : 1.3 : 1.0.

Measurements (n = 2): EyW: 0.40 mm; EyD: 0.82–0.84 mm; BL: 7.40–7.53 mm; PL: 2.07 mm; PW: 1.40–1.43 mm; EL: 5.33–5.47 mm; EW: 1.73–1.77 mm. EyD/EyW: 2.05–2.10; PL/PW: 1.44–1.48; EL/EW: 3.02–3.15; EL/PL: 2.58–2.65; EW/PW: 1.23–1.24.

Anterior plate of metendosternite (Fig. 20) slightly extended anteriorly. Unguis with basal denticles; metatibiae (Fig. 21) apically dilated to near apex, thence weakly narrowed, densely covered with pubescence on posterior inner surface.

Pygidium (Fig. 27) round posteriorly; pygidial struts short. Sternite VIII (Fig. 33) trapezoidal, weakly pigmented in middle. Spicular plate (Fig. 39) with intraspicular plate.

Connecting membrane between tegmen and phallus in fully extended condition (Figs 47–48) vested with fine spines; tegmen shorter than phallus; phallobase cylindrical, mem-



Figs 19–24. Labial palpi (19, 22), metendosternites (20, 23) and male hind tibiae (21, 24). 19–21 – *Diplopherusa kitamurai* Nakane, 1989; 22–24 – *Paracladiscus choui* sp. nov. Scale bars: 0.25 mm (19–20, 22–23), 0.5 mm (21, 24).

branous in ventral view; phallobasic apodeme elongate, rounded at apex; phallus divaricate in apical 1/4, dorsally with median orifice, rounded at apex.

***Female*.** Unknown.

Differential diagnosis. This species is similar to *D. yonaguniensis* sp. nov., but can be distinguished by the following characters: punctation of pronotum dense; elytra black at apex; elytral rows of punctures extended before apex; EyD/EyW: 2.05–2.10; tibiae metallic dark blue and rather stout; male pygidial struts stout; sternite VIII trapezoidal in males.

Distribution. Japan: Okinawa Prefecture: Yaeyama Islands: Ishigaki-jima, Iriomote-jima (Ômomo 1999), Hateruma-jima (Nakamura 2001) (Fig. 61).

Diplopherusa shibatai (Miyatake, 1965)

(Figs 4–5, 13–14, 28, 34, 40, 49–50, 55–56, 61)

Gracilotillus shibatai Miyatake, 1965: 21 (original description, incl. fig. 1C–D, pl. 3C).

Diplopherusa shibatai: Nakamura (1986): 40 (faunistics); Miyatake (1985): 152 (noted, incl. fig. 22, pl. 24); Satô (1998): 8 (noted, incl. fig. 3).

Type locality. Japan, Kagoshima Prefecture, Amami Islands, Ikari.

Type material examined. Holotype: ♀, 'IKARI, | AMAMI IS. | 30. VI. 1961 | T. Shibata [leg.] || gracilotillus | shibatai | M. Miyatake [des.] || HOLOTYPUS [red label]' (OMNH). Paratype: 1 ♀, 'Amami-Oshima | Hatsuno | 11 VII. 1962 | N. Ohbayashi [leg.] || gracilotillus | shibatai | M. Miyatake [des.] || ♀'.(EUMJ, Type No. 1080).

Additional material examined. JAPAN: Kagoshima Prefecture: ***Amami Islands*****:** Amami-Ôshima, Hatsuno, 26.vi.1970, 2 ♂♂, T. Kobayashi leg. (EUMJ), 28.vi.1974, 1 ♂, B. K. Bya leg. (EUMJ); Amami-Ôshima, Nishinakama, 3.vii.1975, 1 ♀, 5.vii.1976, 1 ♀, H. Makihara leg. (KUM); Amami-Ôshima, Chûô-rindô, 27–29.vi.1987, 1 ♂, K. Shimizu leg. (EUMJ), 28.vi.1988, 1 ♂ M. Nishimura leg. (EUMJ), 29. vi. 2001, 1 ♂, 30.vi.2001, 1 ♀, 26.vi.2003, 1 ♂, T. Kurihara leg. (EUMJ); Amami-Ôshima, Santarô-tôge, Sumiyô-chô, 5.vii.2009, 1 ♂, S. Matsuno leg. (EUMJ). ***Tokara Islands*****:** Kuchino-shima, 26.vi.–3.vii.1969, 1 ♀, H. Makihara leg. (KUM); Nakano-shima, Sokonashi, 19.vi.1998, 1 ♂, (EUMJ). **Okinawa Prefecture:** ***Okinawa Islands***: Yonaha-dake, 5.vii.1973, 1 ♂, Sugino leg. (EUMJ). ***Yaeyama Islands***: Ishigaki-jima, Omoto-dake, 8.vi.1972, 1 ♀, 22.vi.1972, 1 ♀, 29. vi. 1972, 1 ♀ Mizunuma leg. (EUMJ); Yonaguni-jima, Jinmen-Iwa, Yonaguni-chô, Yaeyama-gun, 3.v.2016, 1 ♀, H. Ikeda leg. (EUMJ); Yonaguni-jima, Mantabaru-shinrinkôen, Yonaguni-chô, Yaeyama-gun, 6.v.2016, K. Yoshida leg, 1 ♀, (EUMJ). **TAIWAN: Kaohsiung County:** Liukuei, Renai Township, 28.iv.1970, 1 ♀, Y. Kiyoyama leg. (EUMJ).

Differential diagnosis. This species is easily distinguished from other Japanese and Taiwanese members of the genus by pronotum dilated distally and elytra with white band behind middle.

Redescription. ***Male*** (Fig. 4). Head, pronotum except for basal 1/5, more than half of elytra except for white band, and legs dark blue and moderately shiny; basal 1/5 of pronotum, basal half of elytra reddish brown. Body surface with white pubescence.

Measurements (n = 7): EyW: 0.30–0.44 (0.37) mm; EyD: 0.70–0.84 (0.78) mm; BL: 6.00–7.54 (6.71) mm; PL: 1.68–2.1 (1.92) mm; PW: 1.25–1.50 (1.39) mm; EL: 4.32–5.44 (4.79) mm; EW: 1.45–1.90 (1.69) mm.

Head convex dorsally; EyD/EyW: 1.86–2.67 (2.15). Terminal palpomeres of maxillary palpi short digitiform; those of labial palpi widely triangular, their length equal to 1/3 of width of apical margin of terminal palpomeres. Antennae longer than total length of head and pronotum combined; antennomere III–X biramous; XI flattened. Approximate length ratio of antennomeres (n = 1): 3.6 : 0.9 : 4.1 : 3.8 : 3.9 : 4.1 : 3.9 : 3.8 : 3.6 : 3.1 : 5.9. Relative length ratio of rami of antennomeres III–X (n = 1): 1.1 : 1.4 : 1.5 : 1.6 : 1.4 : 1.4 : 1.2 : 1.0.

Pronotum widest in apical 1/5, thence narrowed anteriorly, constricted in basal 1/5; surface with fine and densely arranged setigerous punctures; PL/PW: 1.20–1.46 (1.38).

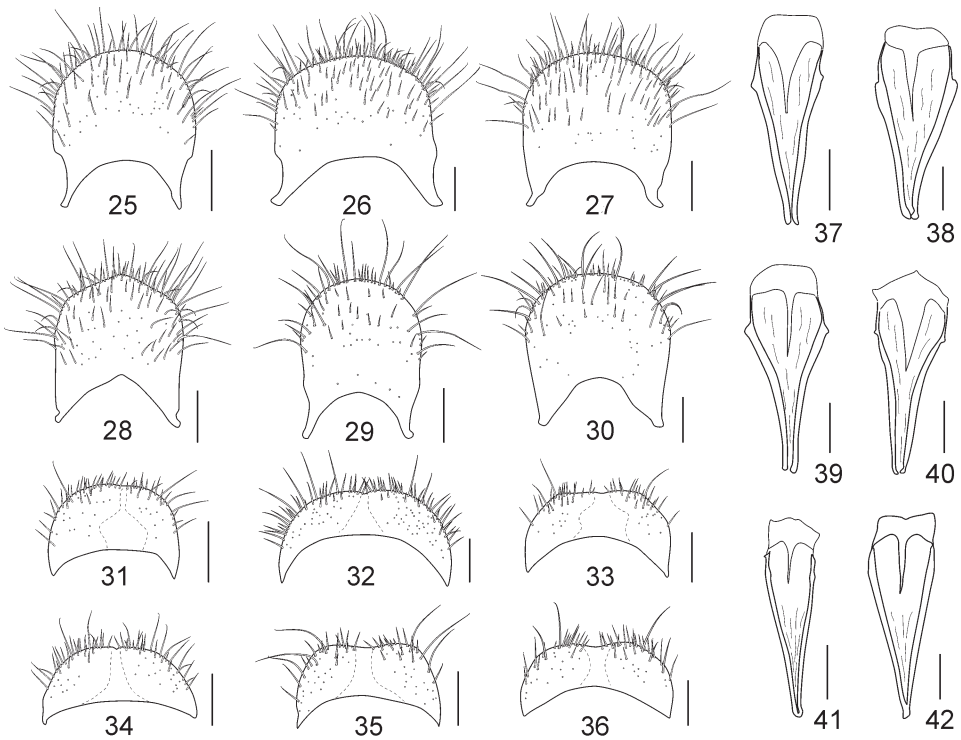
Elytra elongate, subparallel-sided to near apex, covered with large and deep punctures; rows of punctures extended before apex; intervals slightly smaller than puncture diameter and with pubescence; EL/EW: 2.62–2.98 (2.84); EL/PL: 2.37–2.59 (2.49); EW/PW: 1.16–1.27 (1.22). Anterior plate of metendosternite slightly extended anteriorly.

Unguis with basal denticles; metatibiae apically dilated to near apex, thence weakly narrowed, densely covered with pubescence on posterior inner surface.

Pygidium (Fig. 28) posteriorly pointed in middle; pygidial struts short. Sternite VIII (Fig. 34) weakly pigmented in central portion, slightly incised on apical margin. Spicular fork (Fig. 40) with intraspicular plate.

Connecting membrane between tegmen and phallus in fully extended condition (Figs 49–50) vested with finely spines; tegmen shorter than phallus; phallobase membranous in ventral view; phallobasic struts developed; phallobasic apodeme elongate, rounded at apex; phallus divaricate in apical 1/4, rounded at apex, dorsally with median orifice.

Female (Fig. 5). Measurements (n = 8): EyW: 0.24–0.32 (0.28) mm; EyD: 0.74–1.08 (0.90) mm; BL: 5.22–8.25 (6.97) mm; PL: 1.38–2.25 (1.96) mm; PW: 1.15–1.68 (1.48) mm; EL: 3.84–6.00 (5.01) mm; EW: 1.43–1.93 (1.71) mm.

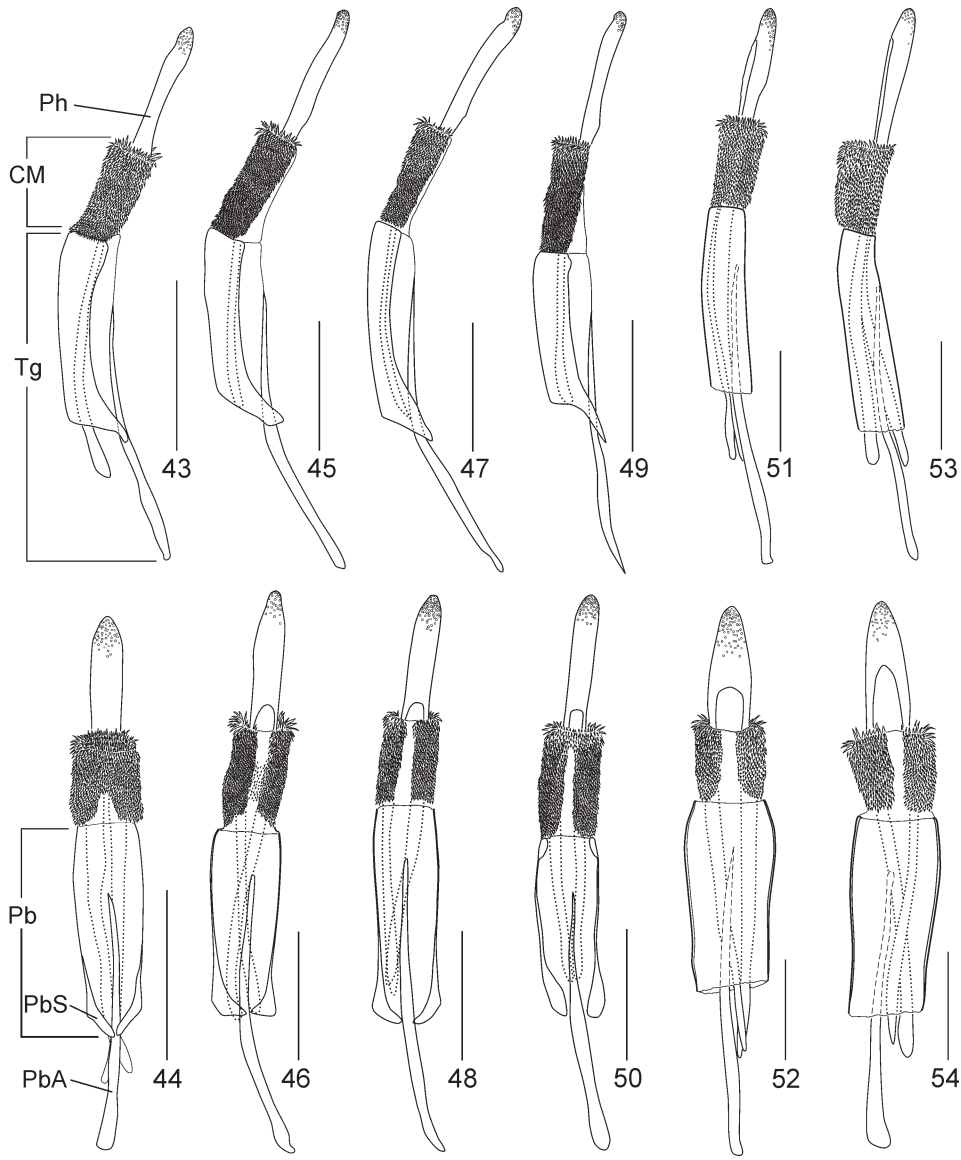


Figs 25–42. Male pygidia (25–30), 8th sternites (31–36) and spicular forks (37–42). 25, 31, 37 – *Diplopherusa yonaguniensis* sp. nov.; 26, 32, 38 – *D. ahsini* Yang & Yang. 2013; 27, 33, 39 – *D. kitamurai* Nakane, 1989; 28, 34, 40 – *D. shibatai* (Miyatake, 1965); 29, 35, 41 – *Paracladiscus choui* sp. nov.; 30, 36, 42 – *P. atricolor* Miyatake, 1965. Scale bars: 0.25 mm (25–28, 30–34, 36–40, 42), 0.5 mm (29, 35, 41).

Similar to male, but EyD/EyW: 2.93–3.86 (3.19), antennae (Fig. 14) shorter than lengths of head and pronotum combined; elytra rather narrow; metatibiae not swollen, simply elongate. Approximate length ratio of each length of antennomeres (n = 1): 3.1 : 1.0 : 1.6 : 1.5 : 1.6 : 1.3 : 1.3 : 1.1 : 1.1 : 1.1 : 2.4. Relative width ratio of antennomeres (n = 1): 1.5 : 1.1 : 1.0 : 1.1 : 1.3 : 1.6 : 2.0 : 2.1 : 2.3 : 2.3 : 2.0. PL/PW: 1.20–1.42 (1.33); EL/EW: 2.69–3.12 (2.92); EL/PL: 2.25–2.79 (2.57); EW/PW: 1.07–1.24 (1.16). Pygidium (Fig. 55) pointed posteriorly; pygidial struts short. Sternite VIII (Fig. 56) rounded posteriorly.

Distribution. Japan: Kagoshima Prefecture: Amami-Ôshima (Nakamura 1986), Kuchino-shima, Nakano-shima (present paper); Okinawa Prefecture: Okinawa-jima (Nakamura 1986), Ishigaki-jima, Iriomote-jima (Miyatake 1985), Yonaguni-jima (present paper); Taiwan: Kaohsiung Co. (present paper) (Fig. 61). Species new to Taiwan.

Remark. Miyatake (1965) mentioned that the paratype was a male but in fact it is a female.



Figs 43–54. Male genitalia in lateral views (43, 45, 47, 49, 51, 53) and ventral views (44, 46, 48, 50, 52, 54). 43–44 – *Diplopherusa yonaguniensis* sp. nov.; 45–46 – *D. ahsini* Yang & Yang, 2013; 47–48 – *D. kitamurai* Nakane, 1989; 49–50 – *D. shibatai* (Miyatake, 1965); 51–52 – *Paracladiscus choui* sp. nov.; 53–54 – *P. atricolor* Miyatake, 1965. Abbreviations: Ph, phallus; CM, connecting membrane between tegmen and phallus; Tg, tegmen; Pb, phallobase; PbA, phallobasic apodeme; PbS, phallobasic struts. Scale bars: 0.5 mm (43–52), 0.20 mm (53–54).

Key to the species of *Diplopherusa*
(modified from Corporaal & van der Wiel 1949)

1 Elytra unicolour. 2
– Elytra multicolour. 5
2 Elytra orange. 3
– Elytra black. 4
3 PL/PW: 1.34–1.45; elytra with regular large deep punctation reaching to apex. .... ***D. ahsini*** Yang & Yang, 2013
– PL/PW: approximately 1.0; elytra with irregular fine and dense punctation on apical 2/5 of length. ..... ***D. tumidipes*** Heller, 1922
4 Pronotum red with black anterior margin; elytral rows of punctures not reaching to apex. ..... ***D. rosti*** Schenkling, 1908
– Pronotum uniformly metallic blue; elytral rows of punctures reaching to apex. .... ***D. delicatula*** Gerstmeier, 2015
5 Elytra with white or yellow postmedian band. 6
– Elytra without postmedian band. 8
6 Pronotum black with reddish basal margin. ..... ***D. shibatai*** (Miyatake, 1965)
– Pronotum reddish with black apical margin. 7
7 Elytra with round reddish markings near scutellum, the rest of elytra copper in color. .... ***D. magnificus*** Schenkling, 1908
– Elytra reddish in basal 1/4 of length and black in apical 3/4. .... ***D. transversalis*** Corporaal & Wiel, 1949
8 EyD/EyW: 1.95–2.20; punctation of pronotum rather dense; only apex of elytra black; tibiae metallic dark blue and stout. ..... ***D. kitamurai*** Nakane, 1989
– EyD/EyW: 2.37–2.40; punctation of pronotum rather sparse; elytra black in apical 1/2 of length; tibiae brownish black and slim. ..... ***D. yonaguniensis* sp. nov.**

Paracladiscus Miyatake, 1965

Paracladiscus Miyatake, 1965: 20 (original description).

Type species. *Paracladiscus atricolor* Miyatake, 1965, by original designation.
Diagnosis. *Paracladiscus* is similar to *Diplopherusa*, but distinguished by the following characters: head and pronotum covered with deep and large punctures; terminal palpomeres of labial palpi triangular, as long as width of apical margin of terminal palpomeres (Fig. 22); gula with two separate postgular processes, which are not swollen at extremities; anterior plate of metendosternite (Fig. 23) tapered anteriorly; hind tibiae in male (Fig. 24) weakly swollen in middle and apically curved inwardly; phallobasic struts (Figs 52, 54) not developed.
Remark. Miyatake (1965) mentioned that the feature of male antennae is significant for the distinction between *Paracladiscus* and *Diplopherusa*. However, the herein described species, *Paracladiscus choui* sp. nov., has ramose antennae like *Diplopherusa*, therefore this character cannot be considered a distinctive feature for the two genera.

Paracladiscus choui sp. nov.

(Figs 6–7, 15–16, 22–24, 29, 35, 41, 51–52, 57–58, 61)

Type materials. Holotype: ♂ '[Taiwan] Dahanshan (Mt.) | Chunri Township | Pingtung County | [the locality name written in Chinese characters] | 8. VII, 2012 | H. Murakami leg.' (EUMJ). Paratypes: **TAIWAN: Hsinchu County:** 5 ♂♂, Yulao, Alt. ca. 1,589 m, Jianshih Township, Hsinchu County, 3.vii.2015, W. I. Chou leg. (WCTT); 3 ♂♂, same data, but the date is 4. vii. (WCTT); **Nantou County:** 1 ♂, Songchuangang, Alt. ca. 2,500m, Renai Township, Nantou County, 25.vi.2014, W. I Chou leg. (WCTT); **Pingtung County:** 1 ♂, same data as holotype (TARI). **Taitung County:** 2 ♀♀, Xiangyang, Alt. ca. 2,100 m, Haiduan Township, Taitung County, 1.vii.2012, J. Yamasako leg. (EUMJ); 1 ♂, Yenping Forestroad, Yenping Township, Taitung County, 12.vii.2012, H. Murakami leg. (EUMJ); 1 ♂, Dasyueshan, Alt. ca. 2,500m, Heping Township, Taichung County, 6.vii.2014, by light trap with mercury lamp, S. Sin Yan leg. (SSCT); 1 ♂, Xiangyang, Alt. ca. 2,200 m, Haiduan Township, Taitung County, 25.vi.2015, W. I. Chou leg. (WCTT); 1 ♂, Taimalishan, Alt. ca. 1,300 m, Taimali Township, Taichung County, 29.vi.2016, W. I. Chou leg. (WCTT).

Description. ***Male*** (Fig. 6). Body uniformly black, covered with brownish pubescence.

Measurements (n = 3): EyW: 0.20–0.30 (0.25) mm; EyD: 0.50–0.62 (0.55) mm; BL: 4.45–5.91 (5.32) mm; PL: 1.10–1.47 (1.28) mm; PW: 0.71–1.01 (0.84) mm; EL: 3.35–4.43 (4.04) mm; EW: 1.00–1.32 (1.20) mm.

Head closely and densely covered with setigerous punctures; frons elevated towards lateral margins; EyD/EyW: 2.00–2.50 (2.19). Terminal palpomeres of maxillary palpi short digitiform. Those of labial palpi longitudinal triangular, as long as width of apical margin of terminal palpomeres (Fig. 22). Antennae (Fig. 15) longer than total length of head and pronotum combined; antennomere I swollen and bent; II compact; III–X biramous; ramus becoming progressively longer towards V; XI flattened, fusiform. Approximate length ratio of antennomeres (n = 1): 3.3 : 0.9 : 3.4 : 4.1 : 4.2 : 4.2 : 4.2 : 4.2 : 4.2 : 4.1 : 6.7. Relative length ratio of rami of antennomeres III–X (n = 1): 1.0 : 1.6 : 1.8 : 1.9 : 1.8 : 1.6 : 1.4 : 1.1.

Pronotum widest before apex, constricted in basal 1/4; surface with large deep and densely arranged setigerous punctures; pronotal projections reaching to procoxal projection; PL/PW: 1.46–1.59 (1.54).

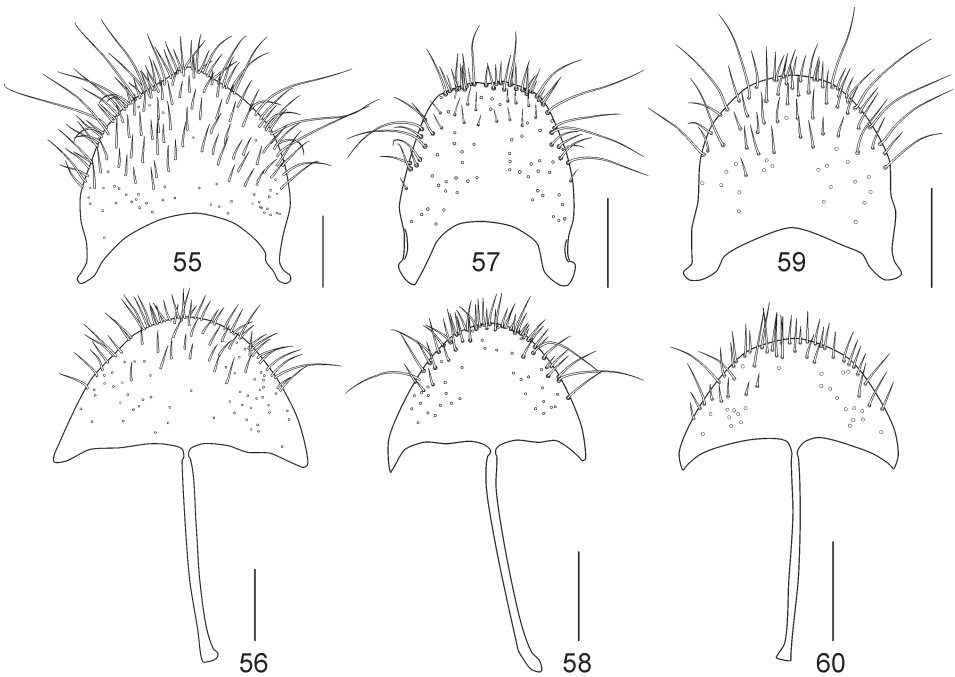
Elytra elongate, subparallel-sided, widest at humeri, covered with large deep punctation; rows of punctures reaching to apex; distance among punctures slightly larger than puncture diameter; interspaces with pubescence; EL/EW: 3.35–3.42 (3.38); EL/PL: 3.02–3.42 (3.16); EW/PW: 1.32–1.59 (1.44). Metendosternite (Fig. 23) with extended furcal arms anterolaterally; furcal laminae distally extended; process anteriorly extending from base of furcal arms.

Unguis with basal denticles; pro and mesotibiae elongate, gently widened apically; metatibiae (Fig. 24) elongate, gradually dilated towards basal half, thence slightly curved inwardly.

Pygidium (Fig. 29) rounded posteriorly; pygidial struts stout, anteriorly extended. Sternite VIII (Fig. 35) weakly pigmented in medial portion; apical margin emarginate in middle. Spicular fork (Fig. 41) with intraspicular plate.

Aedeagus in fully extended condition (Figs 51–52) with finely spinose area between tegmen and phallus. Tegmen shorter than phallus; phallobase cylindrical without phallobasic struts, membranous in ventral view; phallobasic apodeme elongate, tapered posteriorly. Phallus divaricate in apical 1/5, dorsally with median orifice, and roundly pointed apex.

Female (Fig. 7). Measurements (n = 2): EyW: 0.20–0.22 mm; EyD: 0.64–0.68 mm; BL: 5.73–5.93 mm; PL: 1.29–1.30 mm; PW: 0.89–0.95 mm; EL: 4.44–4.63 mm; EW: 1.27–1.30



Figs 55–60. Female pygidia (55, 57, 59) and 8th sternites (56, 58, 60). 55–56 – *Diplopherusa shibatai* (Miyatake, 1965); 57–58 – *Paracladiscus choui* sp. nov.; 59–60 – *P. atricolor* Miyatake, 1965. Scale bars: 0.25 mm.

mm. Similar to male, but EyD/EyW: 3.09–3.20; antennae (Fig. 16) crenate, their length equal to 2/3 of length of male antennae; hind tibiae simply elongate. Approximate length ratio of antennomeres (n = 1): 2.1 : 1.0 : 1.6 : 1.8 : 1.8 : 1.9 : 1.6 : 1.5 : 1.5 : 1.4 : 1.9. Relative width ratio of antennomeres (n = 1): 1.4 : 1.0 : 1.1 : 1.4 : 1.5 : 1.8 : 1.8 : 1.8 : 1.6 : 1.6 : 1.5. PL/PW: 1.37–1.45; EL/EW: 3.49–3.56; EL/PL: 3.43–3.56; EW/PW: 1.37–1.43. Pygidium (Fig. 57) almost straight at apical margin; pygidial struts stout. Sternite VIII (Fig. 58) rounded posteriorly.

Differential diagnosis. The new species can be distinguished from *P. atricolor* by antennomeres III–X biramous in males (Fig. 15); females have antennae longer than combined lengths of head and pronotum; punctation of head and pronotum dense; elytral rows of punctures extending to apex; tibiae elongate in male.

Etymology. The species name is dedicated to Wen-I Chou, who kindly helped and cooperated during a collecting trip to Taiwan in 2012.

Distribution. Taiwan: Hsinchu Co., Nantou Co., Pingtung Co., and Taitung Co. (Fig. 61).

Paracladiscus atricolor Miyatake, 1965

(Figs 8–9, 17–18, 30, 36, 42, 53–54, 59–60, 61)

Paracladiscus atricolor Miyatake, 1965: 20 (original description, incl. fig. 1A–B, pl. 3B). Miyatake (1985): 152 (noted, incl. fig. 21, pl. 24); Nakamura (1986): 40 (faunistics).

Type locality. Japan, Kagoshima Prefecture, Amami Islands, Naze.

Type material examined. Holotype: ♂, 'HOLOTYPUS [red label] || NAZE | AMAMI IS. | 12. VI. 1960 | K. Yamada [leg.] || 8–23 [orange label] || Paracladiscus | articolor | M. Miyatake [des.] [handwritten label]' (EUMJ, Type No. 477). Paratype: 1 ♀, 'TSUNAGU | AMAMI. Is | 15. VII. 1962 | H. Yokoyama [leg.] || Paracladiscus | atricolor | M. Miyatake [des.] || PARAYPE [yellow label]' (OMNH).

Additional material examined. JAPAN: Kagoshima Prefecture: *Amami Islands*: Amami-Ôshima, Chûô-rin-dô, 27–29. vi. 1987, 1 ♂, K. Shimizu leg. (EUMJ); Amami-Ôshima, Hatsuno, 26.vi.1971, 1 ♂, T. Mizunuma leg. (EUMJ), 26.vi.1970, 1 ♂, 24.vi.1970, 1 ♂, T. Kobayashi leg. (EUMJ); Amami-Ôshima, Mt. Yui-dake, 18.vi.1982, 1 ♀, T. Kobayashi leg. (KSTJ).

Supplementary description. ***Male*** (Fig. 8). For full description see Miyatake (1965). Measurements. Male (n = 4): EyW: 0.20–0.26 (0.24) mm; EyD: 0.48–0.58 (0.53) mm; BL: 3.17–4.83 (4.13) mm; PL: 0.87–1.33 (1.12) mm; PW: 0.55–0.90 (0.76) mm; EL: 2.30–3.50 (3.01) mm; EW: 0.73–1.15 (1.00) mm. Approximate length ratio of antennomeres (n = 1): 3.1 : 1.0 : 3.8 : 3.8 : 4.4 : 4.2 : 4.2 : 4.0 : 4.6 : 4.0 : 6.9. Relative length ratio of rami of antennomeres III–X (n = 1): 1.0 : 2.1 : 2.4 : 2.5 : 2.5 : 2.4 : 2.2 : 1.9. EyD/EyW: 2.00–2.40 (2.25); PL/PW: 1.40–1.58 (1.47); EL/EW: 2.78–3.14 (3.02); EL/PL: 2.55–2.98 (2.70); EW/PW: 1.28–1.33 (1.32). Metendosternite with extended furcal arms anterolaterally; furcal laminae distally extended; process extending anteriorly from base of furcal arms. Unguis with basal denticles; pro- and mesotibiae stout, gently widened apically; metatibiae stout, dilated towards basal half, thence slightly curved inwardly.

Pygidium (Fig. 30) broadly rounded posteriorly; pygidial struts short, stout. Sternite VIII (Fig. 36) weakly pigmented in medial portion; apical margin emarginate in middle. Spicular fork (Fig. 42) without lateral plates.

Connecting membrane between tegmen and phallus in fully extended condition (Figs 53–54) vested with fine spines; tegmen shorter than phallus; phallobase cylindrical without phallobasic struts, membranous in ventral view; phallobasic apodeme elongate, rounded at apex; phallus divaricate in apical 1/6, dorsally with median orifice, roundly pointed at apex.

Female (Fig. 9). Measurements (n = 1): EyW: 0.16 mm; EyD: 0.64 mm; BL: 4.02 mm; PL: 1.21 mm; PW: 0.91 mm; EL: 2.81 mm; EW: 1.16 mm.

Similar to male, but EyD/EyW: 4.00; antennae crenate, about half as long as in males (Fig. 18); pronotum rounded on lateral sides; hind tibiae not swollen. Approximate length ratio of antennomeres (n = 1): 2.0 : 0.9 : 1.6 : 1.3 : 1.3 : 1.3 : 1.3 : 1.3 : 1.4 : 1.4 : 2.3. Relative width ratio of antennomeres (n = 1): 1.8 : 1.5 : 1.0 : 1.3 : 1.8 : 2.0 : 2.0 : 2.0 : 2.0 : 1.8 : 1.8. PL/PW: 1.33; EL/EW: 2.42; EL/PL: 2.32; EW/PW: 1.28. Pygidium (Fig. 59) rounded posteriorly; pygidial struts stout. Sternite VIII (Fig. 60) rounded posteriorly.

Differential diagnosis. *Paracladiscus atricolor* can be distinguished from *P. choui* sp. nov. by antennomeres VII–X uniramous in males (Fig. 17); females with antennae shorter than total length of head and pronotum combined; punctation of head and pronotum sparse; elytral striae not reaching to apex; tibiae stout in male.

Distribution. Japan: Kagoshima Prefecture: Amami-Ôshima, Okinawa Prefecture: Okinawa-jima (Miyatake 1985, Nakamura 1986) (Fig. 61).

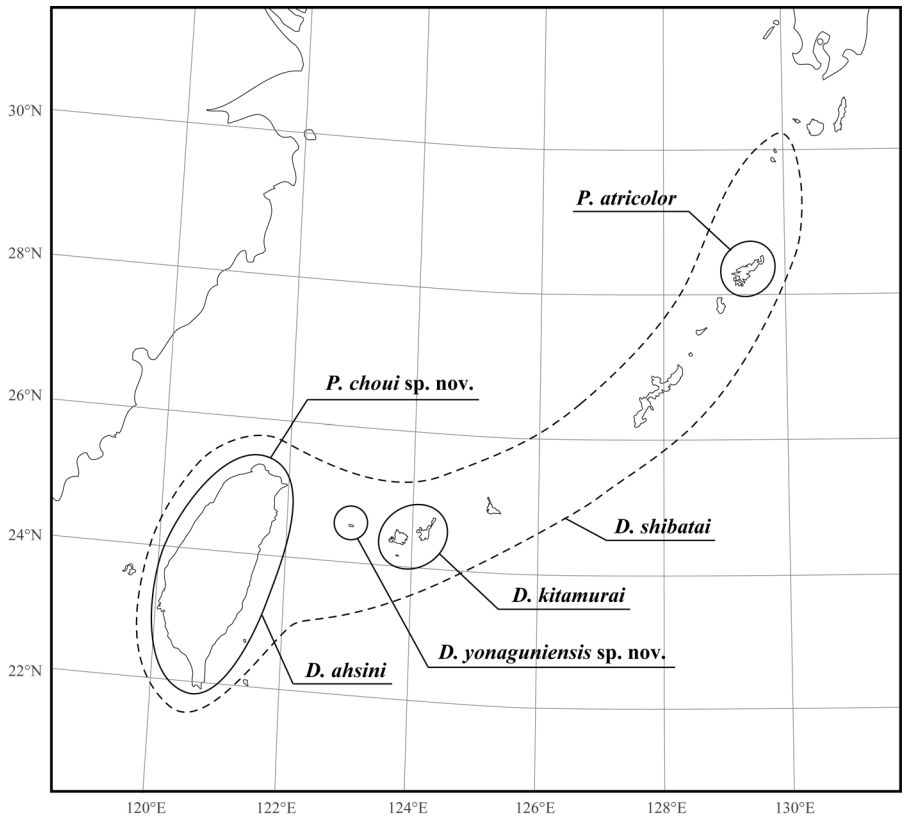


Fig. 61. Distribution map of *Diplopherusa* and *Paracladiscus* species in Japan and Taiwan.

Key to the species of *Paracladiscus*

1 Male antennomeres VII–X uniramous; female antennae longer than total length of head and pronotum combined; punctation of head and pronotum sparse; elytral striae not reaching to apex; tibiae stout. ..... ***P. atricolor*** Miyatake, 1965

– Male antennomeres III–X biramous; female antennae shorter than total length of head and pronotum combined; punctation of head and pronotum dense; elytral striae reaching to apex; tibiae elongate. ..... ***P. choui* sp. nov.**

Remarks on distribution of *Diplopherusa* and *Paracladiscus*

Four species of *Diplopherusa* and two species of *Paracladiscus* are distributed in Taiwan and its adjacent Japanese islands as shown on the map (Fig. 61). *Diplopherusa shibatai* is widely distributed between Taiwan and Kuchino-shima while the other three species, *D. kita-*

murai, *D. ahsini*, and *D. yonaguniensis* sp. nov. (these are also similarly colored in general), are distributed in adjacent islands. The two species of *Paracladiscus* have disjunctive distribution as *P. atricolor* in restricted to Amami-Ôshima while *P. choui* sp. nov. occurs on Taiwan.

Acknowledgements

I would like to express my sincere gratitude to the following people: Mutsuo Miyatake, Kazuhiko Konishi, and Hiroyuki Yoshitomi (all EUMJ) for their kind support and valuable comments on this study; Kiyoshi Andô (Osaka, Japan) for confirming the type series of Shibata collections in OUMN; H. Yoshitomi and Munetoshi Maruyama (KUM) for cooperation in loaning the material preserved in KUM; Akiko Saitô (NHMI), Shôzô Ôsawa (Hiroshima, Japan), and Katsumi Akita (Mie, Japan) for loan of the specimen preserved in NHMI; Junsuke Yamasako (Department of General Systems Studies, Graduate School of Arts and Sciences, the University of Tokyo, Japan), Wen-I Chou (Taitung, Taiwan), Shih Sin Yan (Social Insect Laboratory, National Changhua University of Education, Taiwan), Kaoru Sakai (Tokyo, Japan), Hiroshi Ikeda (EUMJ), Kazuki Yoshida (EUMJ), Takashi Kurihara (Tochigi Prefectural Museum, Japan) for supplying me with valuable materials in this study.

References

CORPORAAL J. B. 1950: Cleridae. In: HINCKS W. D. (ed.): *Coleopterorum Catalogus Supplementa. Pars 23 (editio secunda)*. W. Junk, The Hague, Netherlands, 373 pp.

CORPORAAL J. B. & VAN DER WIEL P. 1949: Studies in Cladiscus and allied genera (Col.). *Tijdschrift voor Entomologie* **91**: 180–199.

GERSTMEIER R. 2015: Two new species of Tillinae from the Himalaya (Insecta: Coleoptera: Cleridae). Pp. 445–450. In: HARTMANN M. & WEIPERT J. (eds) *Biodiversität und Naturausstattung im Himalaya V*. Verein der Freunde und Förderer des Naturkundemuseums Erfurt e.V., Erfurt, 580 pp.

HELLER K. M. 1922: New Philippine Coleoptera. *Philippine Journal of Science* **19** (1921): 523–627.

MIYATAKE M. 1965: New species and records of the Cleridae from Ryukyu Islands, I (Coleoptera). *Entomological Review of Japan* **18**: 19–25.

MIYATAKE M. 1985: Cleridae Latreille, 1802. Pp. 151–160, pls. 24–25. In: KUROSAWA Y., HISAMATSU S. & SASAJI H. (eds): *The Coleoptera of Japan in Color, III*. Hoikusha, Osaka, 500 pp. + 72 pls (in Japanese).

MURAKAMI H. & YAMASAKO J. 2012: Two new species of the genus Allochotes (Coleoptera: Cleridae: Neorthopleurinae) from Taiwan. *Zootaxa* **3564**: 47–53.

NAKAMURA T. 1986: [New distribution of the family Cleridae]. *Gekkan-mushi* **188**: 40 (in Japanese).

NAKAMURA T. 2001: [A record of Diplopherusa kitamurai from Hateruma-jima]. *Gekkan-mushi* **361**: 48 (in Japanese).

NAKANE T. 1989: Notes on some little-known beetles (Coleoptera) in Japan. 5. *Kita Kyushu No Konchu* **36**: 143–152.

OPITZ W. 2010: Classification, natural history, phylogeny, and subfamily composition of the Cleridae and generic content of the subfamilies (Coleoptera: Cleroidea). *Entomologica Basiliensia et Collectionis Frey* **32**: 31–128.

ÔMOMO S. 1999: [A record of Diplopherusa kitamurai from Iriomote-jima]. *Gekkan-mushi* **346**: 3–4 (in Japanese).

SATÔ S. 1998: [Notes on the genus Diplopherusa in Japan]. *Nejirebane* **79**: 7–8 (in Japanese).

YANG G. & YANG X. K. 2013: Description of a remarkable new species of Diplopherusa Heller from Taiwan (Coleoptera: Cleridae). Pp. 167–171. In: LIN M. Y. & CHEN C. C. (eds): *In memory of Mr. Wenhsin Lin*. Formosa Ecological Company, Taiwan, 233 pp.