

## Notes on the Lineage of *Asiopodabrus malthinoides* (Coleoptera, Cantharidae), with Description of a New Subspecies

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**Abstract** The lineage of *Asiopodabrus malthinoides* is reexamined. Two species and a subspecies are scrutinised. *Asiopodabrus hayato* NAKANE is not a subspecies of *A. malthinoides* but an independent species. *Asiopodabrus malthinoides takizawai* ssp. nov. is described as a new subspecies. A key to the species and subspecies of the *malthinoides* lineage is given.

### Introduction

*Asiopodabrus malthinoides* KIESENWETTER, 1874, a small species almost brownish black in the colour of the body, is one of the commonest *Asiopodabrus* in Japan. It has been divided so far into two subspecies, one of which *A. malthinoides hayato* NAKANE, 1989 occurs in Kyushu. There is no more geographical variation to have been known up to the present, though some individual variations have been found through my examination of a series of specimens. On the other hand, I found coexistence of two different forms at a place in Ōita Prefecture, Kyushu. One of them is indubitably *A. malthinoides hayato* and the other is closely related to *A. malthinoides* but not perfectly coincide with true *A. malthinoides*. This suggests that *A. malthinoides hayato* is not a subspecies of *A. malthinoides*. Since then I have continuously tried to examine numerous specimens collected from various localities in Honshu, Shikoku and Kyushu of Japan. As the result, I found two forms of *A. malthinoides* collected from relatively close localities in Shikoku, one being the *malthinoides* of the Kyushu form as mentioned above, and the other almost coincides with true *A. malthinoides*.

After a careful examination, I have concluded that *A. hayato* is an independent species, whereas the *malthinoides* of the Kyushu form should be regarded as a new subspecies. I am therefore going to give a new status for *A. hayato* and to describe a new subspecies in the following lines.

Before going further, we wish to express my deep gratitude to the late Dr. Masataka SATŌ for his kind encouragement of my study and giving me opportunity to examine abundant specimens. My great appreciation is expressed to Mr. Malcolm D. KERLEY of the Natural History Museum, London and Dr. Masahiro ÔHARA of the Hokkaido University Museum for their giving opportunity to examine type specimens used in this study. Cordial thanks are also due to Mr. Katsumi AKITA of Tsu, Mr. Kaoru HAGA of

Saitama, Mr. Haruo TAKIZAWA of Hasuda, Dr. Nobuo OHBAYASHI of the Entomological Laboratory, Faculty of Agriculture, Ehime University, Dr. Yûichi OKUSHIMA of the Kurashiki Museum of Natural History and Mr. Atsuto YOSHIDA of Inagi, for their kind help in providing me with valuable materials.

### Materials and Methods

Method of examining the male genitalia follows that explained in TAKAHASHI (1999).

The abbreviations used in the text are as follows. HW – width of head; PW – width of pronotum; PL – length of pronotum; PA – width of anterior margin of pronotum; PB – width of basal margin of pronotum; EW – width of elytra; EL – length of elytra.

*Type depositories.* The holotype to be designated in this paper is deposited in the collection of the Kanagawa Prefectural Museum of Natural History, Odawara. Paratypes are preserved in the collections of the Entomological Laboratory, Faculty of Agriculture, Ehime University, Matsuyama (ELE) and mine (KTC).

### Descriptions

#### *Asiopodabrus malthinoides* (KIESENWETTER, 1874)

*Podabrus malthinoides* KIESENWETTER, 1874, 265.

*Podabrus (Dichelotarsus) malthinoides*: DELKESKAMP, 1939, 16.

*Podabrus (Asiopodabrus) malthinoides*: WITTMER, 1982, 123.

*Asiopodabrus malthinoides*: OTSUKA, 2003, 30.

*Dichelotarsus sulcithorax* PIC, 1904, 26. — NAKANE & MAKINO, 1989, 4. [Synonym of *Podabrus malthinoides* Kiesenwetter, 1874.]

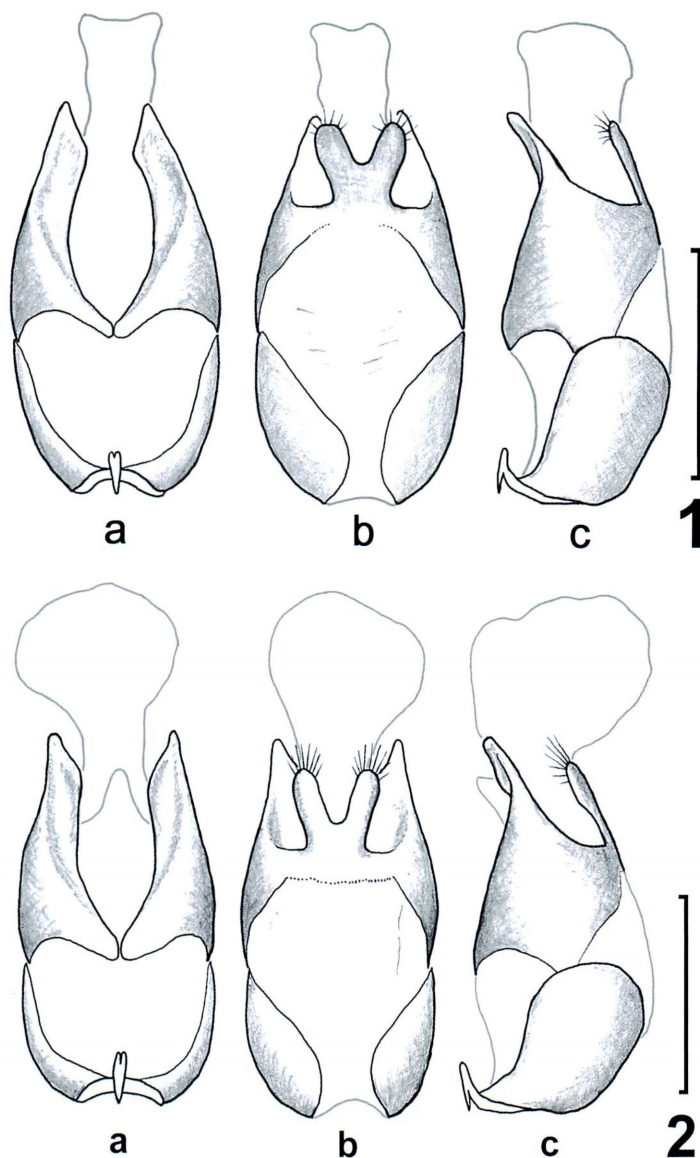
*Podabrus (Dichelotarsus) sulcithorax*: DELKESKAMP, 1939, 17.

#### *Asiopodabrus malthinoides malthinoides* s. str.

(Figs. 1, 2)

**Male.** Body almost brownish black; head before eyes, antennal segments 1–2 and basal portion of 3, lateral sides of pronotum (sometimes except for the middle), anterior half of prosternum, mouthparts except for last segments of maxillary and labial palpi and apical halves of mandibles, apical portion of coxae and trochanters yellowish brown; head beneath, antennal segments 3–11, apical portion of femora and tibiae dark yellowish brown.

Head closely covered with moderate punctures in front, rather closely and largely so behind eyes, and rugosely so on neck, surfaces of the other parts rather reticulated. Eyes prominent; inter-ocular distance 3.31–3.49 times as wide as eye. Terminal segments of maxillary palpi rather slender, 2.55 times as long as wide. Antennae short, reaching basal fifth of elytra; comparative lengths of each segment as follows:— 1.88 : 1.19 : 1.00 : 1.23 : 1.23 : 1.23 : 1.26 : 1.26 : 1.23 : 1.21 : 1.53.



Figs. 1-2. Male genitalia of *Asiopodabrus malthinoides malthinoides* (KIESENWETTER). — 1, From Mt. Rokkô, Hyôgo Pref., Honshu; 2, From Takimoto, Kumanogawa-chô, Wakayama Pref., Kii Peninsula, Honshu. — a, Ventral view; b, dorsal view; c, lateral view. (Scale: 0.5 mm.)

Pronotum almost the same in length and width, clearly narrower than head, widest at middle;  $PW/HW$  0.84–0.88,  $PW/PL$  1.03–1.08,  $PW/PA$  1.36–1.44,  $PW/PB$  1.1–1.11; surface closely covered with moderate punctures, though the punctures become larger on the basal half of elevated portion and in anterior marginal area; frontal and basal

margins nearly straight, lateral ones sinuate, anterior angles slightly angulate and posterior ones slightly prominent; disc well elevated except for lateral marginal parts, though circularly concave in basal half. Elytra rather short, distinctly wider than pronotum; EW/PW 1.36–1.38; EL/EW 2.85–3.19.

Male genitalia rather elongate; ventral process joining lateral sides of paramere, relatively wide with inner side slightly concave; dorsal process broad, rather sclerotized (Fig. 1). A form bearing not so broad dorsal process occurs in Shikoku and the Kii Peninsula, Honshu (Fig. 2).

Length: 4.9–5.7 mm; breadth: 1.0–1.3 mm.

*Female.* Similar to male, but body relatively broader, eyes smaller, antennae shorter; head and prosternum entirely brownish brown. Eyes not so prominent; inter-ocular distance 4.61–5.15 times as wide as eye. Terminal segments of maxillary palpi rather broad, 2.38 times as long as wide. PW/HW 0.88–0.93, PW/PL 1.06–1.08, PW/PA 1.43–1.55, PW/PB 1.09–1.11. Elytra wider and shorter; EW/PW 1.24–1.31; EL/EW 3.09–3.29.

Length: 5.3–6.2 mm; breadth: 1.1–1.4 mm.

*Specimens examined.* Lectotype, ♀, Kobe, Japan, G. LEWIS, 1910–320; 1 ♂, Bandaiaatami, Kôriyama-shi, Fukushima Pref. 17–V–1987, K. HAGA leg.; 1 ♂, Numata, Gunma Pref., 10–V–1949, T. TAKEI leg.; 1 ♂, 1 ♀, Nanma, Kanuma-shi, Tochigi Pref., 28–V–1992, H. TAKIZAWA leg.; 1 ♂, Uchiurayama, Kamogawa-shi, Chiba Pref., 18–VI–2005, K. KUBO leg.; 1 ♂, Ishidoshuku, Kitamoto-shi, Saitama Pref., 30–IV–1990, A. YOSHIDA leg.; 1 ♂, Hatsuzawamachi, Hachiôji-shi, Tokyo Met., 8–V–1999, Y. OKUSHIMA leg.; 1 ♂, Mabushi, Izu-Ôshima, 4–V–1979, Y. NOTSU leg.; 1 ♂, Zushi, Kanagawa Pref., 15–IV–1983, T. NIISATO leg.; 1 ♂, Tsuchiya, Hiratsuka-shi, Kanagawa Pref., 14–IV–2002, K. TAKAHASHI leg.; 1 ♀, Inugoeji, Tanzawa Mts., Kanagawa Pref., 10–VII–1992, K. TAKAHASHI leg.; 1 ♂, Kôhôji, Oyabe-shi, Toyama Pref., 3–V–1992, K. TAKAHASHI leg.; 2 ♂♂, Nisshin, Aichi-gun, Aichi Pref., 5–V–1970, K. YAMAGISHI leg.; 1 ♂, Yotsuya, Inuyama, Aichi Pref., 19~20–V–1973, H. YAMADA & Y. HORI leg.; 1 ♂, Suhara, Gifu Pref., 30–IV–1967, N. OHBAYASHI leg.; 2 ♂♂, Mitsuka, Kasuga-mura, Gifu Pref. 20–VII–1986, I. KIRIYAMA leg.; 2 ♂♂, Takimoto, Kumanogawa-chô, Wakayama Pref., 2–V–1999, K. TAKAHASHI leg.; 2 ♂♂, Kiinagashima, Mie Pref., 22–IV–1971, H. ICHIHASHI leg.; 1 ♂, Yunoyama, Mie Pref., 17–V–1967, H. ICHIHASHI leg.; 1 ♂, 1 ♀, Nachi skyline, Nachikatsuura-chô, Wakayama Pref., 3–V–2002, K. AKITA leg.; 1 ♀, Hibanomori, Nachikatsuura-chô, Wakayama Pref., 4–V–2002, K. AKITA leg.; 1 ♀, Ikemine, Shimokitayama-mura, Nara Pref., 3–V–1995, K. TAKAHASHI leg.; 3 ♂♂, Kasugayama, Nara-shi, Nara Pref., 17–V–1996, K. TAKAHASHI leg.; 1 ♀, Kibune, Kyoto-shi, Kyoto Pref., 1~2–VI–1975, H. TAKIZAWA leg.; 1 ♂, Mt. Rokkô, Hyôgo Pref., 6–V–1967, N. UEDA leg.; 1 ♂, Mt. Tanematsuyama, Kurashiki-shi, Okayama Pref., 29–IV–1995, Y. OKUSHIMA; 1 ♂, Oh-iwa, Gayo-chô, Okayama Pref., 4–V–1991, K. WATANABE leg.; 1 ♂, Tamashimayashima, Kurashiki-shi, Okayama Pref., 1–V–2000, Y. YABE leg.; 1 ♂, Mukouyama, Kurashiki-shi, Okayama Pref., 25–IV–1999, Y. OKUSHIMA leg.; 1 ♂, Kageishidani, Nishiawakura-son,

Okayama Pref., 25-V-1996, Y. OKUSHIMA leg.; 3 ♂♂, 2 ♀♀, Okubara, Shûtô-chô, Yamaguchi Pref., 4-V-1991, K. TAKAHASHI leg.; 4 ♂♂, Akahonejima Is., Iwagi-son, Ehime Pref., 26~27-IV-2004, J. OGAWA leg.; 1 ♂, 1 ♀, Mt. Bizan, Tokushima Pref., 24-IV-1964, M. SAKAI leg.; 1 ♂, West Ravine of Mt. Shiratsue, Ehime Pref., 27-IV-1969, M. SAKAI leg.; 1 ♂, Omogo-kei, Ehime, 5-VI-1983, K. ISHIDA leg.

*Distribution.* Japan (Honshu except for northernmost area, Shikoku, mostly Camellietea-japonicae region).

*Asiopodabrus malthinoides takizawai* ssp. nov.

(Figs. 3, 4)

*Male.* Body almost brownish black; antennal segments 1-2, lateral sides of pronotum (sometimes except for the middle), head before eyes except in Kyushu specimens, lateral sides of prosternum, mouth-parts except for last segments of maxillary and labial palpi and apical halves of mandibles, apical portion of fore and mid coxae and



Fig. 3. Habitus of *Asiopodabrus malthinoides takizawai* ssp. nov., male (holotype).

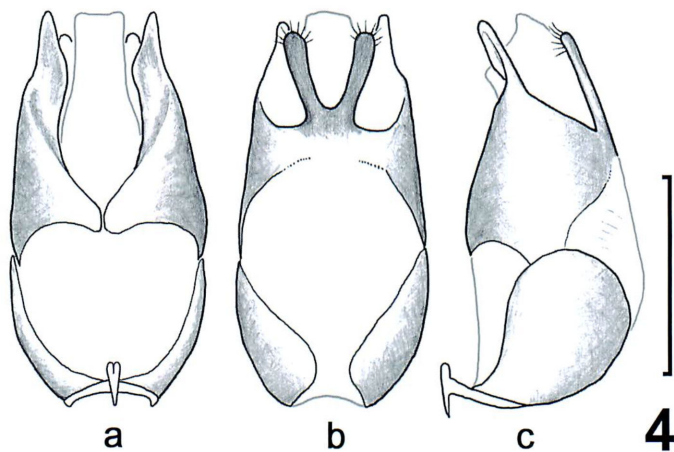


Fig. 4. Male genitalia of *Asiopodabrus malthinoides takizawai* sp. nov.; a, ventral view; b, dorsal view; c, lateral view. (Scale: 0.5 mm.)

fore and mid trochanters yellowish brown; head beneath, antennal segment 3 and tibiae dark yellowish brown; antennal segments 4–11 dark brown.

Head closely covered with moderate punctures in front, rather closely and largely so behind eyes, and densely so on neck, surface of the other parts rather reticulated. Eyes prominent; inter-ocular distance 3.61–3.86 times as wide as eye. Terminal segments of maxillary palpi rather slender, 2.46 times as long as wide. Antennae short, reaching basal fifth of elytra; comparative lengths of each segment as follows:— 1.74 : 1.01 : 1.00 : 1.15 : 1.19 : 1.15 : 1.15 : 1.15 : 1.11 : 1.11 : 1.46.

Pronotum very slightly wider than length, clearly narrower than head, widest at basal two-thirds; PW/HW 0.85–0.92, PW/PL 1.03–1.07, PW/PA 1.49–1.5, PW/PB 1.11–1.17; surface closely covered with moderate punctures, though the punctures become larger on the basal half of elevated portion and in anterior marginal area; frontal and basal margins nearly straight, lateral ones sinuate, anterior angles slightly angulate and posterior ones slightly prominent; disc well elevated except in lateral marginal parts, though shallowly and circularly concaved in basal half. Elytra rather short, distinctly wider than pronotum; EW/PW 1.32–1.35; EL/EW 3.02–3.06.

Male genitalia rather elongate; ventral process joining lateral sides of paramere, relatively wide with inner side slightly concave; dorsal process rather slender, well sclerotized (Fig. 5).

Length: 5.6 (5.1–6.2) mm; breadth: 1.3 (1.1–1.3) mm.

**F e m a l e.** Similar to male, but body relatively broader, eyes smaller, antennae shorter. Eyes not so prominent; inter-ocular distance 4.13–4.35 times as wide as eye. PW/HW 0.97–0.98, PW/PL 1.03–1.04, PW/PA 1.38–1.38, PW/PB 1.08–1.12. Elytra wider and shorter; EW/PW 1.35–1.37; EL/EW 2.89–2.95.

Length: 5.8–7.1 mm; breadth: 1.3–1.6 mm.

*Type series.* Holotype: ♂, Obukuro, Sankô-mura, Ôita Pref., 24~25-IV-1992, H. TAKIZAWA leg. Paratypes: 1 ♂, Mt. Hiko, Fukuoka Pref., 17~19-V-1967, H. TAKIZAWA leg. (KTC); 2 ♂♂, Mt. Futagami, Takachiho-chô, Miyazaki Pref., 19-V-2005, K. TAKAHASHI leg. (KTC); 12 ♂♂, 8 ♀♀, Mominoki (alt. 1,300 m), Izumi-mura, Kumamoto Pref., 20-V-2005, K. TAKAHASHI leg. (KTC); 1 ♂, Sugitate, Matsuyama-shi, Ehime Pref., 3-IV-1974, Y. NOTSU leg. (ELE); 1 ♂, Oda-chô, Ehime Pref., 1-VI-1984, E. YAMAMOTO leg. (ELE).

*Distribution.* Japan (Kyushu and Shikoku (Ehime Pref.)), upper *Camellietea-japonicae* region and lower *Fagetea-crenatae* region).

*Asiopodabrus hayato* (NAKANE, 1989)

(Fig. 5)

*Podabrus malthinoides hayato* NAKANE, 1989, 4.

*Podabrus (Asiopodabrus) malthinoides hayato* TAKAHASHI, 1998, 35.

*Asiopodabrus malthinoides hayato*: KAZANTSEV & BRANCUCCI, 2007, 235.

**Male.** Body almost brownish black; head before eyes, antennal segments 1-2, lateral sides of pronotum, prosternum, mouth-parts and apical portion of coxae and trochanters yellowish brown; head beneath, antennal segments 3, fore coxae except for apical portion, inner sides of fore and mid femora and fore and mid tibiae dark yellowish brown.

Head closely covered with moderate punctures in front, closely and somewhat largely so behind eyes, and densely so on neck, surface of the other parts reticulated.

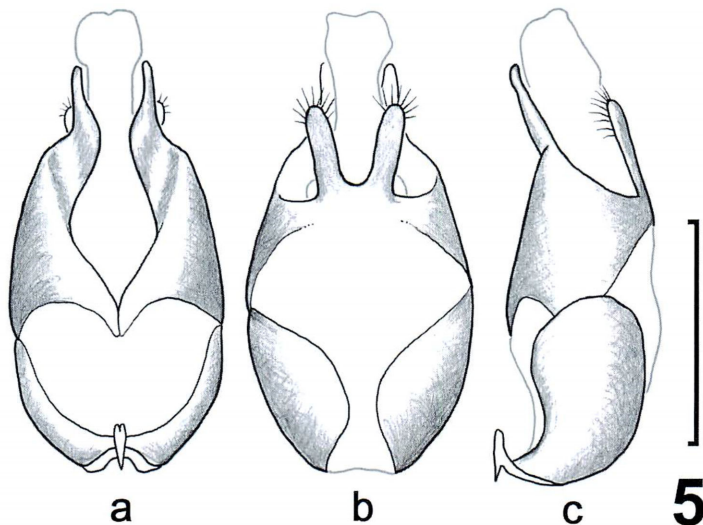


Fig. 5. Male genitalia of *Asiopodabrus hayato* (NAKANE); a, ventral view; b, dorsal view; c, lateral view. (Scale: 0.5 mm.)

Eyes prominent; inter-ocular distance 3.97–4.14 times as wide as eye. Terminal segments of maxillary palpi rather broad, 2.19 times as long as wide. Antennae short, reaching basal fifth of elytra; comparative lengths of each segment as follows:— 1.64 : 1.06 : 1.00 : 1.05 : 1.19 : 1.19 : 1.19 : 1.18 : 1.15 : 1.12 : 1.27.

Pronotum a little broader than length, distinctly narrower than head, widest at basal two-thirds; PW/HW 0.84–0.87, PW/PL 1.13–1.14, PW/PA 1.44–1.50, PW/PB 1.1–1.13; surface closely covered with relatively large punctures, then the punctures become larger on the basal half of elevated portion and in anterior marginal area; frontal and basal margins nearly straight, lateral ones sinuate, anterior angles slightly angulate and posterior ones slightly prominent; disc well elevated except for lateral marginal areas, though slightly concave in basal half. Elytra rather short, distinctly wider than pronotum; EW/PW 1.32–1.33; EL/EW 3.0–3.08.

Male genitalia rather elongate; ventral process joining lateral sides of paramere, relatively narrow, gradually narrowed toward apex; apices spread outwards; dorsal process rather slender, not so heavily sclerotized (Fig. 3).

Length: 5.0–5.7 mm; breadth: 1.1–1.3 mm.

*F e m a l e.* Similar to male, but body relatively broader, eyes smaller, antennae shorter; head entirely brownish black; prosternum partly darkened. Eyes not so prominent; inter-ocular distance 3.35–3.56 times as wide as eye. Terminal segments of maxillary palpi rather broad, 2.38 times as long as wide. PW/HW 0.9–0.94, PW/PL 1.12–1.15, PW/PA 1.46–1.52, PW/PB 1.04–1.06. Elytra wider and shorter; EW/PW 1.45–1.48; EL/EW 2.86–2.94.

Length: 5.4–6.8 mm; breadth: 1.2–1.6 mm.

*Specimens examined.* Holotype, ♂, Shiroyama, Kagoshima-shi, Kyushu, Japan, 17-IV-1981, T. NAKANE leg.; 2 ♂♂, 2 ♀♀, Neko Pass, Sasaguri-chô, Fukuoka Pref., 27-IV-2002, K. TAKAHASHI leg.; 2 ♂♂, 3 ♀♀, Kasagi-dam, Iizuka-shi, Fukuoka Pref., 26-IV-2002, K. TAKAHASHI leg.; 2 ♂♂, Obukuro, Sankô-mura, Ôita Pref., 24~25-IV-1992, H. TAKIZAWA leg.; 2 ♂♂, Tomioka, Amakusa, Kumamoto Pref., 6-IV-1973, Y. FURUKI leg.; 6 ♂♂, 4 ♀♀, Ibusuki, Kagoshima Pref., 29-III-1991, H. TAKIZAWA leg.; 1 ♂, estuary of Riv. Kawaguchi, Sata-chô, Kagoshima Pref., 7-V-1994, K. HAGA leg.

*Distribution.* Japan (Kyushu, mostly Camellieta-japonicae region).

#### Key to the Species of the Lineage of *Asiopodabrus malthinoides*

1. Inner bottom between two lobes of dorsal process of male genitalia distinctly higher than the base .....*A. malthinoides malthinoides* (KIESENWETTER).
- Inner bottom between two lobes of dorsal process of male genitalia slightly higher than the base .....2.
2. Ventral process joining lateral sides of paramere relatively narrow, rather sharply narrowed near base; apices spread outwards; dorsal process not so heavily sclerotized .....*A. hayato* (NAKANE).
- Ventral process joining lateral sides of paramere relatively wide, gradually



narrowed near apices; apices not spread outwards; dorsal process well sclerotized.....*A. malthinoides takizawai* ssp. nov.

### Discussion

Close analysis of the distributional patterns of respective taxa clarifies two problems (Fig. 6). The first is the sympatric distribution recognized in Kyushu between *A. hayato* and *A. malthinoides takizawai*. Collecting data of the two species suggest that *A. hayato* occurs in relatively low places, in contrast to *A. malthinoides takizawai* which occurs in relatively high places. This means that the sympatry of the two species occurs in rather limited areas. The second problem is the existence of intermediate form of *A. malthinoides malthinoides* and *A. malthinoides takizawai*. Several localities in Shikoku and the Kii Peninsula, in central Honshu, harbour the intermediate form, whose peculiarity mostly appears in the shape of the dorsal process of the male genitalia. The fact suggests possibility of hybridization of the two forms occurring in those areas. This is why I do not regard *A. malthinoides takizawai* as an independent species.

The cause of differentiation of these taxa is not clear, though their distributional patterns suggest that they occur almost allopatrically. Judging from morphological gap,



Fig. 6. Map showing the distribution of the lineage of *A. malthinoides*. — ○, *A. malthinoides malthinoides* (KIESENWETTER); ⊙, *A. malthinoides malthinoides* (KIESENWETTER) (intermediate form of *A. m. malthinoides* and *A. m. takizawai*); ●, *A. malthinoides takizawai* sp. nov.; □, *A. hayato* (NAKANE).

*A. hayato* firstly diverged from the others. The place of divergence is surmised to have been somewhere in Kyushu. The specific independency of *A. hayato* can be concluded from its sympatric distribution with *A. malthinoides takizawai*. In my view, *A. malthinoides takizawai* may have diverged next from *A. malthinoides*, and the place of divergence may have been in Kyushu or Shikoku. In the course of this differentiation, hybridization between *A. malthinoides malthinoides* and *A. malthinoides takizawai* may have taken place somewhere in Shikoku or the Kii Peninsula. Occurrence of intermediate form between the subspecies *malthinoides* and *takizawai* may be elucidated in this way. Further detailed studies are needed for explaining raiation and speciation of the *malthinoides* lineage of *Asiopodabrus* on a sounder basis.

The *malthinoides* lineage is a relatively homogeneous group in external morphology, so that it is very interesting to know how the three taxa have diverged and occupied the present distributional areas. It is to be hoped that intensive surveys of their distribution will be made in near future.

## 要 約

高橋和弘：クロヒメクビボソジョウカイ種群に関する知見と1新亜種の記載。——日本産クロヒメクビボソジョウカイ種群について検討を行った結果、2種1亜種を認めた。従来クロヒメクビボソジョウカイ *Asiopodabrus malthinoides* KIESENWETTER の亜種として扱われていた ssp. *hayato* NAKANE は、クロヒメクビボソジョウカイと同所的に分布することが明らかとなり、独立種として扱うのが適当と考えられた。また、四国および九州に分布するクロヒメクビボソジョウカイに類似する個体群は、クロヒメクビボソジョウカイとは、一定の形態的差異が認められたので、クロヒメクビボソジョウカイの新亜種 *takizawai* ssp. nov. として記載した。

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