

Formicidae (Insecta: Hymenoptera) from the Island of Minami-iwo-to, the Volcano Islands, with Descriptions of Two New Species

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Abstract. Eight species of ants belonging to 7 genera of 3 subfamilies are recorded from the island of Minami-iwo-to, the Volcano Islands, Japan. Among them, *Temnothorax mekira* and *Camponotus iwoensis* are described as new to science, and 4 species, *Hypoponera nippona*, *H. bondoroiti*, *Monomorium chinensis* and *Paratrechina amia*, are recorded from this island for the first time.

Key words: Formicidae, Volcano Islands, Camponotus, Temnothorax, new species

Introduction

Minami-iwo-to is a small volcanic island, lying in the Pacific Ocean at latitude 24°13.7'N and longitude of 141°27.7'E. This island is under oceanic subtropical climate, and has about 3.67 km² in area and 916 m in altitude. The island is a very interesting area, since it is pristine for the ecosystem status (Kato *et al.*, 2008). Previous report indicated that the insect fauna is strongly affected by the faunas of the other islands of the Bonin (Ogasawara) and Volcano Islands, and it may be tolerant of the immigration from Micronesia or the Philippines (Okutomi *et al.*, 1982; Sato, 1982; Karube & Matsumoto, 2008).

The distribution records of ants from the island are scarce, being known only by 7 species in 6 genera including 5 unnamed species: *Pachycondyla pilosior* (= *Trachymesopus pilosior*), *Tetramorium bicarinatum*, *Tetramorium* sp., *Monomorium* sp., *Cardiocondyla* sp., *Paratrechina* sp. and *Camponotus* sp. (Sato, 1982).

One hundred eighty-nine individuals of ants identified as 8 species were collected by members of the Scientific Expedition of Natural Environment on Minami-iwo-to Island in 2007. That is the second and 25 years interval for scientific expedition of the island. In this paper, a list of the ants is presented based on the

material collected during the expedition.

Materials and Methods

The survey of this island was carried out during 17-27 June 2007. The specimens were collected by looking for under stone or decaying wood, sweeping with entomological net in a bush, beating dead tree, and by Malaise trap, attractant trap (α -pinene and ethanol in chemical attractants) and Tullgren apparatus.

The terms used in this paper follow those in Terayama & Onoyama (1999) and Terayama (1999). The following abbreviations and indices are used in this paper for descriptions.

HL, head length: maximum full face view length from the anteriormost margin of clypeus to the occipital margin of the head (when the occipital margin is concave, to a transverse line connecting its posteriormost extensions).

HW, head width: maximum dorsal view distance across head including eyes in full face view.

HW-II, head width: maximum dorsal view distance across head excluding eyes in full face view.

SL, scape length: length of scape excluding radicle.

CI, cephalic index: $HW/HL \times 100$.

CI-II, cephalic index II: $HW-II/HL \times 100$.

SI, scape index: $SL/HW \times 100$.

SI-II, scape index II: $SL/HW-II \times 100$.

WL, Weber's length of alitrunk: maximum diagonal distance from the base of anterior slope of pronotum to the propodeal lobe.

PL, petiole length: maximum length of petiole in lateral view, measured from ventral juncture with propodeum to juncture with postpetiole or gaster.

PNL, petiolar node length: maximum diagonal length of the petiolar node in lateral view.

PH, petiole height: maximum height of petiole in lateral view, measured perpendicularly from apex of petiolar node to venter of

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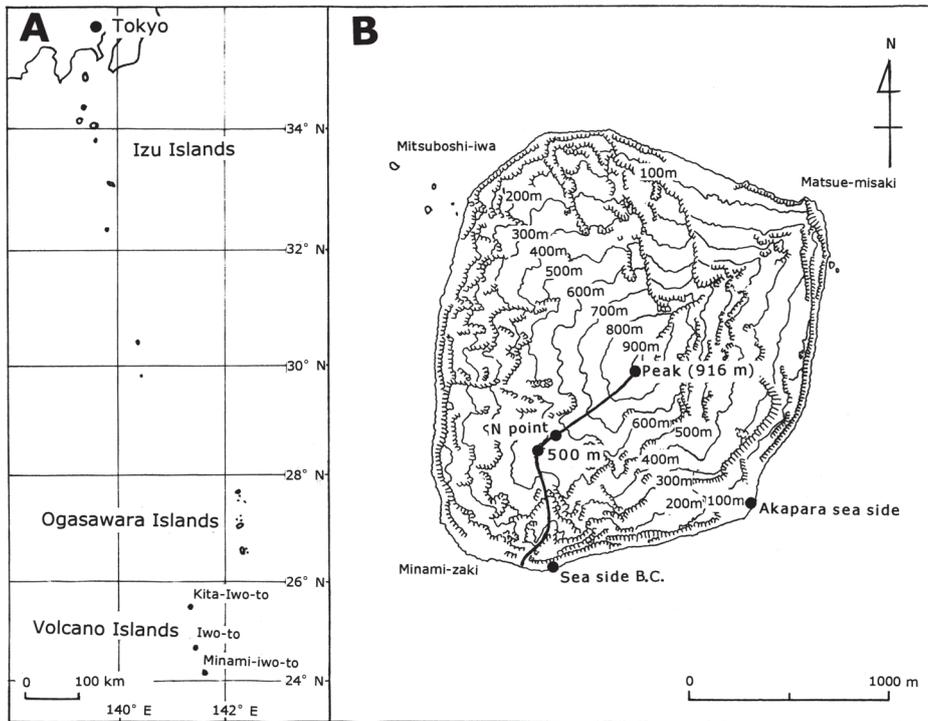


Fig. 1. Geographical location of Minami-iwo-to Island (A), and a map of study area showing collecting sites (B). A thick solid line in B shows a collecting route in this survey. Numbers on the contour lines show an altitude above sea level.

petiole.

DPW, petiole width: maximum width of petiole in dorsal view.

PPL, postpetiole length: maximum length of postpetiole in lateral view, measured from ventral juncture with propodeum or petiole to juncture with gaster.

PPH, postpetiole height: maximum height of postpetiole in lateral view, measured perpendicularly from apex of postpetiolar node to venter of postpetiole.

PPW, postpetiole width: maximum width of postpetiole in dorsal view.

TL, total body length: outstretched length from the mandibular apex to the gastral apex.

The specimens are deposited in the Kanagawa Prefectural Museum of Natural History [KPM-NK], Odawara, Japan, and the National Institute of Agro-Environmental Sciences [NIAES], Tsukuba, Japan.

Results

One hundred eighty-nine individuals of ants were collected from Minami-iwo-to Island. These are identified as 8 species.

Subfamily Ponerinae

Hypoponera nippona (Santschi, 1937)

Japanese name: Higenaga-nise-hari-ari

Specimens examined. All specimens were collected in Minami-iwo-to, Ogasawara-mura, Tokyo. 39 workers, (Peak, 916 m asl), 25.vi.2007, H. Karube leg.; 7 workers, same locality (750 m asl), 25.vi.2007, H. Karube leg.; 20 workers, (500 m asl), 25.vi.2007, H. Karube leg.; 1 worker, (500 m asl-Peak), 25.vi.2007, H. Karube leg.

Remarks. All the worker specimens were collected from a leaf litter by Tullgren apparatus. This is the first record of this island.

Hypoponera bondoroiti (Forel, 1911)

Japanese name: Tobi-nise-hari-ari

Specimens examined. All specimens were collected in Minami-iwo-to, Ogasawara-mura, Tokyo. 7 alate females (queens), Minami-iwo-to, Ogasawara-mura, Tokyo, (Peak, 916 m asl), 25.vi.2007, H. Karube leg.; 1 alate female, same locality (500 m asl-750 m asl), 24.vi.2007, H. Karube leg.; 4 alate queens, (750 m asl), 25.vi.2007, H. Karube & K. Matsumoto leg.; 1 alate female, (500 m asl), 25.vi.2007, Y. Ito leg.; 3 alate females, 14 males, (500 m asl), 25.vi.2007, H. Karube & K. Matsumoto leg.

Remarks. All the specimens were collected by Malaise traps and attractant traps. The females of *H. nippona* have yellowish body color, long antennal scapes and the shape of petiole and subpetiolar process similar to that of the worker of *nippona*. The female of *bondoroiti* have short antennal scapes, not reaching posterior margin of head, blackish brown boy excepting brown mandibles, antennae and legs, and large eyes (ca. 0.18-0.19 mm in maximum diameter).

Although this is the first record of this island, it is not rare in the Bonin (Ogasawara) Islands.

Pachycondyla pilosior (Wheeler, 1928)

Japanese name: Kebuka-hari-ari

Specimens examined. All specimens were collected in Minami-iwo-to, Ogasawara-mura, Tokyo. 1 worker, (Peak, 916 m asl), 24.vi.2007, H. Karube leg.; 1 dealate female, (500 m asl), 25.vi.2007, H. Karube leg.; 1 male, (350 m asl), 25.vi.2007,

H. Karube & K. Matsumoto leg.; 5 males, (Akapara sea side), 22.vi.2007, H. Karube & K. Matsumoto leg.; 2 males, (N point), 25.vi.2007, H. Karube & K. Matsumoto leg.; 1 male, 26-27.vi.2007, (Akapara sea side - Sea sides B. C.), 26-27.vi.2007, H. Karube leg.

Remarks. One worker and one female specimens were collected from a leaf litter by Tullgren apparatus. Several male specimens were collected by attractant traps.

Subfamily Myrmicinae

Tetramorium bicarinatum (Nylander, 1846)

Japanese name: Oo-shiwa-ari

Specimens examined. All specimens were collected in Minami-iwo-to, Ogasawara-mura, Tokyo. 1 worker, (750 m asl), 24.vi.2007, H. Karube leg.; 1 dealate female, (Akapara sea side), 26-27.vi.2007, H. Karube leg.; 4 workers, (Akapara sea side), 25.vi.2007, H. Karube & K. Matsumoto leg.; 3 workers, (Akapara sea side), 22.vi.2007, H. Karube leg.; 1 worker, (Akapara sea side - sea sides B. C.), 26-27.vi.2007, H. Karube leg.

Remarks. This is a worldwide tramp species, and inhabits open sites such as grasslands or bare areas.

Monomorium chinense Santschi, 1925

Japanese name: Kuro-hime-ari

Specimen examined. 1 worker, Minami-iwo-to (Akapara sea side), Ogasawara-mura, Tokyo, 22.vi.2007, H. Karube leg.

Remarks. This is the first record of this island.

Temnothorax mekira Terayama & Kubota, sp. nov.

(Figs. 2-4)

New Japanese name: Minami-iwou-muneboso-ari

Diagnosis. This species belongs to the genus *Temnothorax* by the 5-toothed mandibles, 12-segmented antennae, funiculus terminating in a 3-segmented club, clypeus with a median carina,

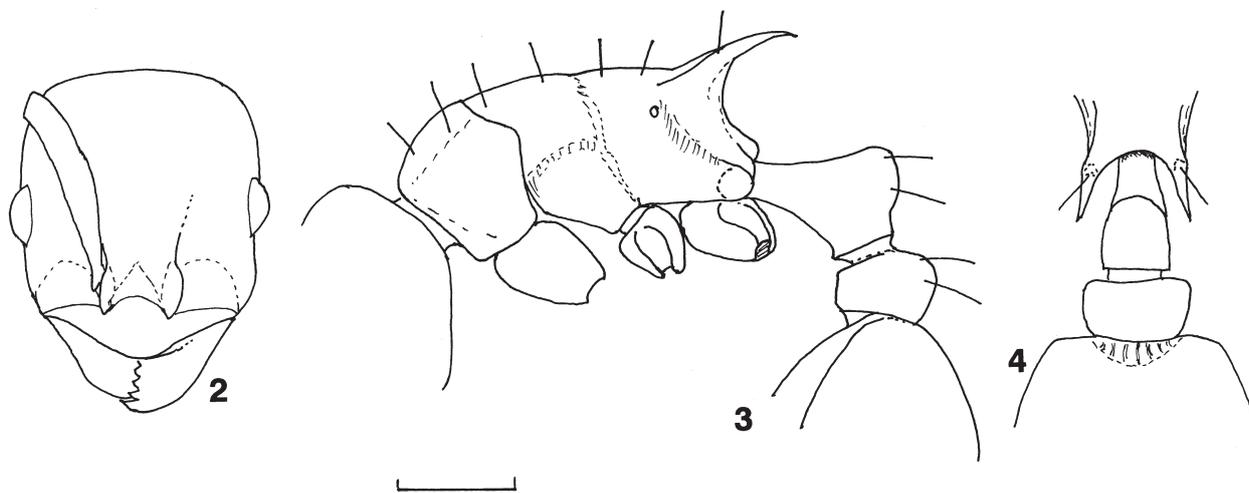
propodeum with posterodorsal spines, and pedunculate petiole. It is separated from the other congeners by the long antennal scapes, long and basally wide propodeal spines, inverted V-shape petiolar node, angulate anterolateral corners of gaster in dorsal view, and blackish body color.

Description. Holotype worker. **Structure:** Head 1.27 times as long as wide, with almost straight posterior margin and round posterolateral corners in full-face view. Mandible with 5 teeth; apical tooth largest; basal smallest. Anterior margin of clypeus convex. Antenna with 12 segments; scape long, almost reaching posterior margin of head in full-face view; pedicel 2.5 times as long as wide; 3rd to 9th segments each wider than long; apical 3 segments forming a club, the ratio of about 7 : 8 : 19 in length; 10th segment 1.2 times as long as wide, 11th 1.3 times as long as wide, apical segment 2.3 times as long as wide. Eye prominent, 0.13 mm in maximum diameter, and with about 13 facets in the longest row.

Dorsal outline of pronotum gently convex in profile; anterolateral corners rounded, not forming distinct angle in dorsal view. Mesonotal dorsum almost straight in profile. Metanotal groove not incised dorsally. Dorsum of propodeum slightly convex in profile. Ppropodeal spine 0.23mm long; basal 1/3 wide, forming obtuse triangle, apical 2/3 acute and narrow and pointing posteriorly; about 1.1 times as its basal width and pointing posteriorly.

Petiolar peduncle long; node reverse V-shaped, its anterior slope much more steep than posterior slope, tip forming dull angle; node 1.17 x as long as wide, with strongly convex anterior margin, straight posterior margin, and parallel sides; subpetiolar process small, triangular. Postpetiolar node higher than long, with convex anterior and almost straight posterior dorsal slopes; in dorsal view, 1.6 times as wide as long, with straight anterior margin and parallel sides.

Gaster with weakly concave anterior margin and dully angulate



Figs. 2-4. *Temnothorax mekira* Terayama & Kubota, sp. nov., worker. —2, Head, full-face view; 3, alitrunk, lateral view; 4, propodeal spines, petiole and postpetiole, dorsal view. Scale bar = 1.0 mm.

anterolateral corners, 0.60 mm in maximum width in dorsal view.

Sculpture: Frons and vertex of head longitudinally rugulose and reticulate, with about 18 longitudinal rugulae between frontal carinae; gena reticulate; mandible opaque with rugulae, apical 1/3 nearly smooth; clypeus with about 10 longitudinally rugulae. Dorsum of alitrunk longitudinally rugulose and reticulate; pronotal dorsum with about 14 longitudinal rugulae; side of mesonotum reticulate; propodeal side microreticulate with 7 longitudinal rugulae. Pedicel microreticulate. Gaster smooth and shining.

Pilosity: Head dorsum with moderately abundant erect hairs; the longest one 0.04 mm. Long erect hairs present on the pronotum (5 pairs), mesonotum (2 pairs), propodeum (2 pairs), petiole (2 pairs), and postpetiole (4 pairs); the longest hair on pronotum 0.10 mm; propodeal spine with a relatively long erect hair in the middle. Gaster with moderately abundant suberect hairs which are 0.07-0.10 mm long.

Color: Head and alitrunk blackish brown; gaster black. Mandible yellowish brown; antennal scape brown excepting apical portion brown, 2nd to 5th segment of antenna brown to blackish brown, 6th to terminal segment blackish brown. Fore leg blackish brown to brown excepting trochanter, tip of femur and tibia yellowish brown; middle and hind legs brown excepting tibiae and tarsi yellowish brown.

Measurements (mm): Holotype: HL 0.70, HW 0.55, HW-II 0.50, SL 0.53, CI 79, CI-II 71, SI 95, SI-II 106, WL 0.83, PL 0.31, PH 0.20, DPW 0.15, PPL 0.18, PPH 0.23, PPW 0.25, TL 2.8. Paratype workers (n=2): HL 0.68, -, HW 0.55, -, HW-II 0.51, -, SL 0.50, 0.52, CI 81, -, CI-II 75, -, SI 98, -, SI-II 104, -, WL 0.80, 0.80, PL 0.30, 0.33, PH 0.20, 0.20, DPW 0.15, 0.16, PPL 0.15, 0.18, PPH 0.21, 0.22, PPW 0.23, 0.24, TL 2.4, 2.7.

Holotype. KPM-NK9000001, worker, Minami-iwo-to (peak, 916 m asl), Ogasawara-mura, Tokyo, 26.vi.2007, K. Matsumoto leg.

Paratypes. 2 workers, same data as holotype.

Type depository. Holotype is deposited in KPM-NK and paratypes in NIAES.

Eymology. The specific epithet is the Japanese noun Mekira, which is the name of a Japanese god.

Remarks. This species is easily distinguished from the other species in the Bonin (Ogasawara) Islands, *T. haira* (Terayama & Onoyama, 1999) and *T. santra* (Terayama & Onoyama, 1999), by the blackish brown body color, long propodeal spines, and long petiolar peduncle.

Subfamily Formicinae

Paratrechina amia (Forel, 1913)

Japanese name: Kebuka-ameiro-ari

Specimens examined. All specimens were collected in Minami-iwo-to, Ogasawara-mura, Tokyo. 1 alate female, 11 workers, (Akapara sea side), 22.vi.2007, H. Karube leg.; 14 workers, 2 males, (Akapara sea side), 25.vi.2007, H. Karube & K. Matsumoto leg.; 6 workers, (750 m asl), 25.vi.2007, H. Karube & K. Matsumoto leg.; 1 worker, (500 m asl - Peak), 26.vi.2007, K. Matsumoto leg.; 2 workers, (500 m asl - Peak), 24.vi.2007,

H. Karube leg.; 1 worker, (500 m asl), 25.vi.2007, H. Karube & K. Matsumoto leg.; 2 workers, (350 m asl), H. Karube & K. Matsumoto leg.; 3 workers, 5 males, (Akapara sea side - Sea sides B. C.), 26-27.vi.2007, H. Karube leg.; 1 worker, (Sea side), 17.vi.2007, Y. Ito leg.; 1 alate female, (N point), 25.vi.2007, H. Karube & K. Matsumoto leg.

Remarks. This is the first record of this island.

Camponotus iwoensis Terayama & Kubota, sp. nov.

(Figs. 5-8)

New Japanese name: Iwo-yotsuboshi-oo-ari

Diagnosis. This species belongs to the subgenus *Myrmamblyx* of the genus *Camponotus* by the convex anterior clypeal border, 5-toothed mandibles, long antennal scapes, and small body size not exceeding 7 mm in workers. This species is in the minor worker distinguished from the other species in this subgenus by the following characters: 1) dorsal outline of propodeum weakly concave in profile; 2) propodeal declivity below strongly produced posteriorly, anterior half of slope much steep and forming an angle at middle; 3) petiolar scale thick, asymmetrical in profile, anterior margin shorter than posterior margin; 4) first gastral tergum with a pair of brownish elliptical spots and 2nd tergum with a pair of brownish oblong spots at anterior portion.

Description. Holotype worker. **Structure:** Head 1.14 times as long as wide, with convex sides and convex posterior margin in full face view. Mandible with 5 teeth. Anterior margin of clypeus moderately convex. Eye 0.25 mm in maximum diameter, weakly protruding. Antenna relatively long; scape exceeding posterior margin of head by 2/5 its length; 2nd segment 2.3 times as long as wide, 3rd and 4th segment 1.5 and 1.6 times as long as wide, respectively.

Pronotal dorsum weakly convex and lower than mesonotal dorsum in profile; in dorsal view, anterolateral corners rounded, 0.38 mm in maximum width; mesonotal dorsum convex in profile; metanotal depression absent. Dorsal outline of propodeum concave in profile; propodeal declivity below strongly produced posteriorly, anterior half of slope much steep and forming an angle at middle. Petiolar scale thick, asymmetrical in profile, anterior margin shorter than posterior margin; in dorsal view, scale 2.3 times as wide as long, with weakly convex anterior margin and straight posterior margin.

Gaster oval, 0.13 mm in maximum width in dorsal view.

Sculpture: Head and antenna microreticulate; mandible largely smooth. Alitrunk microreticulate; microtriticulum on pronotum weaker than that on the mesonotum. Petiole smooth. Gaster very weakly microreticulate, and shining. Legs largely smooth.

Pilosity: Head with moderately abundant erect hairs. Pronotal dorsum with 2 pairs of erect hairs at mid length; mesonotal dorsum with 2 pairs of erect hairs, one pair at mid length and other at near posterior end; propodeum with about 20 erect hairs; the longest hair ca. 0.17 mm. Petiolar scale with 4 pairs of erect hairs. Gaster with suberect hairs which are moderately spaced.

Color: Head black; mandible, anterior margin of clypeus and

antenna brown. Pronotum and mesopleuron brown; mesonotum and propodeum black. Petiole blackish brown. Gaster black; 1st gastral tergum with a pair of brownish elliptical spots which are ca. 0.20 mm in maximum diameter; 2nd tergum with a pair of brownish oblong spots at anterior portion which are ca. 0.35 mm in length. Legs brown excepting trochanters yellowish brown.

Measurements (mm): Holotype: HL 1.03, HW 0.90, SL 0.98, CI 95, SI 108, WL 1.38, PNL 0.15, PH 0.48, DPW 0.35, TL 4.0. Paratype workers (n=5): HL 0.98-1.10, HW 0.85-0.95, SL 0.95-1.17, CI 86-87, SI 118-124, WL 1.38-1.70, PNL 0.14-0.15, PH 0.43-0.48, DPW 0.26-0.29, TL 3.7-4.4.

Variation. The spots on the 1st gastral tergum in the paratype workers vary from elliptical to rather oblong, and the maximum diameter from 0.15 to 0.23 mm.

Holotype. KPM-NK9000002, minor worker, Minami-iwo-to (350 m asl), Ogasawara-mura, Tokyo, 25.vi.2007, H. Karube & K. Matsumoto leg.

Paratypes. KPM-NK9000003, 1 minor workers, same data as holotype; KPM-NK9000004 & KPM-NK9000005, 2 minor workers, Minami-iwo-to (500 m asl-750 m asl), Ogasawara-mura, Tokyo, 24.vi.2007, H. Karube leg.; NIAES uncat., 1 minor workers, same data as holotype; NIAES uncat., 1 minor worker, same data as KPM-NK9000004 & KPM-NK9000005.

Other specimens examined. All specimens were collected in

Minami-iwo-to, Ogasawara-mura, Tokyo. 3 possible males, (500 m asl), 25.vi.2007, H. Karube & K. Matsumoto leg.; 1 possible male, (500 m asl), 24.vi.2007, K. Matsumoto leg.; 1 possible male, (N point), 25.vi.2007, H. Karube & K. Matsumoto leg.

Type depository. The holotype and some paratypes are deposited in KPM-NK and other paratypes in NIAES.

Etymology. The specific epithet is based on the name of type locality, Minami-iwo-to (South Iwo island).

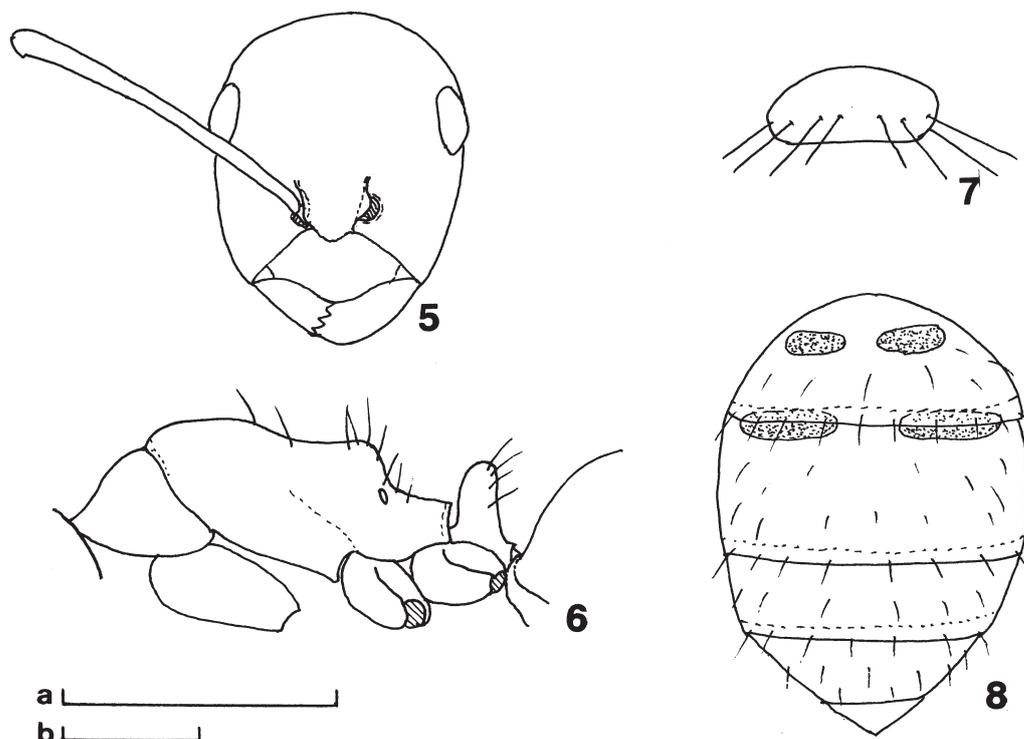
Remarks. The holotype and some paratype specimens were collected by Malaise trap.

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Refernece

- Karube, H. & K. Matsumoto, 2008. Insects of Minami-iwo-to Island. *Ogasawara Research*, **33**: 135-143. [In Japanese with English Summary.]
Kato, H., K. Horikoshi, T. Shumiya, K. Amano, M. Munakata, S. Katoh,



Figs. 5-8. *Camponotus iwoensis* Terayama & Kubota, sp. nov., minor worker. — 5, Head, full-face view; 6, alitrunk, lateral view; 7, petiolar node, dorsal view; 8, gaster, dorsal view. Scale bars: a, 0.25 mm for 5, 6, 8; b, 0.25 mm for 7.

- H. Karube, H. Nakano & N. Kachi, 2008. Overview of expedition of natural environment of Minami-iwo-to Island. *Ogasawara Research*, **33**: 1-29. [In Japanese with English Summary.]
- Okutomi, K., H. Ohba, N. Ishii, Y. Tsukamoto & M. Sato, 1982. Remarkable features of the biota of Minami-iwojima Island. Conservation Reports of the Minami-iwojima Wilderness Area, Tokyo, Japan. pp.393-403. [In Japanese with English summary.]
- Sato, M., 1982. The insect fauna of Minami-iwojima Island. Conservation Reports of the Minami-iwojima Wilderness Area, Tokyo, Japan. pp.303-327. Nature Conservation Bureau, Environment Agency of Japan. [In Japanese with English summary.]
- Terayama, M., 1999. The ant genus *Camponotus* Mayr (Hymenoptera: Formicidae) in Japan. *Mem. Myrmecol. Soc. Jpn.*, **1**: 25-48.
- Terayama, M. & K. Onoyama, 1999. The ant genus *Laptothorax* Mayr (Hymenoptera: Formicidae) in Japan. *Mem. Myrmecol. Soc. Jpn.*, **1**: 71-97.

摘 要

Terayama M., M. Kubota, H. Karube & K. Matsumoto, 2011. Formicidae (Insecta: Hymenoptera) from the island of Minami-iwo-to, the Volcano Islands, with descriptions of two new species. *Bull. Kanagawa prefect. Mus. (Nat. Sci.)*, (40): 75-80. (寺山 守・久保田政雄・苅部治紀・松本浩一, 2011. 火山列島南硫黄島のアリ類 (昆虫綱ハチ目) —2 新種の記載を含む—. 神奈川県立博物館研究報告 (自然科学), (40): 75-80.)

3 亜科 7 属 8 種のアリ (昆虫綱ハチ目アリ科) を火山列島の南硫黄島から記録した。これらの内、*Temnothorax mekira* と *Camponotus iwoensis* を新種として記載し、*Hypoponera nippona*、*H. bondoroiti*、*Monomorium chinensis*、*Paratrechina amia* の 4 種を本島からの初記録として報告した。

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