

Article

Taxonomic Studies on the Japanese Formicidae, Part 2

Seven Genera of Ponerinae, Cerapachyinae and Myrmicinae

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Abstract

The following fifteen new species are described: Ponerinae; *Ponera kohmoku*, *P. takaminei*, *P. tamon*, *P. bishamon*, *Anochetus shohki*. Cerapachyinae; *Cerapachys daikoku*, *C. hashimotoi*. Myrmicinae; *Oligomyrmex borealis*, *O. oni*, *O. hannya*, *O. yamatonis*, *Monomorium hiten*, *Rhopalomastix omotoensis*, *Myrmecina amamiana*, *M. ryukyuensis*. *Ponera swezeyi* (Wheeler) and *Oligomyrmex sauteri* Forel are recorded for the first time from Japan.

Key Words: Insecta, Hymenoptera, Formicidae, new species, Japan

In the course of my recent study of the Japanese Formicidae, I have found many undescribed species. In this paper I describe 15 species of 7 genera belonging to the three subfamilies, Ponerinae, Cerapachyinae and Myrmicinae.

The holotypes designated in this study are deposited in the collection of Museum of Nature and Human Activities, Hyogo. Other specimens are preserved in the collection of National Science Museum, Tokyo, and National Institute of Agro-Environmental Sciences, Tsukuba.

Measurements, indices and their abbreviations used in this paper follow those in the part 1 of this series.

Subfamily Ponerinae

Genus *Ponera* Latreille

Ponera Latreille, 1804, *Nouv. Dict. Hist. Nat.*, 24: 178.

[Type species: *Formica coarctata* Latreille, 1802]

This is a relatively small genus containing 33 described species, most of which are found in the Oriental and the Australian Regions. This genus is distinguished from the other genera of the subfamily Ponerinae by the following combination of characteristics; 1) mandibles triangular, 2) frontal carinae lacking, 3) maxillary and labial palpi each 2-segmented, 4) tarsal claws simple, 5) petiole with a distinct free posterior face and without posterodorsal spines, 6) subpetiolar process with a fenestra and a pair of minute posterobentral denticles.

Among eight species mentioned by the Myrmecological Society of Japan (1989), only three had scientific names: *P. scabra* Wheeler, *P. japonica* Wheeler and *P. yakushimensis* Tanaka. In this paper I describe the remaining four species, together with a new record of *P. swezeyi* from the Ogasawara Islands.

Ponera kohmoku sp. nov. (Figs. 1-6)

Ponera sp. 7: Myrmecol. Soc. Japan, 1989, A guide for the identification of Japanese ants (I): 24.

Japanese name: Manako-hariari.

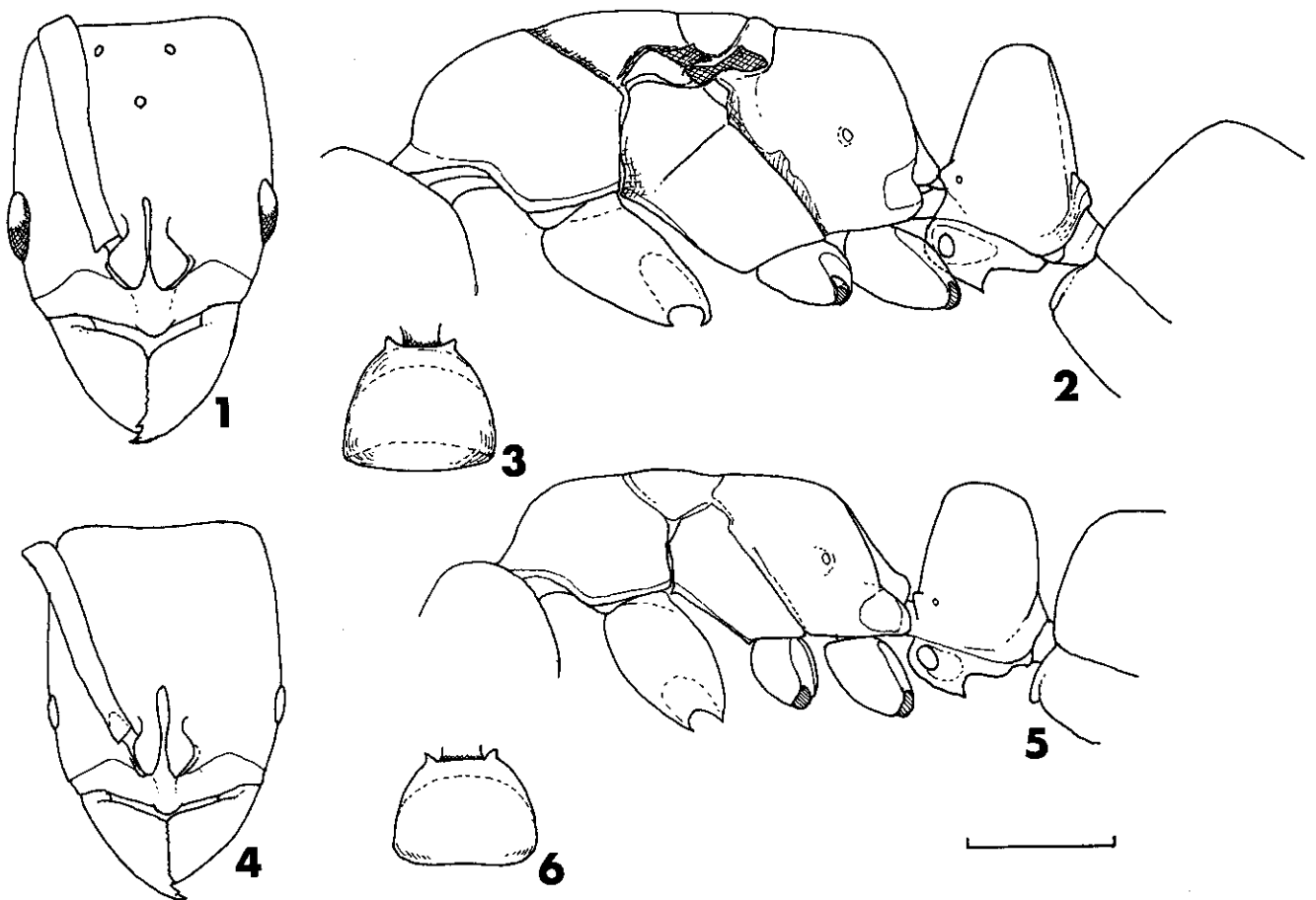
Holotype. Worker. HL 0.80 mm; HW 0.68 mm; SL 0.65 mm; CI 84; SI 96; WL 1.25 mm; PW 0.58 mm; PNL 0.35 mm; PH 0.63 mm; DPW 0.45 mm; PNI 78; TL 3.6 mm.

Head subrectangular, with slightly convex sides and almost straight posterior margin in frontal view. Mandibles with 3 developed apical teeth followed by a series of about 10 minute denticles. Clypeus with a blunt but distinct median tooth. Eyes large for this genus, slightly convex, and each consisting of about 25 indistinct facets; maximum diameter 0.10 mm. Antennae with 12 segments; scape relatively long, slightly exceeding median posterior margin of head in frontal view; club not differentiated; 8th to 12th segments in a ratio of about 7:7:9:11:18 in length; terminal segment 1.4× as long as wide.

General shape of alitrunk and petiole as in Fig. 5; lateral promesonotal and dorsal mesonotal-propodeal sutures distinctly incised; posterolateral corner of propodeum dully angulate. Petiolar node wider than long in dorsal view, with broadly convex anterior margin and straight posterior margin. Subpetiolar process with a pair of strong posterolateral teeth; fenestra relatively large and oval.

Head and antennal scapes microreticulate; mandibles smooth and shining. Dorsum of alitrunk and petiole microreticulate and closely punctate; mesepisterna and lateral faces of propodeum shining and weakly punctate; declivitous face of propodeum smooth and shining. Gaster closely punctate; punctures on 2nd gastral tergite weaker than those

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Figs. 1–6. *Ponera kohmoku* sp. nov. (worker and female) — 1, Head, female, frontal view; 2, alitrunk and petiole, female, lateral view; 3, petiolar node, female, dorsal view; 4, head, worker, frontal view; 5, alitrunk and petiole, worker, lateral view; 6, petiolar node, worker, dorsal view. Scale bar = 0.5 mm.

on the 1st. Pubescence moderately abundant; erect or suberect hairs present on mandibles, antennal scapes, dorsa of alitrunk and petiolar node, and entire gaster.

Body black with brownish tinge; clypeus and subpetiolar process brown; mandibles, antennae, legs and tip of gaster reddish brown.

Paratype females. HL 0.93–0.95 mm; HW 0.78–0.80 mm; SL 0.70–0.71 mm; CI 84–85; SI 89–90; WL 1.55–1.18 mm; AW 0.75–0.67 mm; PNL 0.38–0.39 mm; PH 0.68–0.70 mm; DPW 0.51–0.53 mm; PNI 74–75; TL 4.0–4.3 mm ($n = 4$).

Head and alitrunk as in Figs. 1 and 2. Eyes large, 4.0–4.3 mm in diameter. Ocelli small, forming an acute triangle. Antennal scapes exceeding posterior margin of head. Petiolar node converging above in lateral view; disc $0.53\times$ as long as wide, with weakly concave posterior margin in dorsal view. Color as in worker.

Variation. Ten paratype workers with the following measurements and indices: HL 0.83–0.89 mm; HW 0.70–

0.75 mm; SL 0.63–0.66 mm; CI 85–88; SI 97–91; WL 1.20–1.28 mm; PW 0.58–0.61 mm; PNL 0.34–0.35 mm; PH 0.63–0.68 mm; DPW 0.43–0.48 mm; PNI 71–78; TL 3.4–3.7 mm.

Eyes consisting of 22 to 30 indistinct facets.

Holotype. Worker, Kurio, Yaku-shima, Kagoshima Pref., 23.III.1981, M. Terayama leg.

Paratypes. 23 workers, 1 female, same data as holotype; 2 females, Kusakawa, Yaku-shima, Kagoshima Pref., 22.III.1981, M. Terayama leg.; 2 workers, Yaku-shima, Kagoshima Pref., 16.X.1984, M. Terayama leg.; 4 workers, Anbou, Yaku-shima, Kagoshima Pref., M. Terayama leg.; 3 workers, 20.VIII.1983, Shiroyama, Kagoshima-shi, Kagoshima Pref., 20.VIII.1983, S. Kubota leg.; 2 workers, same locality, 21.VIII.1983, S. Kubota leg.; 1 worker, Sata-misaki, Kagoshima Pref., 10.VIII.1984, M. Terayama leg.; 1 female, Yaku-shima, Osumi Is., Kagoshima Pref., 19.VIII.1983, Sk. Yamane leg.; 28 workers, Shimonoseki, Fukuoka Pref., 6.IV.1993, O. Kitade leg.

Etymology. The specific name is the Japanese noun

Kohmoku-ten, which is the name of one of the four guardian deities in buddhism.

Remarks. This species is distinguished from the other congeners by the large eyes which consist of more than 20 facets in worker.

Ponera takaminei sp. nov. (Figs. 7-9)

Ponera sp. A: Onoyama, 1976, Ecol. Stud. Nat. Cons. Ryukyu Is., II: 127.

Ponera sp. 4: Myrmecol. Soc. Japan, 1989, A guide for the identification of Japanese ants (I): 23.

Japanese name: Arehada-hariari.

Holotype. Worker. HL 0.76 mm; HW 0.65 mm; SL 0.51 mm; CI 85; SI 79; WL 1.03 mm; PW 0.49 mm; PH 0.50 mm; PNL 0.30 mm; DPW 0.43 mm; PNI 88; TL 3.0 mm.

Head $1.17\times$ as long as wide, with gently convex sides and concave posterior margin in frontal view. Mandibles with 3 acute teeth occupying apical 1/3 of masticatory margin; remainder with very minute indistinct denticles. Clypeus with a distinct blunt median tooth. Eyes small, ca. 0.04 mm in diameter, each consisting of 4 or 5 indistinct facets. Antennae with 12 segments; scape not reaching the posterior margin of head; club not differentiated; terminal segment $1.6\times$ as long as wide.

General form of alitrunk and petiole as in Fig. 8; pro-mesonotal suture distinctly incised; dorsal mesonotal-propodeal suture relatively weakly incised; posterolateral corners of propodeum dully angulate. Petiolar node thick and broad, with almost straight dorsal margin; dorsal length larger than that of basal length in profile; in dorsal view, disc $0.57\times$ as long as wide, with dully angulate posterolateral margins and concave posterior margin. Subpetiolar process with acute posterolateral teeth; fenestra oval.

Head and antennal scapes coarsely microreticulate; mandibles smooth and shining. Alitrunk, petiole and gaster coarsely microreticulate and punctate, excepting declivitous face of propodeum shining with scattered shallow punctures. Pubescence moderately abundant; erect or suberect hairs present on head, dorsa of alitrunk and petiolar node, and entire gaster.

Body reddish brown; clypeus yellowish; mandibles, antennae, legs and tip of gaster yellowish brown.

Holotype. Worker, Miyako-jima, Okinawa Pref., 24.VII.1978, H. Takamine leg.

Paratypes. 1 worker, same data as holotype; 4 workers, same locality, 10.II.1985, Y. Hashimoto leg.

Etymology. This species is named after the collector, Mr. H. Takamine.

Remarks. The present species is easily separated from the other congeners in having the characteristic shape of petiolar node.

Ponera tamon sp. nov. (Figs. 10-16)

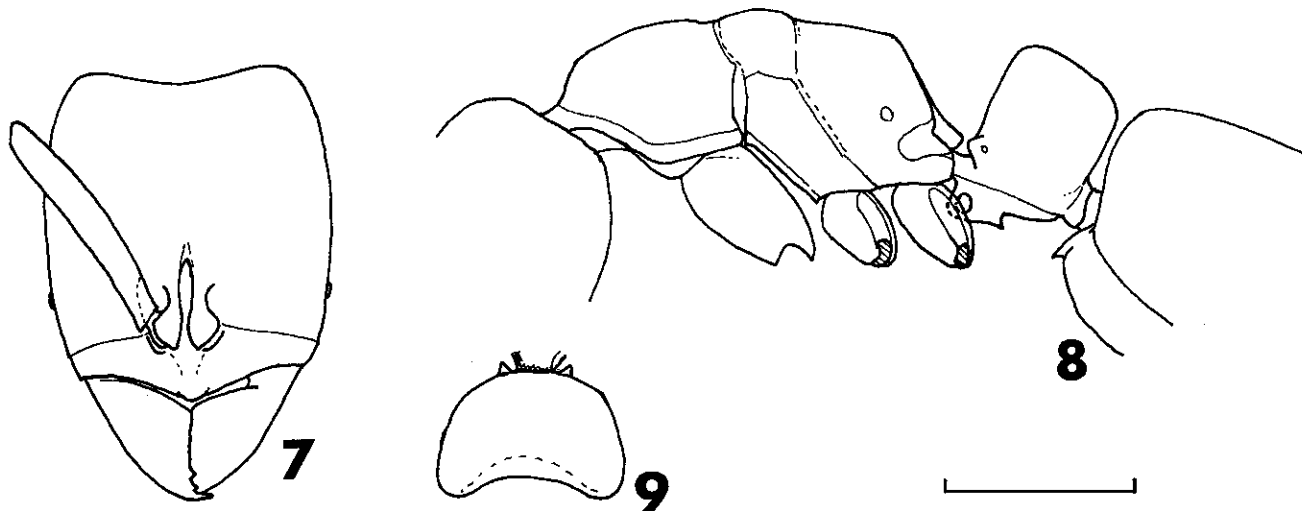
Ponera sp. B: Onoyama, 1976, Ecol. Stud. Nat. Cons. Ryukyu Is., II: 127.

Ponera sp. 8: Myrmecol. Soc. Japan, 1989, A guide for the identification of Japanese ants (I): 24.

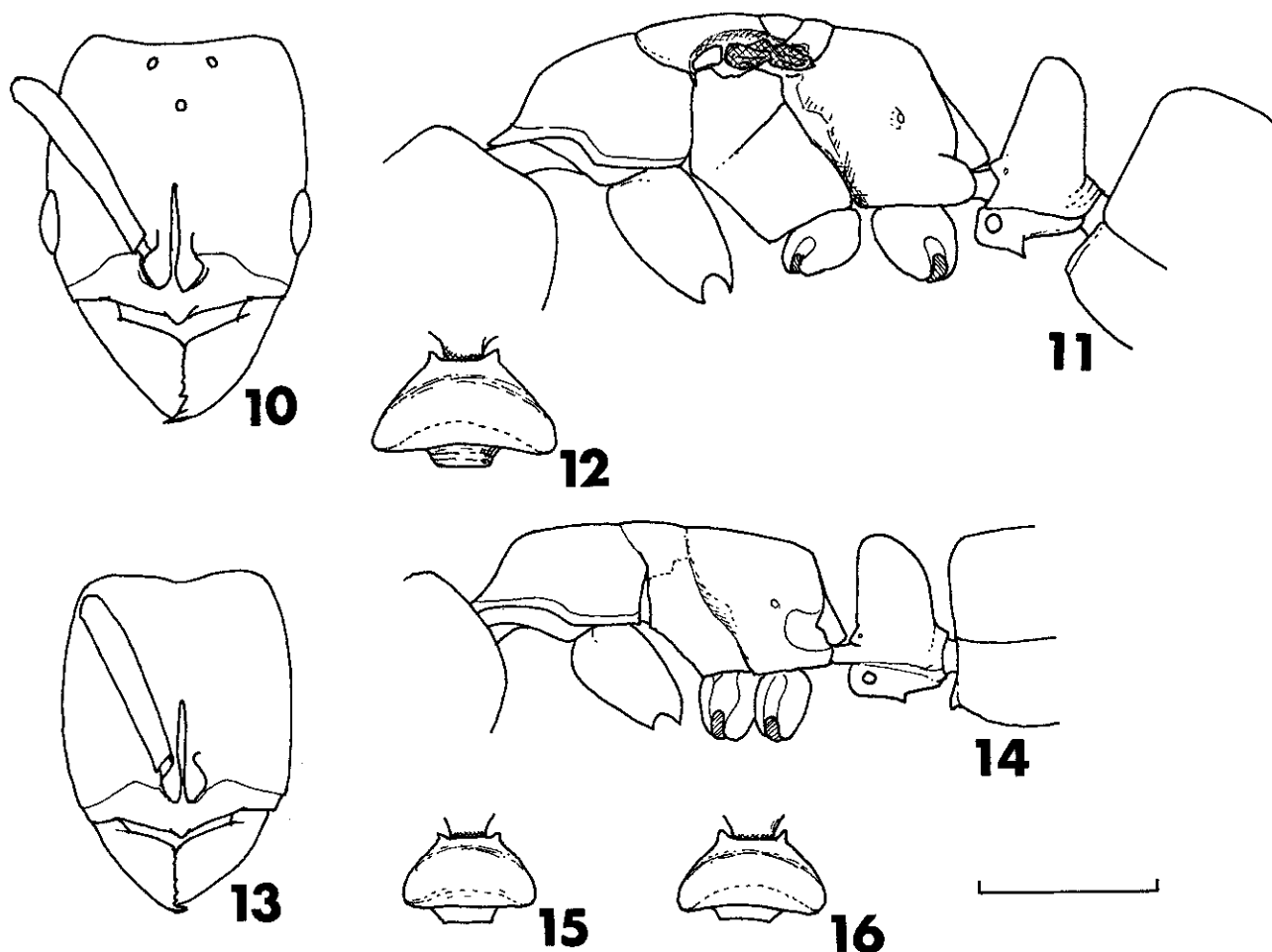
Japanese name: Minami-himehariari.

Holotype. Worker. HL 0.51 mm; HW 0.45 mm; SL 0.38 mm; CI 88; SI 84; WL 0.74 mm; PW 0.35 mm; PH 0.35 mm; PNL 0.18 mm; DPW 0.28 mm; PNI 80; TL 2.5 mm.

Head $1.17\times$ as long as wide, with slightly convex sides and slightly concave posterior margin in frontal view. Eyes small, each consisting of 3-4 indistinct facets. Antennae with 12 segments; scape short, not reaching the posterolateral margin of head; apical 5 segments forming a club.



Figs. 7-9. *Ponera takaminei* sp. nov. (worker) — 7, Head, frontal view; 8, alitrunk and petiole, lateral view; 9, petiolar node, dorsal view. Scale bar = 0.5 mm.



Figs. 10-16. *Ponera tamon* sp. nov. (worker and female) — 10, Head, female, frontal view; 11, alitrunk and petiole, female, lateral view; 12, petiole, female, dorsal view; 13, head, worker, frontal view; 14, alitrunk and petiole, worker, lateral view; 15, petiole, worker, dorsal view, (Amami specimen); 16, ditto (Ishigaki specimen). Scale bar = 0.5 mm.

Profile of alitrunk as in Fig. 14; dorsal margin almost straight; posterolateral corners of propodeum dully angulated. Petiolar node thick and wide, with straight anterior margin and convex posterior margin in lateral view; posterodorsal corner rounded, not forming an angle; viewed from above, node $0.45\times$ as long as wide, with very slightly concave posterior margin. Subpetiolar process with acute posterolateral teeth; fenestra circular.

First gastral tergite $0.83\times$ as long as wide in dorsal view; 2nd tergite $0.62\times$ as long as wide.

Head and alitrunk coarsely microreticulate; punctures separated by less than $0.5\times$ their own diameters. Gaster moderately punctate; punctures on 1st tergite less than those on 2nd.

Pubescence moderately abundant, and erect hairs present on the dorsa of alitrunk and petiole, and entire gaster.

Body black; clypeus reddish brown; mandibles, anten-

nae and legs yellowish brown.

Paratype females. HL 0.60-0.63 mm; HW 0.53-0.55 mm; SL 0.45-0.46 mm; CI 87-88; SI 86-88; WL 0.90-0.92 mm; PW 0.48-0.53 mm; PNL 0.18-0.20 mm; PH 0.43-0.45 mm; DPW 0.35-0.38 mm; TL 3.0-3.2 mm ($n = 3$).

Head slightly longer than wide. Antennal scapes almost reaching the posterolateral corners of head in frontal view. Eyes 0.13-0.14 mm in length. Ocelli forming an acute triangle.

Alitrunk and petiole as in Figs. 11 and 12. Petiolar node with straight anterior margin and convex posterolateral corner in lateral view; disc thin, $0.32\times$ as long as wide, with straight posterior margin in dorsal view.

Head and alitrunk coarsely microreticulate; punctures separated by less than $0.5\times$ their own diameters. Gaster moderately punctate. Color as in worker.

Table 1. Measurements (range in mm) and indices for the workers of *Ponera tamon*.

Localities	Sata-misaki	Amami-oshima	Tokuno-shima	Okino-eabu-jima	Okinawa-jima	Taiwan (Chihpen)	Taiwan (Fenchifu)
N	10	10	5	8	10	10	10
HL	0.53-0.55	0.50-0.56	0.54-0.55	0.54-0.57	0.53-0.58	0.55-0.56	0.58-0.63
HW	0.48-0.51	0.45-0.49	0.48-0.49	0.47-0.50	0.45-0.50	0.50-0.53	0.53-0.58
SL	0.39-0.40	0.38-0.40	0.35	0.40	0.39-0.41	0.40-0.43	0.43-0.48
CI	90-93	86-91	87-89	86-89	86-90	91-93	86-93
SI	77-82	78-84	76-79	81-86	80-86	80-83	77-82
WL	0.74-0.80	0.73-0.78	0.76-0.78	0.74-0.77	0.73-0.80	0.78-0.83	0.83-0.88
PW	0.37-0.40	0.35-0.36	0.35-0.38	0.35-0.38	0.35-0.40	0.38-0.39	0.40-0.45
PNL	0.18-0.19	0.18	0.18	0.18-0.19	0.18-0.20	0.18-0.19	0.19-0.23
PH	0.37-0.39	0.34-0.36	0.35-0.36	0.35-0.39	0.35-0.39	0.37-0.39	0.40-0.45
DPW	0.29-0.33	0.28-0.30	0.29-0.30	0.28-0.32	0.29-0.31	0.31-0.33	0.33-0.39
PNI	74-80	79-84	80-86	77-86	77-86	80-87	82-88

Variation. Dorsal width of petiole in workers varies in the materials of Okinawa and Amami Is. from 0.28 to 0.32 mm, and in that of Taiwan from 0.31 to 0.39 mm. Coloration of body also varies from dark brown to almost black. These differences may reflect the geographical variation within a single species. Morphometric data are summarized in Table 1.

Holotype. Worker, Uken-son, Amami-oshima, Kagoshima Pref., Japan, 1.VII.1983, M. Terayama leg.

Paratypes. Japan: — 7 workers, 1 female, same data as holotype; 13 workers, Sumiyo-son, Amami-oshima, Kagoshima Pref., M. Terayama leg.; 1 worker, Naze-shi, Amami-oshima, Kagoshima Pref., 21.III.1980, M. Terayama leg.; 9 workers, 1 female, Okinoerabu-jima, Kagoshima Pref., 17.III.1989, M. Terayama leg., 1 worker, Yoron-jima, Kagoshima Pref., 14.III.1980, M. Terayama leg.; 3 workers, 1 female, Hirara, Miyako-jima, Okinawa Pref., 20.VIII.1979, M. Terayama leg.; 2 workers, Sonai, Iriomote-jima, Okinawa Pref., 29.VII.1979, M. Terayama leg.; 29 workers, Izena-jima, Okinawa Pref., 31.III.1985, H. Takamine leg.; 16 workers, Nago, Okinawa-jima, Okinawa Pref., 3.X.1984, H. Takamine leg.; 33 workers, Naha, Okinawa-jima, Okinawa Pref., 15.XII.1984, H. Takamine leg.; 6 workers, 2 females, Sata-misaki, Kagoshima Pref., 9.VIII.1984, S. Kubota leg.

Taiwan: — 5 workers, 1 female, Fenchifu, Chiayi Hsien, 4.VIII.1980, M. Terayama leg.; 1 worker, Jiuyuehtan, Nantou Hsien, 16.VIII.1980, M. Terayama leg.; 10 workers, 1 female, Chihpen, Taitung Hsien, 10.VIII.1980, M. Terayama leg.; 14 workers, same locality, 19.VII.1982, M. Terayama leg.; 2 workers, same locality, 24.VII.1982, M. Terayama leg.; 2 workers same locality, 25.VII.1982, M. Terayama leg.

Etymology. The specific name is the Japanese noun Tamon-ten, which is the name of one of the four guardian deities in buddhism.

Remarks. This new species in general appearance sim-

ilar to *Ponera japonica*, but it is easily distinguished from the latter by 1) head much wider and CI 86-91 (77-82 in *japonica*); 2) petiolar node thinner in dorsal view; 3) posterolateral corners of propodeum only weakly angulate, and 4) posterodorsal border of node not forming an angle.

***Ponera bishamon* sp. nov. (Figs. 17-20)**

Ponera sp. C: Onoyama, 1976, Ecol. Stud. Nat. Cons. Ryukyu Is., II: 127.

Ponera sp. 6: Myrmecol. Soc. Japan, 1989, A guide to the identification of Japanese ants (I): 23.

Japanese name: Hoso-himehariari.

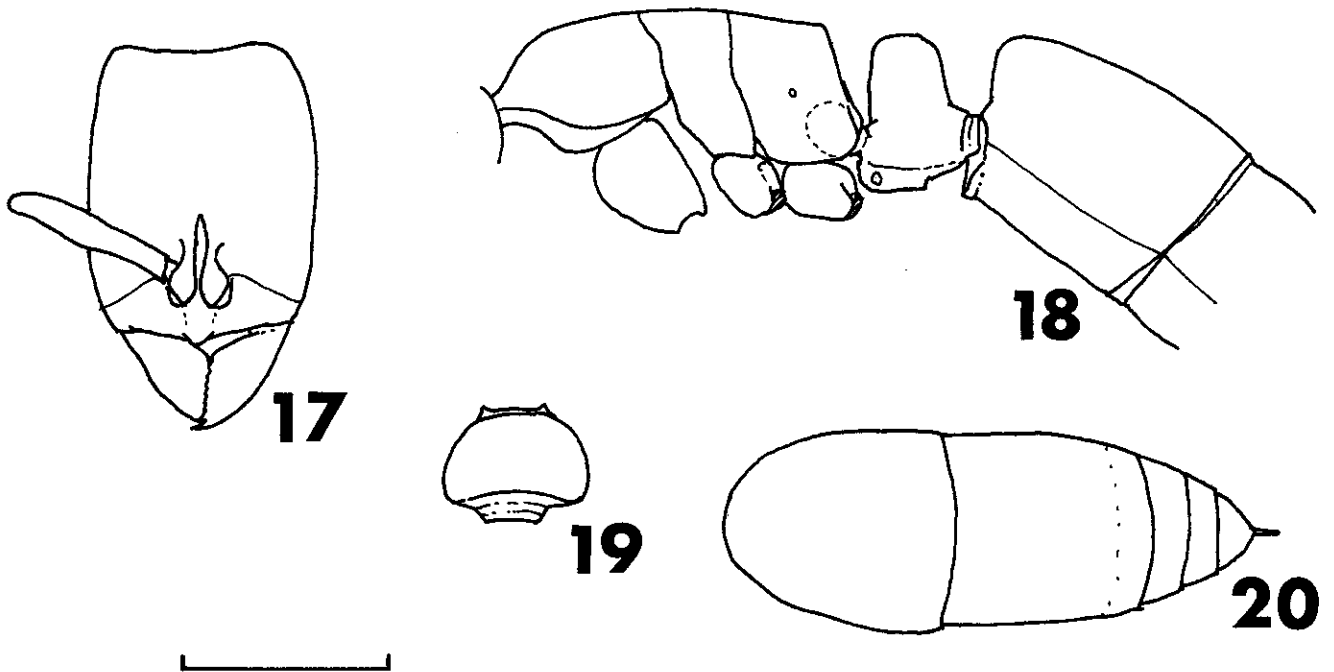
Holotype. Worker. HL 0.48 mm; HW 0.38 mm; SL 0.28 mm; CI 79; SI 74; WL 0.58 mm; AW 0.28 mm; PNL 0.18 mm; PH 0.29 mm; DPW 0.23 mm; PNI 78; TL 1.9 mm.

Head slender, 1.27× as long as wide, with subparallel sides and weakly concave posterior corner in frontal view. Mandibles with 3 apical teeth followed by minute several denticles. Antennae with 12 segments; scape not reaching posterior corner of head; apical 5 segments forming a club. Clypeus with a distinct median tooth. Eyes small, consisting of a single facet only.

Dorsal margin of alitrunk almost straight from the midlength of pronotum to posterior end of propodeum in lateral view; posterodorsal corner of propodeum dully angulate in lateral view. Petiolar node thick; disc 0.40× as long as wide, with concave posterior margin in dorsal view. Subpetiolar process with small and dull posterolateral teeth; fenestra circular.

Gaster long; 1st segment 1.15× as long as wide in dorsal view; 2nd segment slightly shorter than 1st, 1.0× as long as wide.

Head, antennal scapes and pronotum microreticulate; mesonotum and propodeum moderately punctate; petiole smooth with punctures sparsely; 1st and 2nd gastral tergites moderately punctate.



Figs. 17-20. *Ponera bishamon* sp. nov. (worker) — 17, Head, frontal view; 18, alitrunk, petiole, and 1st segment of gaster, lateral view; 19, petiole, dorsal view; 20, gaster, dorsal view. Scale bar = 0.5 mm.

Body blackish brown; mandibles, antennae and legs yellow.

Holotype. Worker, Iriomote-jima, Okinawa Pref., H. Takamine leg.

Etymology. The specific name is the Japanese noun bishamon-ten, which is the name of one of the four guardian deities in buddhism.

Remarks. This species is unique in having the elongate gaster.

***Ponera swezeyi* (Wheeler)**

Pseudocryptopone swezeyi Wheeler, 1933. Amer. Mus. Novitates, 572: 16.

Ponera swezeyi Wilson, 1957. Bull. Mus. Comp. Zool., 116: 370; Taylor, 1967. Pac. Ins. Mon., 13: 85.

Ponera sp.: Shindo, 1979. Nature and Insects, 14(10): 25.

Ponera sp. 5: Myrmecol. Soc. Japan, 1989, A guide for the identification of Japanese ants (I): 23.

Japanese name: Ogasawara-hariari.

Specimens examined. 3 workers, Okiminato, Haha-jima, Ogasawara Is., 19.III.1977, M. Shindo leg.

Remarks. This small yellow species from the Ogasawara (Bonin) Is. agrees with Taylor's redescription (1967) of *P. swezeyi*. The present specimens were taken from leaf-litter by Berlese funnel extraction.

Key to the Japanese species of *Ponera* (worker)

1. First gastral tergite distinctly longer than wide in dorsal

- view *P. bishamon* sp. nov.
- First gastral tergite as long as wide in dorsal view 2
- 2. In lateral view, upper portion of posterior border of petiolar node overhung *P. takaminei* sp. nov.
- In lateral view, posterior border of petiolar node not overhung 3
- 3. Eyes large, consisting of more than 20 facets. Posterior border of petiolar node straight in dorsal view *P. kohmoku* sp. nov.
- Eyes small, consisting of less than 10 facets. Posterior border of petiolar node more or less concave in dorsal view 4
- 4. Larger species (TL>3.0 mm). Dorsa of mesonotum and petiolar node coarsely punctate; punctures separated by less than 0.5× their own diameters 5
- Smaller species (TL<2.5 mm). Dorsa of mesonotum and petiolar node sparsely punctate; punctures separated by more than 1.0× their own diameters 6
- 5. Punctures on 2nd gastral tergite as in those on 1st one *P. scabra* Wheeler
- Punctures on 2nd gastral tergite shallower and sparser than those on 1st one *P. yakushimensis* Tanaka
- 6. Yellow colored species; lateral mesonotal sutures obscure *P. swezeyi* (Wheeler)
- Body black to blackish brown; lateral mesonotal sutures distinctly incised 7
- 7. Disc of petiolar node thick; maximum width less than 2.0× length in dorsal view. Head narrower (CI 77-82) *P. japonica* Wheeler

- Disc of petiolar node thin; width more than $2.0\times$ length in dorsal view. Head wider (CI 86-91)
.....*P. tamon* sp. nov.

Genus *Anochetus* Mayr

Anochetus Mayr, 1861, Europ. Formicid.: 53. [Type species: *Odontomachus ghilianii* Spinola, 1851]

Among the ponerine groups, this genus is characterized by the long and linear mandibles which are inserted in the middle of anterior margin of head, the absence of paired dark apophyseal lines on posterior face of head, and the presence of a free posterior face of petiole.

Recently I have examined specimens of the genus from Ishigaki-jima, the Ryukyus. The species, herein described as new to science, undoubtedly constitutes the first record of the genus from Japan.

***Anochetus shohki* sp. nov. (Figs. 21-25)**

Holotype. Worker. HL 0.88 mm; HW 0.85 mm; SL 0.73 mm; CI 97; SI 86; ML 0.53 mm; MI 60; WL 1.23 mm; AW 0.51 mm; PL 0.24 mm; PH 0.45 mm; DPW 0.30 mm; TL 4.0 mm.

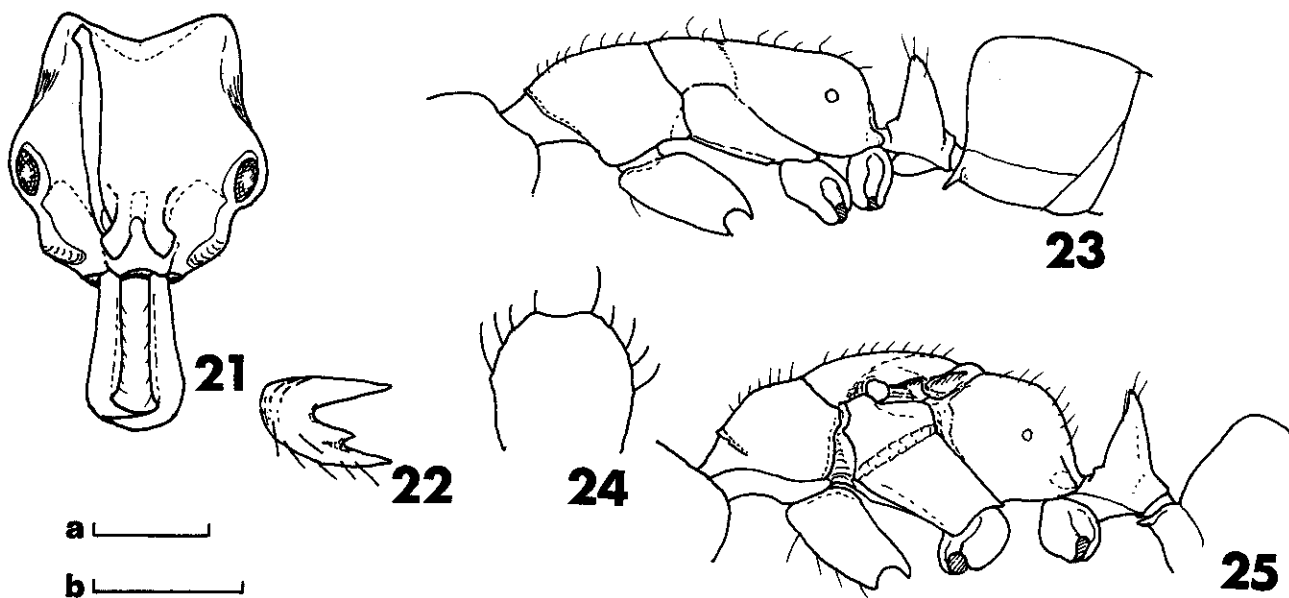
General form of head as shown in Fig. 21; frons microreticulate with striae; genae smooth and shining. Mandibles $0.83\times$ head length with straight dorsal inner margin; shaft only weakly broadened anteriorly; dorsal margin

without tooth; apical portion with 3 acute teeth of which ventral and dorsal ones are subequal in length; intercalary tooth smallest. Antennae with 12 segments; scape long, but not reaching posterolateral corner of head; pedicel $2.0\times$ as long as wide; 3rd to 10th segments each almost as long as wide; 11th segment slightly longer than wide; terminal segment $2.9\times$ as long as wide. Eyes convex, 0.13 mm in maximum length and larger than the maximum width of mandibular shaft, with short erect hairs.

Pronotum microreticulate and coarsely punctate; dorsal length excluding cervix $1.1\times$ dorsal width; anterior margin carinate. Sculpture on dorsal face of mesonotum as on pronotum; mesopleura smooth and impunctate in most part. Posterolateral corner of propodeum broadly rounded in lateral view; dorsal face of propodeum microreticulate and coarsely punctate; lateral faces with numerous longitudinal striae.

Petiole thin, carinate dorsally, with straight anterior margin and very weakly convex posterior margin in lateral view; in frontal view, lateral margins subparallel and dorsal margin broadly rounded. Subpetiolar process low, with an anteroventral lobe.

First gastral tergite slightly wider than long in dorsal view; anterior $3/5$ microreticulate with relatively large punctures densely; the rest smooth with scattered shallow punctures. Second gastral tergite $1.3\times$ as wide as long in dorsal



Figs. 21-25. *Anochetus shohki* sp. nov. (worker and female) — 21, Head, worker, frontal view; 22, apex of mandible, worker, adaxial view; 23, alitrunk and petiole, worker, lateral view; 24, petiolar node, frontal view; 25, alitrunk and petiole, female, lateral view. Scale bars: a, 0.25 mm for 22, 24; b, 0.50 mm for 21, 23, 25.

view; smooth with scattered shallow punctures. Legs subopaque.

Head including mandibles and antennae brown; alitrunk and petiole dark brown; gaster blackish brown; legs yellowish brown. Short suberect hairs present on dorsa of head and alitrunk; the longest pronotal hair about 0.09 mm in length.

Paratype female. HL 0.98 mm; HW 0.97 mm; SL 0.75 mm; CI 99; SI 77; ML 0.55 mm; MI 56; WL 1.32 mm; AL 0.65 mm; PL 0.28 mm; PH 0.50 mm; DPW 0.35 mm; TL 4.7 mm.

General shape of head similar to that of the worker with the usual caste differences. Eyes 0.20 mm in maximum length. Ocelli small, forming a right triangle; anterior ocellus ca. 0.04 mm in diameter.

General form of alitrunk and petiole as in Fig. 25; in profile dorsal outline of alitrunk convex, forming an arch from anterior end of pronotum to posterior end of propodeum; pronotum microreticulate with punctures, $0.60\times$ as long as as wide excluding anterior cervix in dorsal view, with its anterior margin carinate; mesonotum microreticulate with punctures, but punctures smaller than those on pronotum; mesopleura smooth and shining, impunctate in most part. Petiolar node thin, carinate dorsally.

Coloration as in worker.

Holotype. Worker, Mt. Omoto-dake, Ishigaki-jima, Okinawa Pref., 10.XI.1993, K. Yamauchi leg.

Paratypes. 1 female, 9 workers, same data as holotype.

Etymology. The specific name is the Japanese noun *shohki*, which is the name of a strong god of Japan.

Remarks. This species belongs to the *graeffei*-group of Brown (1978) and especially resembles *A. graeffei*. But it is separable from the latter by the following characteristics: mandibular shaft only weakly broadened anteriorly (maximum width of shaft $2.0\times$ its basal width in *graeffei*); petiolar node thin and carinate dorsally (not carinate in *graeffei*); first gastral tergite with relatively large punctures densely (with very small punctures sparsely in *graeffei*).

Subfamily Cerapachyinae

Genus *Cerapachys* Fr. Smith

Cerapachys Fr. Smith, 1857, J. Proc. Linn. Soc., 2: 74.
[Type species: *Cerapachys antennatus* Fr. Smith, 1857]

This genus is distributed world-wide from the warm temperate region to the tropics and represented by 139 described species (Bolton, 1990, 1995). It is distinguished from the other ant genera in workers by the following characteristics: 1) pygidium armed with a row of short spines or peg-like teeth; 2) gastral spiracles 3–5 exposed, not overlapped nor concealed by the tergites of the preceding segments; 3) propodeal spiracle low on side; 4) tibial spurs present on middle legs; 5) gena between the antennal socket and the lateral margin of the head with a longitudinal carina.

Among the four species mentioned by the Myrmecological Society of Japan (1989), only two had scientific names. In this paper I describe the remaining two as new species.

Cerapachys daikoku sp. nov. (Figs. 26–29)

Cerapachys sp. 3: Myrmecol. Soc. Japan, 1989, A guide for the identification of Japanese ants (I): 31.
Japanese name; Kuro-kubirehariari.

Holotype. Worker. HL 0.60 mm; HW 0.48 mm; SL 0.24 mm; CI 80; SI 50; WL 0.75 mm; PNL 0.30 mm; PH 0.33 mm; DPW 0.33 mm; TL 3.1 mm.

Head rectangular, smooth with scattered small punctures, with subparallel sides and shallowly concave posterior margin in frontal view; shallow groove running from eye to anterior end of head in lateral view. Mandibles subtriangular, smooth, and shallowly punctate sparsely; masticatory margin without tooth excepting apical angulation. Antennae with 12 segments; scape $0.50\times$ head width, broadest at posterior end; pedicel slightly wider than long; 3rd to 10th segments each wider than long; 11th segment as long as wide; apical segment $2.0\times$ as long as wide, slightly longer than preceding 2 segments combined. Eyes large, 0.18 mm in maximum diameter.

Alitrunk smooth with shallow punctures sparsely; dorsum straight in profile; anterior margin of pronotum carinate; posterolateral corner of propodeum dully angulate.

Petiole broad with broadly convex dorsum; in dorsal view, $0.87\times$ as long as wide with weakly concave anterior margin and weakly convex posterior margin; anterolateral corners sharply angulate. Postpetiole as long as wide with straight anterior margin in dorsal view. Dorsal face of waist as in alitrunk.

First gastral segment smooth with shallow punctures, slightly longer than waist; dorsal length $0.89\times$ postpetiole length and width $0.81\times$ postpetiole width.

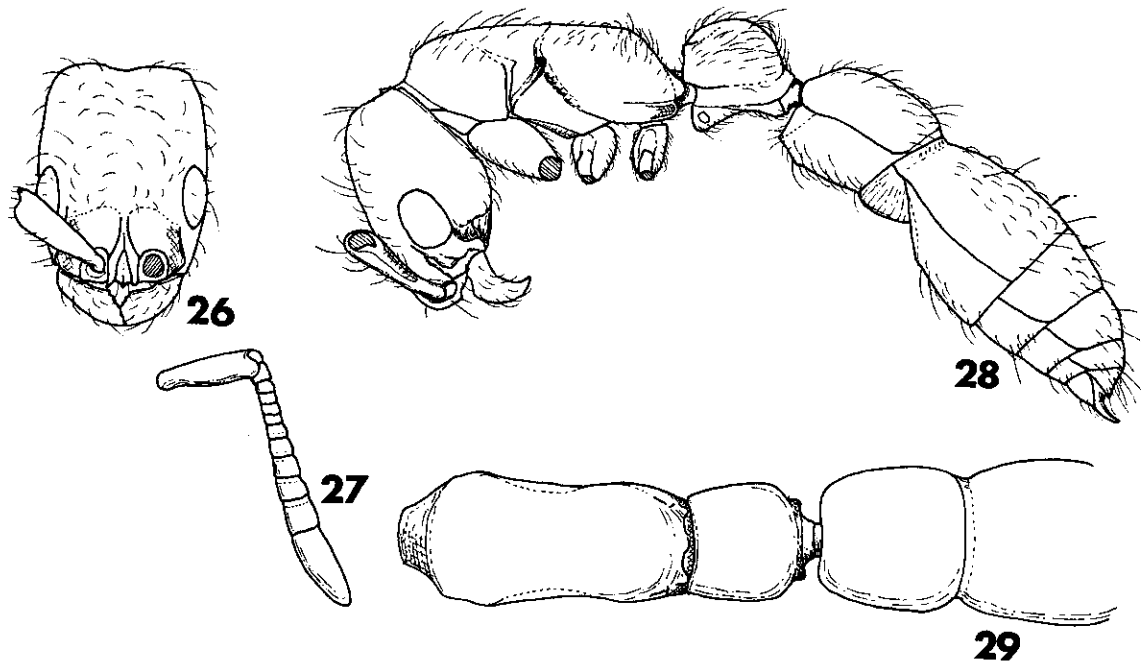
Body blackish brown; mandibles, antennae and legs yellowish brown; eyes black.

Paratype females. HL 0.63–0.65 mm; HW 0.52–0.53 mm; SL 0.24–0.24 mm; CI 81–82; SI 45–47; WL 0.98–1.00 mm; AW 0.44–0.45 mm; PL 0.32–0.33 mm; PH 0.30–0.32 mm; DPW 0.34–0.35 mm; TL 2.9–3.3 mm ($n = 3$).

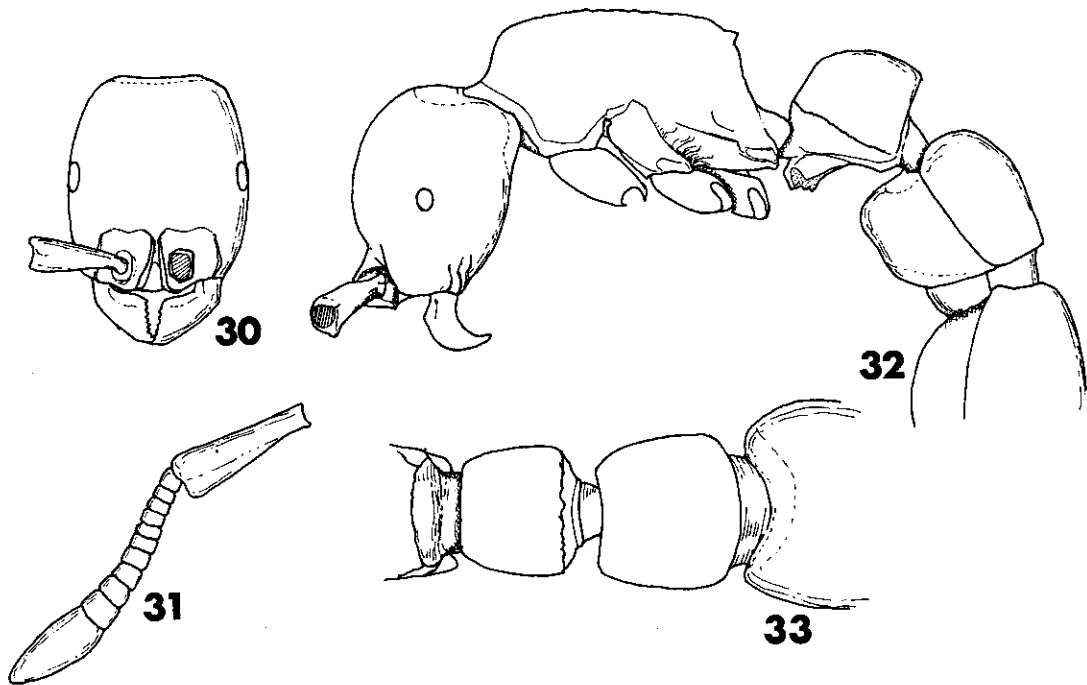
General shape and coloration as in worker. Eyes ca. 0.20 mm in length; ocelli small; anterior angle of ocellar triangle forming a right angle. Forewings hyaline, ca. 2.25 mm in length; pterostigma large and distinct, $1.5\times$ as long as wide; r-m, m-cross, and radial sector veins absent.

Variation. Five paratype workers with the following measurements and indices: HL 0.58–0.61 mm; HW 0.48–0.50 mm; SL 0.23–0.24 mm; CI 80–83; SI 48–49; WL 0.75–0.78 mm; PNL 0.30–0.31 mm; PH 0.33–0.34 mm; DPW 0.33–0.35 mm; TL 2.9–3.1 mm.

Holotype. Worker, Matsugahana, Izu, Shizuoka Pref., 17.IX.1990, E. Hasegawa leg.



Figs. 26-29. *Cerapachys daikoku* sp. nov. (worker) — 26, Head, frontal view; 27, right antenna; 28, body, lateral view; 29, ditto, dorsal view.



Figs. 30-33. *Cerapachys hashimotoi* sp. nov. (worker; surface sculpture omitted) — 30, Head, frontal view; 31, right antenna; 32, head, alitrunk and waist, lateral view; 33, petiole and postpetiole, dorsal view.

Paratypes. 5 workers, same data as holotype; 3 workers, Shimoda, Izu, Shizuoka Pref., 20.VIII.1988, T. Satoh leg.; 2 workers, same locality, 6.XI.1985, T. Satoh leg.; 1 worker, Aono, Minami-izu-machi, Shizuoka Pref., 20.VIII.1987, T. Satoh leg.; 1 worker, 3 females, Kitagawa, Higashi-Izu-machi, Shizuoka Pref., 4.V.1987, H. Sakai leg.; 1 female, Amami-oshima, Kagoshima Pref., 5.V.1966, K. Kusigemati leg.

Etymology. One of the seven deities of good fortune in the old tale of Japan.

Remarks. This species resembles *Cerapachys antennatus* from Borneo, in the 12-segmented antennae, large eyes, vestigial dorsolateral margins of petiole, and smooth petiolar disc, but can be distinguished from the latter by the concave anterior margin of petiole, absence of broad crenulate anterior margination of postpetiole, and small body size.

Cerapachys hashimotoi sp. nov. (Figs. 30–33)

Cerapachys sp. 4: Myrmecol. Soc. Japan, 1989, A guide for the identification of Japanese ants (I): 32.

Japanese name: Jyūni-kubirehariari.

Holotype. Worker. HL 0.73 mm; HW 0.58 mm; SL 0.40 mm; CI 79; SI 69; WL 1.00 mm; PNL 0.38 mm; PH 0.50 mm; DPW 0.40 mm; TL 3.3 mm.

Head rectangular with subparallel sides and concave posterior margin in frontal view; posterolateral corners forming an acute angle; frons, gena and vertex smooth with large punctures coarsely; diameter of punctures ca. 0.03 mm; punctures separated by 0.2–0.4 × their own diameters. Mandibles triangular; masticatory margin with more than 10 small denticles. Antennae with 12 segments; scape 0.69 × head width, broadest at posterior end, maximum width 2.75 × minimum width; pedicel as long as wide; 3rd to 11th segments each distinctly wider than long; terminal segment 2.3 × as long as wide, longer than preceding 3 segments combined. Eyes present, 0.07 mm in maximum diameter, each consisting of relatively indistinct 10 facets.

Alitrunk smooth with large punctures coarsely like head; anterior margin carinate; posterolateral corners angulate.

Petiole subrectangular; anterior and posterior margins straight and dorsal margin very weakly convex in lateral view; sculpture as on alitrunk; in dorsal view, disc slightly wider than long, widest at posterior end with maximum width 1.36 × minimum width. Postpetiole slightly higher than long excluding presclerite and slightly longer than petiole in lateral view; in dorsal view, postpetiole 0.90 × as long as wide, with dorsal width 1.25 × petiole width.

Gaster coarsely punctate; punctures distinctly smaller than those on alitrunk and head. First gastral tergite as long as wide in dorsal view; maximum width 0.70 mm.

Body reddish brown; legs yellowish brown. Suberect golden hairs abundant on the body.

Variation. A paratype worker with the following measurements and indices: HL 0.63 mm; HW 0.50 mm; SL 0.25 mm; CI 79; SI 50; WL 0.85 mm; AW 0.38 mm; PL 0.35 mm; PH 0.30 mm; DPW 0.75 mm; TL 3.0 mm.

Holotype. Worker, Iriomote-jima, Okinawa Pref., 14.II.1985, Y. Hashimoto leg.

Paratype. 1 worker, same data as holotype.

Etymology. This species is named in honor of Dr. Y. Hashimoto, for his contributions to the knowledge of the ant fauna of Japan.

Remarks. This species belongs to the *dohertyi*-group of Brown (1973), and may most resemble *Cerapachys dohertyi* Emery from Borneo. However, it is separated from the latter by the smaller eyes, smooth surface of head and propodeum, smaller punctures on head, and small body size.

Key to the Japanese species of *Cerapachys*

1. Body black; anterolateral corners of petiole angulate in dorsal view *C. daikoku* sp. nov.
- Body reddish brown; anterolateral corners of petiole rounded, not forming a distinct angle in dorsal view .. 2
2. Pronotum not carinate anteriorly; antennae 11-segmented *C. humicola* Ogata
- Pronotum carinate anteriorly; antennae 9- or 12-segmented 3
3. Antennae 9-segmented; 1st gastral segment (true 4th segment of abdomen) longer than petiole and postpetiole combined. *C. biroi* Forel
- Antennae 12-segmented; 1st gastral segment shorter than petiole and postpetiole combined *C. hashimotoi* sp. nov.

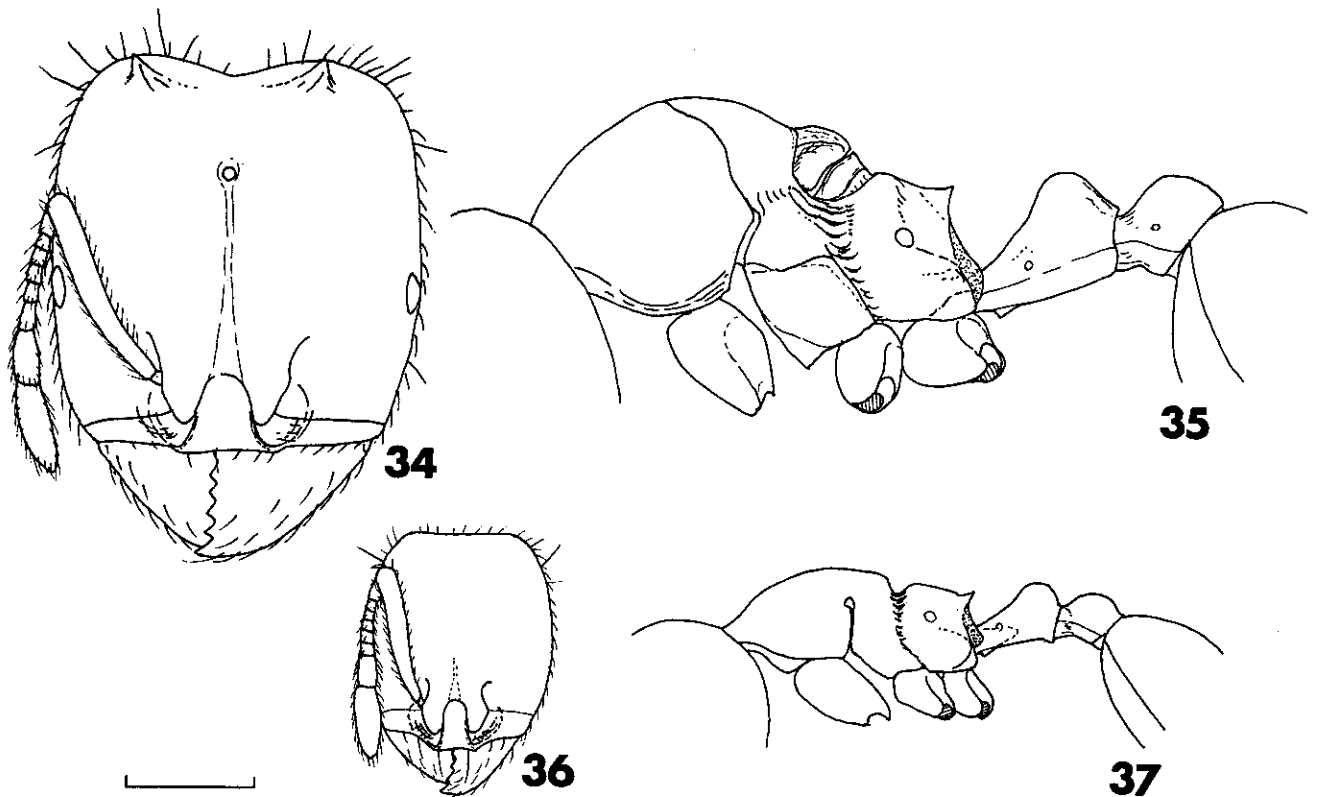
Subfamily Myrmicinae

Genus *Oligomyrmex* Mayr

Oligomyrmex Mayr, 1867, Tijdschr. Ent., 10: 110. [Type species: *Oligomyrmex concinnus* Mayr, 1867]

This genus is distributed from the warm temperate region to the tropics of the world. The species of this genus are small-sized, strongly dimorphic in worker, and found in soil or rotten wood in forests.

Only a single described species, *O. sauteri* Forel originally described from Taiwan, has been known in Japan up to the present. As a result of examining a series of specimens of the genus, three new species have been found from Okinawa-jima Island (2 spp.) and Aomori Pref., Tohoku District (1 sp.) (Myrmecol. Soc. Japan, 1992). Furthermore, I have concluded that the species referred to as *O. sauteri* in Japan is in fact an undescribed species. The true *O. sauteri* is newly recorded from the Senkaku Is., the Ryukyus.



Figs. 34–37. *Oligomyrmex borealis* sp. nov. (minor & major workers) — 34, Head, major worker, frontal view; 35, alitrunk and waist, major worker, lateral view; 36, head, minor worker, frontal view; 37, alitrunk and waist, minor worker, lateral view. Scale bar = 0.5 mm.

Oligomyrmex borealis sp. nov. (Figs. 34–37)

Oligomyrmex sp.: Sonobe, 1980, Scientific Reports of the Surveys in the Omata-kyô Area in the Mt. Moriyoshiyama (Akita Pref.): 67.

Oligomyrmex sp. 2: Myrmecol. Soc. Japan, 1992, A guide to the identification of Japanese ants (III): 42.

Japanese name: Oh-kotsunoari.

Holotype. Major worker. HL 0.98 mm; HW 0.95 mm; SL 0.45 mm; CI 97; SI 47; WL 1.13 mm; PW 0.60 mm; PL 0.45 mm; PH 0.28 mm; DPW 0.23 mm; TL 3.4 mm.

Head almost as long as wide, with concave posterior margin in frontal view; vertex with a pair of strong tubercles; lateral margins gradually converging below in frontal view. Mandibles with 6 strong teeth. Antennae with 9 segments; scape short, $0.4\times$ head length; 2nd segment $2.5\times$ as long as wide; 3rd to 6th segments each wider than long; 7th segment longer than wide; 8th segment $1.5\times$ as long as wide; apical segment $2.0\times$ as long as wide. Eyes larger than the maximum width of antennal scape, each consisting of 5 facets, and situated almost midlength of head capsule in lateral view. A small anterior ocellus present.

Alitrunk massive; promesonotum strongly convex in lateral view; scutellum present; mesopleura with a dis-

tinct transverse groove medially; metanotum distinct; acute propodeal spines present; posterior margins of propodeum carinate, forming a thin lamellar wall.

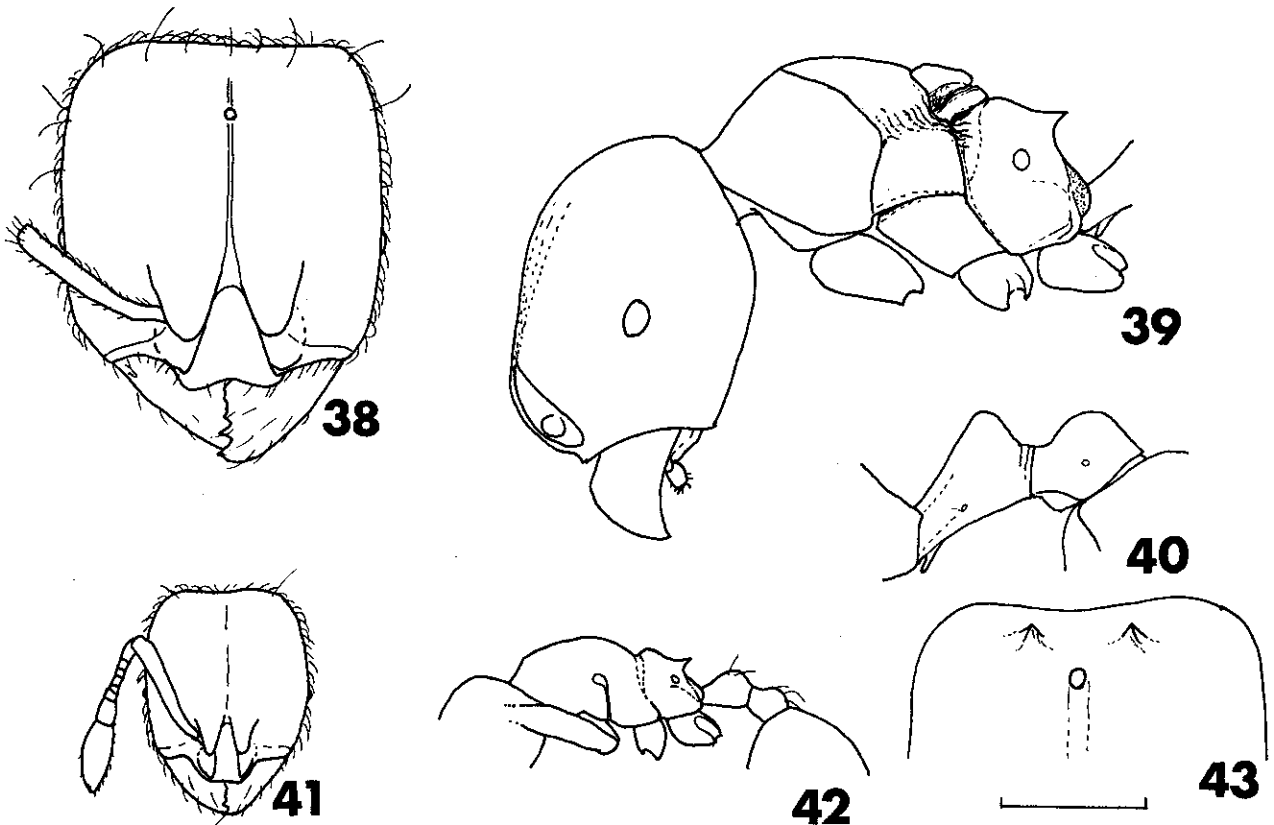
Petiole longer than high, with broadly convex dorsal margin in lateral view; subpetiolar process small, forming an obtuse triangle. Postpetiole slightly higher than long, with convex dorsal margin and concave ventral margin in lateral view.

Head microreticulate with numerous longitudinal striae. Alitrunk covered with small punctures coarsely, excepting pronotum, mesonotal dorsum and upper 2/3 of mesopleura smooth and shining in most part. Petiole microreticulate; postpetiole with weakly microreticulate lateral faces and very weakly microreticulate and much shining dorsal face. Gaster smooth and shining.

Ground color reddish brown and head much darker.

Paratype minor workers. HL 0.48–0.50 mm; HW 0.45–0.47 mm; SL 0.28–0.29 mm; CI 94–95; SI 61–62; WL 0.58–0.60 mm; PW 0.28–0.30 mm; PL 0.22–0.23 mm; PH 0.15 mm; DPW 0.11 mm; TL 1.4–1.5 mm ($n = 5$).

Head almost as long as wide, with subparallel sides and weakly concave posterior margin in frontal view. Mandibles with 5 teeth. Antennae with 9 segments; scape $0.5\times$ head length; 2nd segment longer than wide; 3rd to 7th segments



Figs. 38–43. *Oligomyrmex oni* sp. nov. (minor & major workers) — 38, Head, major worker, frontal view; 39, alitrunk, major worker, lateral view; 40, petiole and postpetiole, major worker, lateral view; 41, head, minor worker, frontal view; 42, alitrunk and waist, minor worker, lateral view; 43, vertex, major worker. Scale bar = 0.5 mm.

each wider than long; 8th segment longer than wide; apical segment $2.0\times$ as long as wide. Eyes small, consisting of a single facet only, and situated almost midlength on head capsule in lateral view.

Promesonotal dorsum broadly convex in lateral view; metanotal groove deeply incised dorsally; propodeal dorsum straight; posterior margins of propodeum carinate, forming a thin lamella; acute propodeal spines present.

Petiole longer than high, with broadly convex dorsal margin in lateral view; subpetiolar process minute, forming an obtuse triangle. Postpetiole $1.2\times$ as long as wide, with broadly convex dorsal margin and concave ventral margin in lateral view.

Head and pronotum smooth and shining; mesonotum, mesopleura and propodeum microreticulate; petiole microreticulate; postpetiole weakly microreticulate; gaster impunctate and shining.

Body yellowish brown; gaster and legs lighter.

Holotype. Major worker, Higashi-dori-mura, Shimokitagun, Aomori Pref., 5.VIII.1994, K. Murata leg.

Paratypes. 32 minor workers, same data as holotype.

***Oligomyrmex oni* sp. nov. (Figs. 38–43)**

Oligomyrmex sp. 3: Myrmecol. Soc. Japan, 1992, A guide to the identification of Japanese ants (III): 47.

Japanese name: Oni-kotsunoari.

Holotype. Major worker. HL 0.80 mm; HW 0.75 mm; SL 0.30 mm; CI 94; SI 40; WL 0.83 mm; PL 0.33 mm; PH 0.25 mm; DPW 0.24 mm; TL 3.5 mm.

Head $1.1\times$ as long as wide, with parallel sides and very weakly concave posterior margin in frontal view; vertex with a pair of blunt tubercles. Mandibles with 6 strong teeth. Antennae with 9 segments; scape short, $0.4\times$ head length; 2nd segment longer than wide; 3rd to 7th segments each wider than long; 8th segments $2.3\times$ as long as wide; apical segments $2.0\times$ as long as wide. Eyes larger than the maximum width of antennal scape, 0.07 mm in diameter, each consisting of about 10 facets, and situated at anterior $1/3$ of head capsule in lateral view; long erect hairs present on eyes. Anterior ocellus present, 0.05 mm in diameter.

Alitrunk massive; scutellum and metanotum present; mesopleura with a distinct transverse groove at midlength.

Propodeal spines tooth-like, with an acute tip; posterior margins of propodeum not carinate.

Petiole longer than wide, with narrowly rounded dorsal margin in lateral view; subpetiolar process low, situated in the anterior portion of petiole, and forming an anteroventral spine. Postpetiole higher than long, with convex dorsal and ventral margins in lateral view.

Head microreticulate with many longitudinal rugae; pronotum, mesonotum and mesopleura smooth and shining in most part; propodeum, petiole and postpetiole microreticulate; gaster smooth and subopaque.

Head blackish brown; alitrunk and gaster reddish brown.

Paratype minor workers. HL 0.38–0.40 mm; HW 0.35–0.36 mm; SL 0.24–0.25 mm; CI 90–93; SI 68–69; WL 0.38 mm; PL 0.11 mm; PH 0.10 mm; DPW 0.09–0.10 mm; TL 1.0–1.2 mm ($n = 5$).

Head square, with weakly convex sides and almost straight posterior margin in frontal view. Anterior border of clypeus produced medially. Eyes small, each consisting of 2–3 indistinct facets. Mandibles with 5 teeth. Antennae with 9 segments; 3rd to 7th segments each wider than long; 8th segment slightly wider than long; apical segment 2.4× as long as wide.

Promesonotal dorsum weakly convex in lateral view; metanotal groove distinctly incised dorsally; dorsum of propodeum convex. Propodeal spines forming an acute triangle, slightly longer than wide at base; posterior margins of propodeum with a thin lamella.

Petiole longer than high; node with a broadly rounded dorsal margin in lateral view; subpetiolar process low, with a small acute tooth anteriorly.

Head and pronotum smooth and shining in most part; mesopleura and propodeum strongly microreticulate; surface sculpture of waist as in propodeum excepting postpetiolar disc smooth; gaster smooth and subopaque.

Body yellowish brown.

Variation. The tubercles on the vertex of major workers vary in condition from developed (Fig. 43) to obscure or almost absent (Fig. 38). Some major workers have no anterior ocellus.

Holotype. Major worker, Mt. Kanna-dake, Okinawa-jima, Okinawa Pref., 9.X.1988, M. Terayama leg.

Paratypes. 2 major workers, 5 minor workers, same data as holotype; 1 major worker, 3 minor workers, Okinawa-jima, Okinawa Pref., 19.XI.1975, T. Abe leg.

Etymology. The specific name is the Japanese noun *oni*, which means a demon who has horns on head.

Remarks. This species is closely allied to *O. borealis* sp. nov., but is distinguished from the latter by the combination of the following characteristics: 1) subpetiolar process spine-like in major and minor workers (small obtuse triangle in *borealis*); 2) posterior margins of propodeum not carinate in major worker (carinate and forming a thin lamellar wall in *borealis*); 3) eyes situated at anterior 1/3 in minor and

major workers (almost midlength in *borealis*); 4) in lateral view dorsal outline of propodeum convex in minor worker (straight in *borealis*).

Oligomyrmex hannya sp. nov. (Figs. 44–47)

Oligomyrmex sp. 4: Myrmecol. Soc. Japan, 1992, A guide to the identification of Japanese ants (III): 47.

Japanese name: Hime-kotsunoari.

Holotype. Major worker. HL 0.50 mm; HW 0.40 mm; SL 0.23 mm; CI 80; SI 58; WL 0.43 mm; PL 0.18 mm; PH 0.13 mm; DPW 0.08 mm; TL 1.3 mm.

Head 1.3× as long as wide, with parallel sides and weakly convex posterior margin in frontal view; vertex with a pair of small tubercles. Mandibles with 5 teeth. Antennae with 9 segments; scape short, 0.5× head length; 2nd segment longer than wide; 3rd to 7th segments each wider than long; 8th segment slightly longer than wide; 9th segment 2.8× as long as wide. Eyes small, each consisting of 2 facets only. Ocelli absent.

Alitrunk as in Fig. 45; dorsum of promesonotum broadly convex in lateral view; metanotal groove deeply incised dorsally; mesopleura without transverse groove; anterior half of propodeal dorsum strongly convex and posterior half almost straight. Posterior margins of propodeum with a thin lamella; posterodorsal corners of propodeum angulated, not forming a spine.

Petiole longer than high, with convex dorsal margin; subpetiolar process forming an acute anteroventral tooth. Postpetiole slightly higher than long, with convex dorsal margin in lateral view.

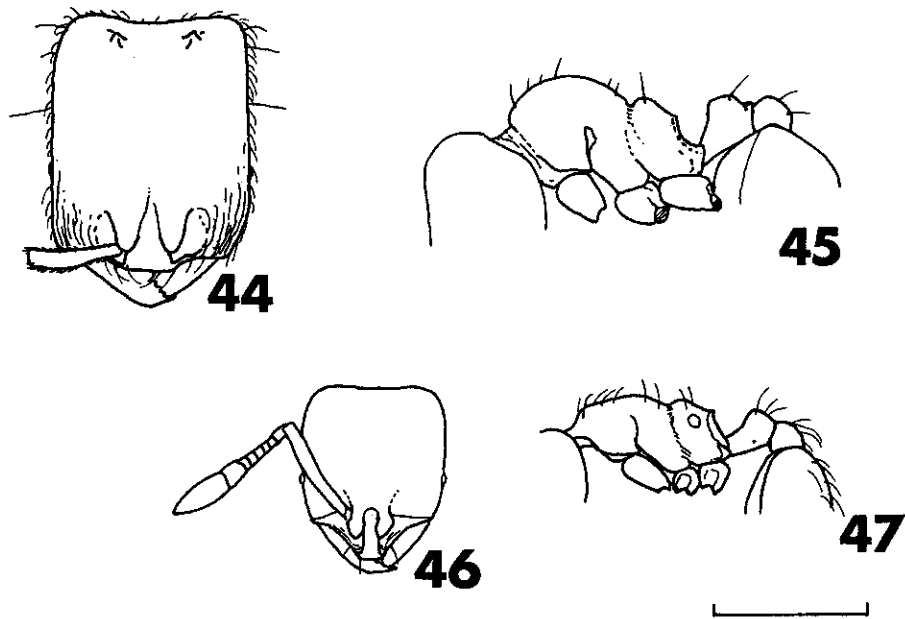
Head very weakly microreticulate; genae with many longitudinal striae; promesonotum smooth and shining; mesopleura and propodeum microreticulate; waist weakly microreticulate; gaster smooth.

Body yellowish brown.

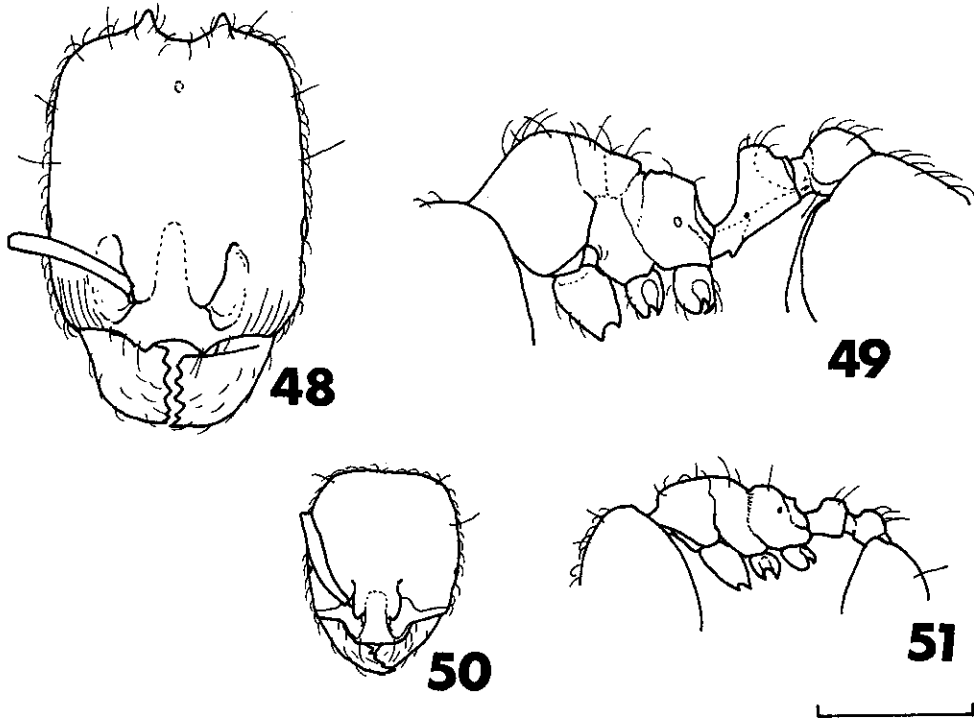
Paratype minor workers. HL 0.31–0.33 mm; HW 0.28–0.29 mm; SL 0.23 mm; CI 88–90; SI 78–82; WL 0.42–0.43 mm; PL 0.11 mm; PH 0.09 mm; DPW 0.06 mm; TL 0.9–1.0 mm ($n = 5$).

Head square, with subparallel sides and weakly concave posterior margin in frontal view. Mandibles with 5 teeth. Eyes small, consisting of a single facet only. Antennae with 9 segments; 3rd to 7th segments each wider than long; 8th segment as long as wide; apical segment 2.4× as long as wide.

Promesonotal dorsum broadly convex in lateral view; metanotal groove strongly incised dorsally; propodeal dorsum weakly convex; posterior margins of propodeum with a thin lamella; its dorsalmost part obscurely angulated. Petiole longer than high, with convex dorsal margin in lateral view; subpetiolar process forming an acute anteroventral tooth. Postpetiole longer than high, with broadly convex dorsal margin in lateral view.



Figs. 44-47. *Oligomyrmex hannya* sp. nov. (minor & major workers) — 44, Head, major worker, frontal view; 45, alitrunk and waist, major worker, lateral view; 46, head, minor worker, frontal view; 47, alitrunk and waist, minor worker, lateral view. Scale bar = 0.5 mm.



Figs. 48-51. *Oligomyrmex yamatonis* sp. nov. (minor & major workers) — 48, Head, major worker, frontal view; 49, alitrunk and waist, major worker, lateral view; 50, head, minor worker, frontal view; 51, alitrunk and waist, minor worker, lateral view. Scale bar = 0.5 mm.

Head smooth with shallow punctures sparsely; pronotum smooth and shining; mesopleura and propodeum microreticulate; waist microreticulate excepting disc of postpetiole smooth; gaster smooth and subopaque.

Body yellowish brown.

Holotype. Major worker, Syuri, Okinawa-jima, Okinawa Pref., 6.X.1988, M. Terayama leg.

Paratypes. 2 major workers, 5 minor workers, same data as holotype; 2 major workers, 5 minor workers, Chibana, Okinawa-jima, Okinawa Pref., 19.V.1983, T. Mizukami leg.; major worker, 2 minor workers, Chinen, Okinawa-jima, Okinawa Pref., 26.VIII.1975, T. Abe leg.

Etymology. The specific name is the Japanese noun *hannya*, which is the name of a Japanese deity who has a pair of horns on head.

***Oligomyrmex yamatonis* sp. nov. (Figs. 48–51)**

Oligomyrmex sauteri: Azuma, 1951, *Hyogo Biology*, (1): 87; Okamoto, 1952, *Gensei*, (1): 11; *Myrmecol. Soc. Japan*, 1992, A guide for the identification of Japanese ants (III): 47.

Japanese name: Kotsunoari.

Holotype. Major worker. HL 0.63 mm; HW 0.53 mm; SL 0.28 mm; CI 84; SI 53; WL 0.53 mm; PL 0.20 mm; PH 0.18 mm; DPW 0.14 mm; TL 2.3 mm.

Head 1.2× as long as wide, with parallel sides in frontal view; posterior margin concave medially; vertex with a pair of strong tubercles. Mandibles strong, with 5 teeth. Anterior margin of clypeus concave medially with a pair of dull projections. Antennae with 9 segments; scape short, 0.4× head length; 2nd segment 1.8× as long as wide; 3rd to 7th segments each wider than long; 8th segment 1.3× as long as wide; apical segment 2.0× as long as wide. Eyes small, each consisting of 3 facets, and situated at anterior 3/10 of head capsule in lateral view. Ocelli absent.

Alitrunk as in Fig. 49; pronotum and anterior 1/3 of mesonotal dorsum strongly raised, and the rest of mesonotal dorsum straight in lateral view; matanotum present, but small; propodeal dorsum straight. Posterodorsal corners of propodeum obtusely angulate, without spine; posterior margins carinate, forming a thin lamellar wall.

Petiole 1.1× as long as high; anterodorsal and posterodorsal corners dully angulate; dorsal margin of node almost straight in lateral view; subpetiolar process small, forming a dull angle. Postpetiole higher than long, with convex dorsal margin in lateral view.

Head coarsely microreticulate; frons and vertex with many longitudinal striae; alitrunk and petiole microreticulate; postpetiole relatively weakly microreticulate; gaster smooth and shining.

Head dark reddish brown; alitrunk and waist reddish brown; gaster and legs brown with a yellowish tinge.

Paratype minor workers. HL 0.35–0.36 mm; HW 0.30–0.31 mm; SL 0.20 mm; CI 85–86; CI 65–67; WL 0.30–0.31 mm; PW 0.20 mm; PL 0.12–0.13 mm; PH 0.10 mm; DPW 0.08 mm; TL 0.9 mm ($n = 5$).

Head slightly longer than wide, with subparallel sides and straight posterior margin in frontal view. Mandibles with 5 teeth. Antennae with 9 segments; 3rd to 7th segments each wider than long; 8th segment slightly longer than wide; apical segment 3.0× as long as wide. Eyes small, consisting of a single facet only.

Dorsal outline of promesonotum broadly convex; metanotal groove distinctly incised dorsally; dorsum of petiole broadly convex. Posterior margins of propodeum carinate, forming a thin lamellar wall; its dorsal end angulate, but not forming a distinct spine.

Petiole 1.2× as long as wide; anterodorsal and posterodorsal corners dully angulate; subpetiolar process minute, forming a dull angle. Postpetiole higher than long, with convex dorsal margin in lateral view.

Head, alitrunk, and petiole coarsely microreticulate; postpetiole weakly microreticulate; gaster smooth and subopaque.

Body reddish brown; antennae and legs yellowish brown.

Females and males. Described and illustrated by Ogata (1991).

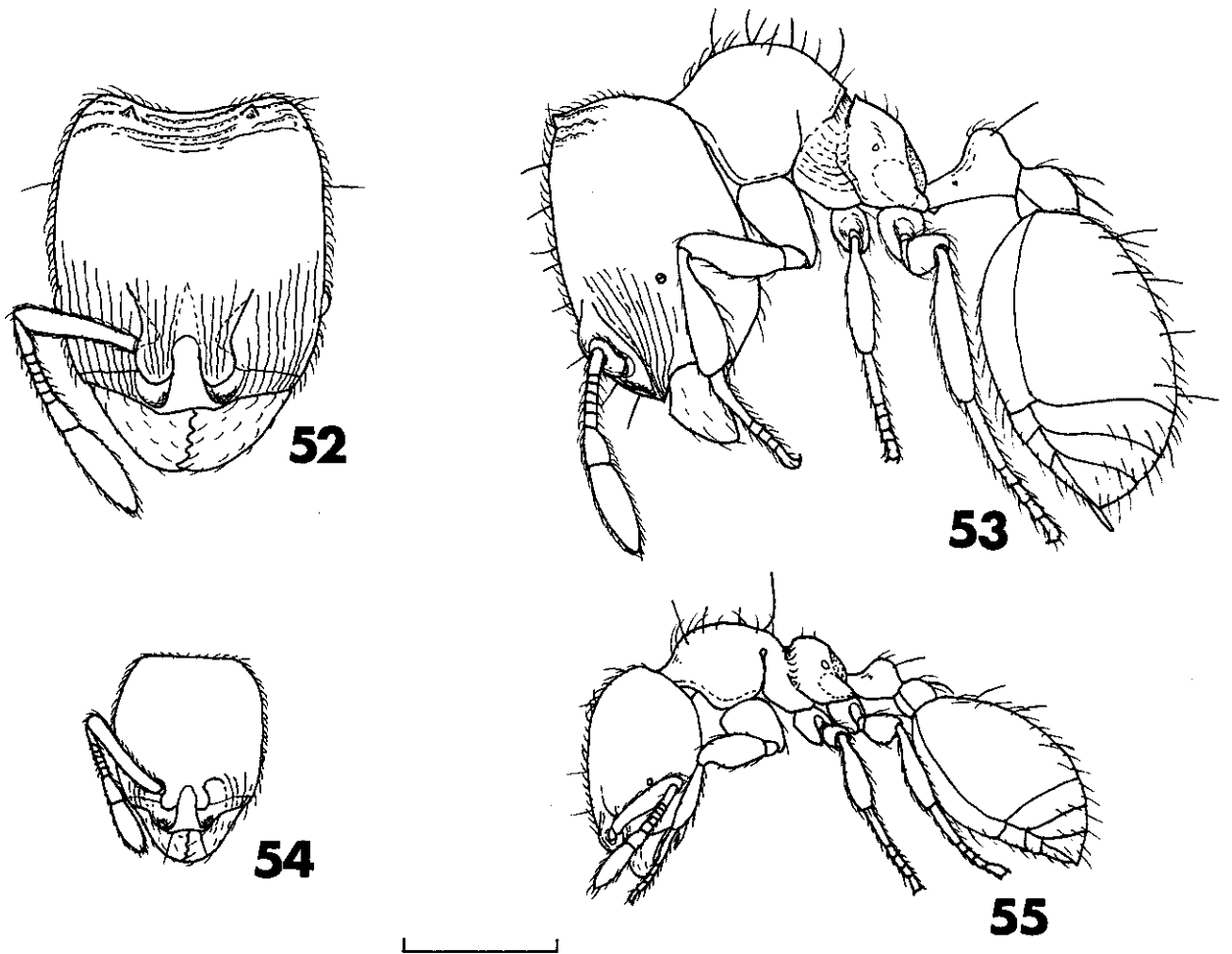
Variation. The microreticulation on pronotum and head in the Yaeyama material is weaker than in the Manazuru material. The number of facets of eyes in the major workers vary from 2 to 4.

Holotype. Major worker, Manazuru, Kanagawa Pref., 14.IX.1987, M. Terayama leg.

Paratypes. 6 major workers, 25 minor workers, same data as holotype; 10 major workers, 30 minor workers, same locality, 13.V.1995, M. Terayama leg.

Other material examined. 1 major worker, 3 minor workers, Mt. Yonaha-dake, Okinawa-jima, Okinawa Pref., 10.III.1983, M. Terayama leg.; 3 major workers, 2 minor workers, Mt. Kanna-dake, Okinawa-jima, Okinawa Pref., 9.X.1988, M. Terayama leg.; 3 major workers, 3 minor workers, Mt. Omoto-dake, Ishigaki-jima, Okinawa Pref., 16.III.1984, M. Terayama leg.; 2 major workers, 10 minor workers, Komi, Iriomote-jima, 18.III.1984, M. Terayama leg.

Remarks. In 1951, Azuma regarded a Japanese *Oligomyrmex* species as *O. sauteri* Forel, 1912, which is originally described from Pilam (= Peinan, Taitung Hsien), Taiwan. Thereafter the Japanese myrmecologists applied the name *sauteri* to this relatively common Japanese species. Recently, a species that is morphologically similar to but apparently different from the Japanese "*sauteri*" has been collected from the Senkaku Is., the Ryukyus. Unfortunately, the present location of the type specimen of *O. sauteri* Forel is not known, and is not deposited in the Forel collection of



Figs. 52-55. *Oligomyrmex sauteri* Forel, 1912 (minor & major workers) — 52, Head, major worker, frontal view; 53, body, major worker, lateral view; 54, head, minor worker, frontal view; 55, body, minor worker, lateral view. Scale bar = 0.5 mm.

Muséum d'Histoire naturelle, Genève nor in Naturhistorisches Museum, Basel. However, I examined a series of specimens from Taiwan (more than 30 colonies from 10 different localities) which were regarded as *O. sauteri* judging from the original description and the type locality of *O. sauteri*. The morphological comparison between the Japanese material and the Taiwanese one indicated that Taiwanese and the Senkaku specimens are conspecific, and that the materials from other parts of Japan belong to a different species. So I regarded the Senkaku population as *O. sauteri* and the common Japanese form as new to science.

This new species is distinguished from *sauteri* by the straight outline of mesonotal and propodeal dorsum in profile in major worker (convex in *sauteri*), angulated posterodorsal corners of propodeum in minor and major workers (rounded in *O. sauteri*), microreticulation on head in major worker (largely smooth in *O. sauteri*), and microreticulation on head

and pronotum in minor worker (smooth in *O. sauteri*).

Accordingly, most of the previous records of *O. sauteri* from Japan may concern the present new species.

***Oligomyrmex sauteri* Forel (Figs. 52-55)**

Oligomyrmex sauteri Forel, 1912, Ent. Mitt., 1: 56.

Material examined. 1 major worker, 6 minor workers, Kitakojima, Senaku Is., Okinawa Pref., 15-17.VI.1995, H. Takamine leg.

Remarks. The true *O. sauteri* is recorded here for the first time from Japan. See under "Remarks" of the preceding species.

Key to the Japanese species of *Oligomyrmex* (worker)

- 1. Major worker 2
- Minor worker 6

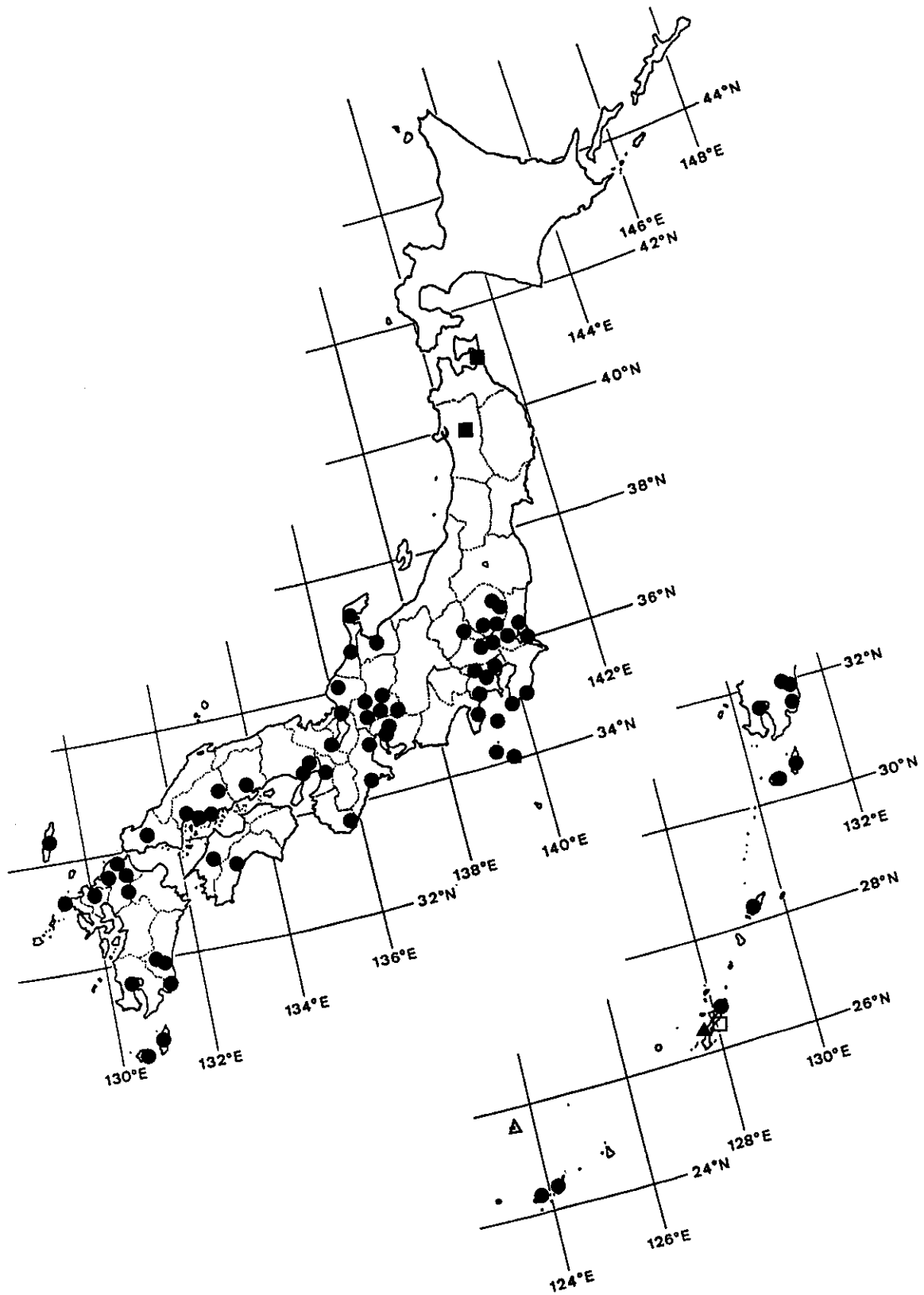
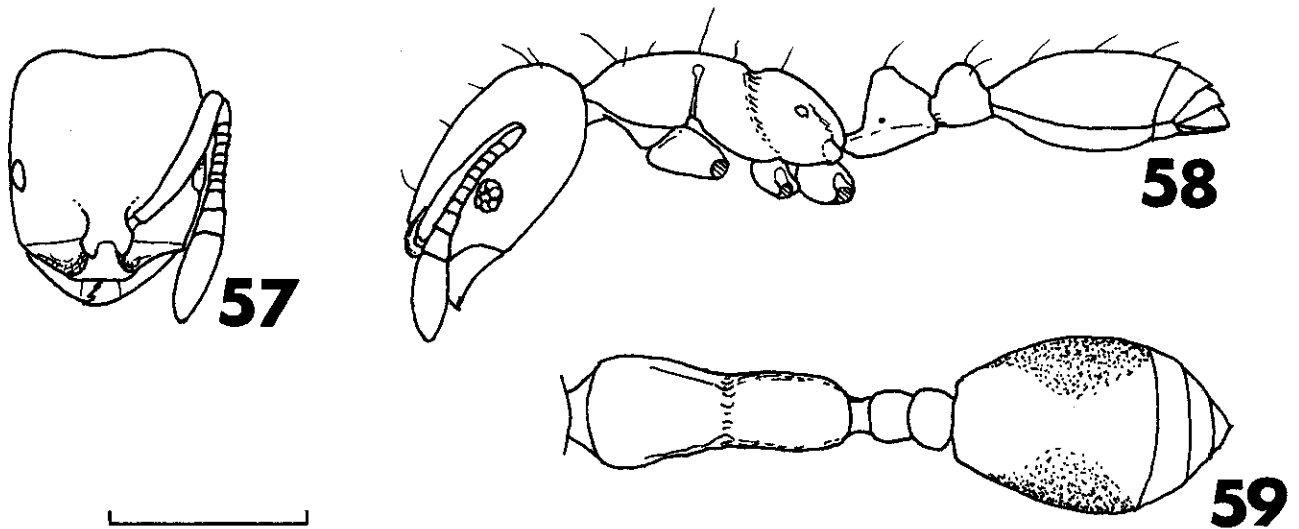


Fig. 56. Geographical distributions of the Japanese species of *Oligomyrmex*. ●: *O. yamatonis*, ■: *O. borealis*, ▲: *O. oni*, □: *O. hannya*, △: *O. sauteri*.



Figs. 57-59. *Monomorium hiten* sp. nov. (worker) — 57, Head, frontal view; 58, body, lateral view; 59, ditto, dorsal view. Scale bar = 0.5 mm.

2. Eyes large, larger than the maximum width of antennal scape; mesopleura with a transverse groove at about midlength 3
 - Eyes small, smaller than the maximum width of antennal scape; mesopleura without a groove at midlength 4
3. Posterior margins of propodeum distinctly carinate; subpetiolar process obtuse triangular, not bearing an anteroventral tooth *O. borealis* sp. nov.
 - Posterior margins of propodeum rounded, not carinate; subpetiolar process bearing a distinct anteroventral tooth *O. oni* sp. nov.
4. Vertex and occiput largely smooth; 5-6 distinct transverse rugae present on vertex *O. sauteri* Forel
 - Vertex and occiput microreticulate; distinct transverse rugae absent on vertex 5
5. Posterior margin of head almost straight in frontal view; subpetiolar process bearing an anteroventral tooth; smaller species (HW < 0.45 mm) .. *O. hannya* sp. nov.
 - Posterior margin of head strongly concave in frontal view; subpetiolar process bearing a dull small tubercle; larger species (HW > 0.50 mm) *O. yamatonis* sp. nov.
6. Head and pronotum coarsely microreticulate
 *O. yamatonis* sp. nov.
 - Head and pronotum largely smooth 7
7. Posterodorsal corners of propodeum angulate or rounded, but not forming distinct spines 8
 - Acute propodeal spines present 9
8. Subpetiolar process bearing an anteroventral tooth
 *O. hannya* sp. nov.
 - Subpetiolar process bearing a dull small tubercle
 *O. sauteri* Forel
9. Eyes situated at anterior 1/3 of head capsule; dorsum of propodeum convex in lateral view *O. oni* sp. nov.
 - Eyes situated almost at midlength of head capsule; dorsum of propodeum straight in lateral view
 *O. borealis* sp. nov.

Subfamily Myrmicinae

Genus *Monomorium* Mayr

Monomorium Mayr, 1855, Verh. zool.-bot. Ver. Wien, 5: 452. [Type species: *Monomorium monomorium* Bolton, 1987]

The genus *Monomorium* Mayr is widely spread through the North temperate to tropical zones of the world. This genus is characterized in the subfamily Myrmicinae as follows: 1) mandibles each with 3-5 teeth; 2) midpoint of anterior clypeal margin with a long unpaired median seta; 3) antennae with 12 segments (10 or 11 in some species), the funicles ending in a 3-segmented club; 4) eyes present; 5) propodeal spines absent.

Eight described species of *Monomorium* have been recorded from Japan up to the present (Myrmecological Society of Japan, 1992), and the ninth species is described here from the Nansei Islands.

Monomorium hiten sp. nov. (Figs. 57-59)

Monomorium sp.: Onoyama, 1976, Ecol. Stu. Nat. Cons. Ryukyu Is., II: 125, 130.

Monomorium sp. 9: Myrmecol. Soc. Japan, 1992, A guide for the identification of Japanese ants (III): 40.
Japanese name: Futamon-himeari.

Holotype. HL 0.35 mm; HW 0.30 mm; SL 0.23 mm; CI 86; SI 77; WL 0.40 mm; PL 0.14 mm; PH 0.14 mm; DPW 0.11 mm; TL 1.4 mm.

Head rectangular, 1.17× as long as wide, with weakly convex sides and concave posterior margin in frontal view. Mandibles with 3 teeth of which basalmost smallest. Clypeus with a pair of indistinct longitudinal carinae; anterior margin weakly concave. Eyes 0.03 mm in length, each consisting of ca. 12 facets. Antennae with 12 segments; scape short, not reaching the posterior margin of head; terminal segment longer than the preceding 2 segments combined.

Dorsum of promesonotum convex in lateral view; metanotal groove distinct; dorsum of propodeum convex, dorsolateral corner not forming an angle. Petiole 0.87× as long as high, with broadly rounded ventral margin; node subtriangular with convex dorsal margin. Postpetiole 0.75× as long as high; dorsal width 1.10× dorsal width of petiole.

Entire body smooth and shining. Five pairs of elect hairs present on the dorsum of alitrunk; a pair on the dorsum of both petiole and postpetiole.

Body yellow; 1st gastral tergite with a pair of large brown spots.

Paratype female. HL 0.50 mm; HW 0.45 mm; SL 0.33 mm; CI 90; SI 73; WL 0.93 mm; AW 0.30 mm; PL 0.30 mm; PH 0.28 mm; DPW 0.23 mm; TL 3.1 mm ($n = 1$). Eyes 0.13 mm in length.

Head and alitrunk yellow; ground color of gaster yellow; 1st tergite with a pair of large brown spots; 2nd to 4th tergites each with a transverse brown apical band.

Paratype workers. Paratype workers show small variation in head length (0.35–0.38 mm) and in head width (0.30–0.32 mm).

Holotype. Worker, Yonaguni-jima, Okinawa Pref., 11.VIII.1989, H. Takamine leg.

Paratypes. 3 females, 30 workers, same data as holotype.

Etymology. The specific name is the Japanese noun *hiten*, which means a heavenly maiden in buddhism.

Remarks. This species is separated from the other East Asian congeners by the yellow colored body with a pair of large brown spots on the 1st gastral tergite in worker.

Genus *Rhopalomastix* Forel

Rhopalomastix Forel, 1900, Ann. Soc. Ent. Belg., 43: 24.
[Type species: *Rhopalomastix rothneyi* Forel, 1900]

This small genus is known from the Oriental Region, and contains five nominal forms only (Bolton, 1982; Chapman & Capco, 1951; Wheeler, 1929). This genus has the following combination of characteristics; 1) antennae 10-segmented, with a 2-segmented strong club, 2) antennal scape extremely

short, 3) frontal lobes very closely approximated, 4) antennal scrobes and frontal carinae absent, 5) alitrunk box-like, and 6) postpetiole very broadly attached to gaster.

Recently, I discovered an undescribed species of this genus from the Yaeyama Islands., the Ryukyus (Terayama, 1985).

Rhopalomastix omotoensis sp. nov. (Figs. 60–65)

Rhopalomastix sp.: Terayama, 1985, Ari, (13): 8.

Rhopalomastix sp.: Myrmecol. Soc. Japan, 1992, A guide for the identification of Japanese ants (III): 52.

Japanese name: Higebutoari.

Holotype. Worker. HL 0.48 mm; HW 0.43 mm; SL 0.20 mm; CL 90; SI 47; WL 0.58 mm; LP 0.18 mm; PH 0.24 mm; DWP 0.15 mm; TL 1.9 mm.

Head slightly longer than wide, with subparallel sides and almost straight posterior margin in frontal view; frons with numerous thin longitudinal striae. Mandibles triangular with small blunt teeth. Anterior margin of clypeus convex medially. Frontal lobes small, connected to each other. Antennae with 10 segments; scape short, 0.5× as long as head width; 2nd to 9th segments each wider than long; 9th segment 0.47× as long as wide; terminal segment 2.0× as long as wide, and as long as the preceding 7 segments combined. Eyes small, 0.09 mm in length, each consisting of about 18 facets.

Alitrunk with almost straight dorsal margin in lateral view; dorsum with very weakly convex anterior margin and almost parallel sides in dorsal view, surface with numerous fine longitudinal striae; lateral faces weakly microreticulate and subopaque; metanotal groove absent; posterodorsal corner of propodeum rounded, not forming a distinct angle. Petiole high and short, 1.33× as long as high; node trapezoidal with broadly convex dorsal margin in lateral view; subpetiolar precess low, with an anterior angle. Postpetiole 0.6× as long as high in lateral view; whole posterior margin connected to the 1st gastral segment.

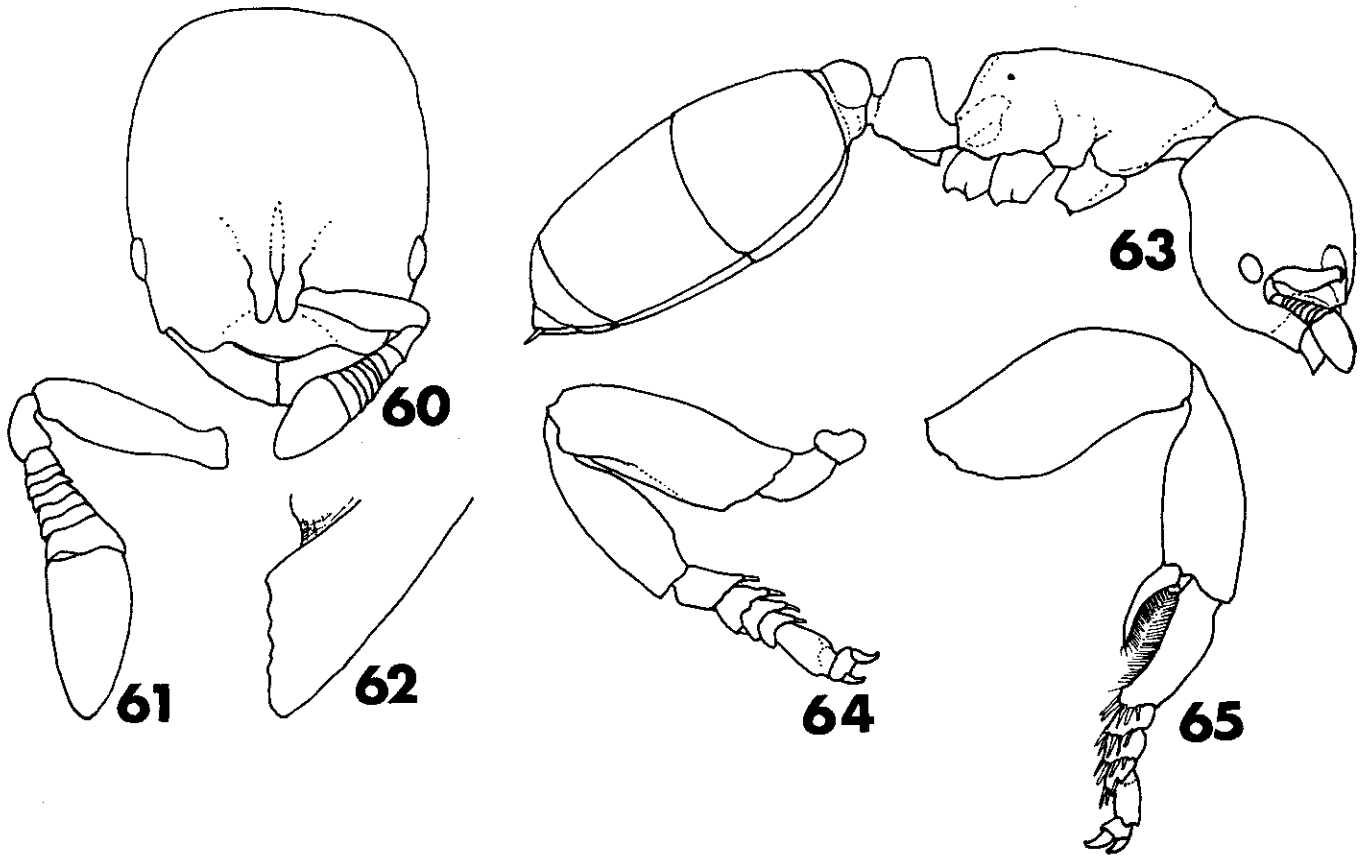
Gaster smooth and subopaque. Legs short; trochanters and tibiae incrassate as in Figs. 64 and 65.

Body yellowish brown; antennae, legs and tip of gaster yellow.

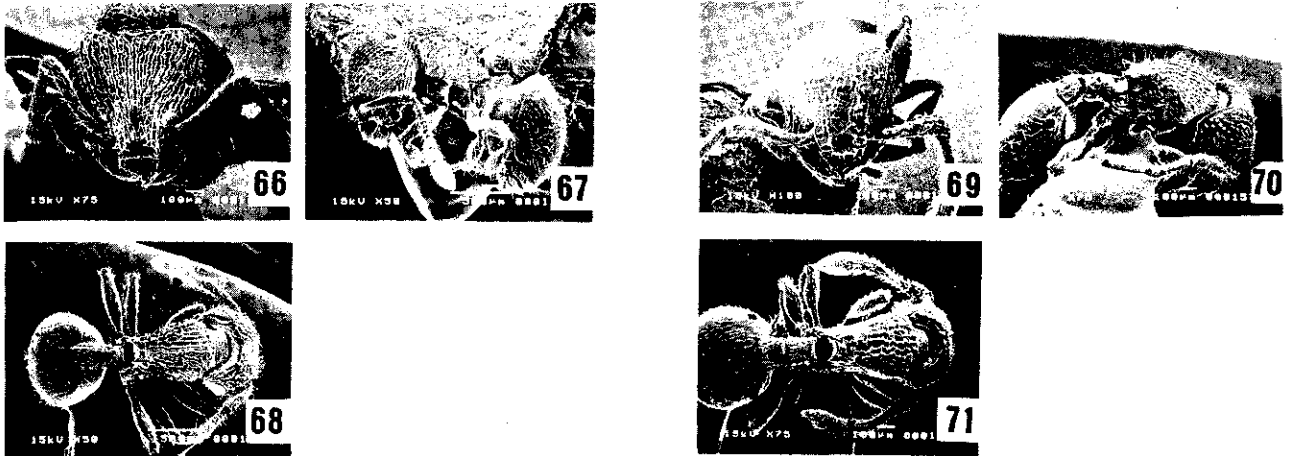
Holotype. Worker, Mt. Omoto-dake, Ishigaki-jima, Okinawa Pref., 28.VII.1977, H. Takamine leg.

Paratype. 1 worker, same data as holotype (mounted on a slide).

Remarks. This species is separated from the other congeners by the longer head which is slightly longer than wide, yellowish brown head and alitrunk, somewhat larger eyes consisting of 18 facets, much shorter antennal scape, low subpetiolar process, and weaker longitudinal striae on head and alitrunk.



Figs. 60–65. *Rhopalomastix omotoensis* sp. nov. (worker) — 60, Head, frontal view; 61, antenna; 62, mandible; 63, body, lateral view; 64, middle leg; 65, fore leg.



Figs. 66–68. *Myrmecina amamiana* sp. nov. (worker) — 66, Head, frontal view; 67, body, lateral view; 68, ditto, dorsal view.

Figs. 69–71. *Myrmecina ryukyuensis* sp. nov. (worker) — 69, Head, frontal view; 70, body, lateral view; 71, ditto, dorsal view.

Genus *Myrmecina* Curtis

Myrmecina Curtis, 1892, Brit. Ent., 6: 226. [Type species: *Myrmecina latreillii* Curtis, 1892 (= *Formica graminicola* Latreille, 1802)]

This genus is distinguished from the other genera of the subfamily Myrmecinae by the following combination of characteristics: 1) antennae with 12 segments, the funiculus ending in a 3-segmented club; 2) eyes present; 3) ventrolateral margin of head delineated by a sharp longitudinal carina on each side; 4) petiole barrel-shaped, without an anterior peduncle.

Up to the present, 27 species of the genus have been known from the world (Bolton, 1995), and 2 from Japan. The first Japanese representative of *Myrmecina*, *M. graminicola nipponica*, was described by Wheeler (1906) from Yamana, Suruga (= Shizuoka Pref.). Subsequently, Terayama (1985) described *M. flava* from Kanagawa Pref., Kanto District. Further two undescribed species have been found from the Nansei Islands (Myrmecol. Soc. Japan, 1992).

Myrmecina amamiana sp. nov. (Figs. 66–68)

Myrmecina sp. 3: Myrmecol. Soc. Japan, 1992, A guide for the identification of Japanese Ants (III): 55.

Japanese name: Sujibuto-kadofuhiari.

Holotype. Worker. HL 0.88 mm; HW 0.93 mm; SL 0.71 mm; CI 106; SL 76; WL 0.98 mm; LP 0.25 mm; PH 0.24 mm; DPW 0.20 mm; TL 3.1 mm.

Head slightly wider than long, with weakly convex sides and concave posterior margin in frontal view. Frons smooth with distinct 14 longitudinal rugae; genae smooth and each with 5 longitudinal rugae. Mandibles with acute apical and subapical teeth and 9 dull, small, and indistinct teeth. Clypeus smooth and shining; anterior margin straight, with a median small lobe and a pair of lateral projection. Antennae with 12 segments; scape 1.3× head width, not reaching the posterior corner of head; pedicel 1.33× as long as wide; 3rd to 9th segments each distinctly wider than long; 10th to 12th segments with a ratio from the base, 5:5:11.5 in length. Eyes prominent, each consisting of more than 20 facets; maximum length 0.13 mm, almost the same as length of 10th antennal segment.

Alitrunk with a convex dorsal margin in lateral view; dorsum smooth with 10 strong longitudinal rugae; propodeum with acute small teeth anterolaterally; propodeal spines large, slightly longer than wide, with upturned tip; lateral faces of mesonotum and propodeum smooth with 7–8 longitudinal rugae.

Petiole slightly longer than high in lateral view, in dorsal view 1.1× as long as wide, with parallel sides. Subpetiolar process present, but low. Postpetiole as long as wide with straight dorsal margin in lateral view; 1.2× as long as wide in dorsal view; dorsal width 1.1× dorsal petiole width.

Gaster smooth and subopaque.

Body black; antennal funicles and legs yellowish brown; mandibles, clypeus, and antennal scapes reddish brown.

Variation. The paratype workers vary in head length from 0.83 to 0.90 mm, in head width from 0.93 to 0.95 mm, and in scape length from 0.65 to 0.71 mm.

Holotype. Worker, Kamiya, Amami-oshima, Kagoshima Pref., 21.III.1984, M. Terayama leg.

Paratypes. 12 workers, same data as holotype; 5 workers, Amami-oshima, Kagoshima Pref., 3.VII.1983, M. Terayama leg.; 2 workers, Tokuno-shima, Kagoshima Pref., 20.III.1980, M. Terayama leg.; 6 workers, Hanatoku, Tokuno-shima, Kagoshima Pref., 12.VIII.1986, M. Terayama leg.

Remarks. This species resembles *M. graminicola*, but easily separated from the latter by the presence of longitudinal rugae on genal areas, prominent eyes, and much stronger longitudinal rugae on head and alitrunk.

This species is restricted to Amami-oshima and Tokuno-shima of the Amami Islands (Fig. 72).

Myrmecina ryukyuensis sp. nov. (Figs. 69–71)

Myrmecina sp. A: Onoyama, 1976, Ecol. Stud. Nat. Cons. Ryukyu Is., II: 130.

Myrmecina sp. 4: Myrmecol. Soc. Japan, 1992, A guide for the identification of Japanese ants (III): 56.

Japanese name: Kogata-kadofushiari.

Holotype. Worker. HL 0.60 mm; HW 0.59 mm; SL 0.40 mm; CI 98; SI 78; WL 0.65 mm; PL 0.18 mm; PH 0.20 mm; DPW 0.18 mm; TL 2.4 mm.

Head almost as long as wide, with shallowly concave posterior margin in frontal view; frons microreticulate with reticulate rugae; genae microreticulate. Mandibles with acute apical and preapical teeth following 6 small blunt teeth. Anterior margin of clypeus with a small median lobe and a pair of lateral angles. Antennae with 12 segments; scape microreticulate, 0.75× head length. Eyes small, smaller than the 10th antennal segment, and each consisting of 6 facets.

Dorsum of alitrunk weakly microreticulate, with relatively irregular longitudinal rugae; lateral faces of pronotum with 6 rugae; anterolateral corners of propodeum with small blunt teeth; propodeal teeth slightly longer than its basal width. Petiole wider than long in lateral view; disc slightly wider than long in dorsal view. Subpetiolar process low, anteroventral corner acutely produced. Postpetiole 1.2× as wide as long in dorsal view.

Gaster very weakly microreticulate and subopaque; anterior border of 1st gastral tergite straight, anterolateral borders rounded in dorsal view.

Body blackish brown; mandibles, antennae, legs and tip of gaster yellowish brown.

Variation. The specimens from the Sakishima Is. are distinguished from the type series (Okinawa and Amami materials) by the smaller size (HL 0.52–0.55 mm, HW 0.52–0.55 mm), lighter coloration of body, and weaker and more

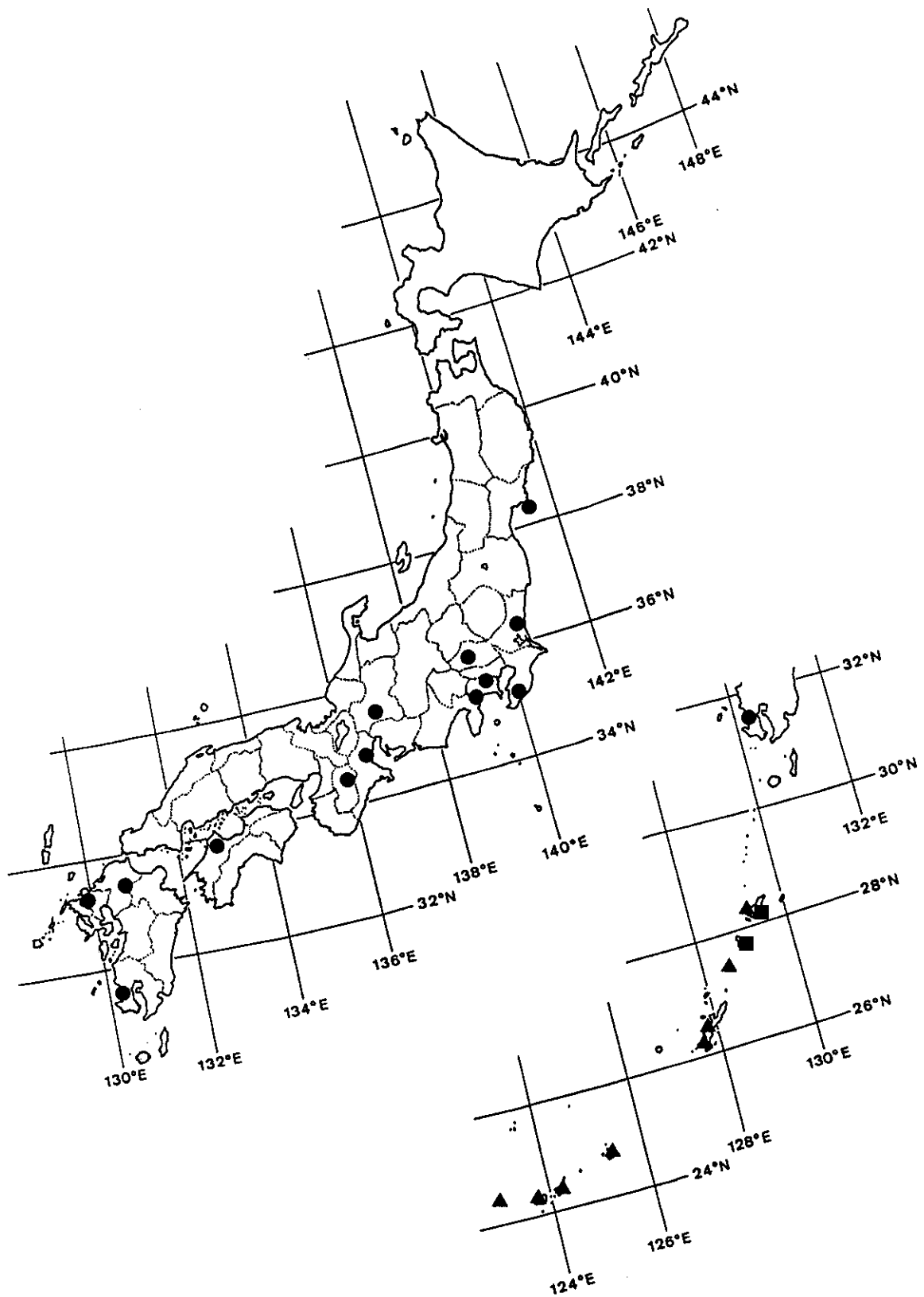


Fig. 72. Distributions of the Japanese species of *Myrmecina*. ●, *M. flava* Terayama; ■, *M. amamiana* sp. nov.; ▲, *M. ryukyuensis* sp. nov. *M. graminicola nipponica* Wheeler is commonly and widely distributed from Hokkaido to Yaku-shima of Kagoshima Prefecture.

irregular rugae on head and dorsum of alitrunk in worker. The differences of body size are more distinct in females; HL 0.68 mm and HW 0.70 mm in Okinawa material, while HL 0.58 mm and HW 0.60 mm in Sakishima material. However, I regard these morphological differences as a geographic variation within a single species. Much information will be needed to finally determine the exact taxonomical status of those populations.

Holotype. Worker, Shuri, Okinawa-jima, Okinawa Pref., 6.X.1988, M. Terayama leg.

Paratypes. 1 worker, same data as holotype; 1 female, 1 worker, Chibana, Okinawa-jima, Okinawa Pref., 29.XII.1989, M. Terayama leg.; 1 worker, same locality, 20.V.1982, H. Takamine leg.; 1 worker, Okinawa-jima, Okinawa Pref., 30.III.1983, H. Takamine leg.; 2 workers, Sumiyo-son, Amami-oshima, Kagoshima Pref., 21.III.1980, M. Terayama leg.

Other material examined. 1 worker, Unarizaki, Iriomote-jima, Okinawa Pref., 8.I.1983, K. Kinomura leg.; 1 female, 2 workers, Mt. Sonai-dake, Iriomote-jima, Okinawa Pref., 13.VIII.1979, M. Terayama leg.; 1 female, Mt. Banna-dake, Ishigaki-jima, Okinawa Pref., 18.VIII.1979, M. Terayama leg.; 2 workers, Yonaguni-jima, Okinawa Pref., 12.VIII.1989, H. Takamine leg.; 1 worker, Miyako-jima, Okinawa Pref., 1.VIII.1985, Y. Hashimoto leg.; 1 worker, Okinoerabu-jima, Kagoshima Pref., 29.IV.1993, Sk. Yamane leg.

Remarks. This species is similar in appearance to *M. sauteri* from Taiwan. However it is easily distinguished from the latter by the straight anterior margin and rounded anterolateral corners of first gastral tergite in dorsal view (concave anterior margin and acutely produced anterolateral corners in the *sauteri* type specimen).

Key to the Japanese species of *Myrmecina*

1. Body color yellow to yellowish brown; base of antennal scape forming a half circular condyle cover
..... *M. flava* Terayama
- Body color black to blackish brown; base of antennal scape simple, not broadened 2
2. Eyes small, consisting of less than 7 facets; small species (HL < 0.65 mm, HW < 0.65 mm)
..... *M. ryukyuensis* sp. nov.
- Eyes larger, consisting of more than 10 facets; larger species (HL > 0.85 mm, HW > 0.80 mm) 3
3. Genal areas each with 4-5 strong longitudinal rugae
..... *M. amamiana* sp. nov.
- Genal areas smooth, without rugae
..... *M. graminicola nipponica* Wheeler

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