

**The Ant Genus *Leptothorax* MAYR (Hymenoptera: Formicidae) in Japan**

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**Abstract.** The ant genus *Leptothorax* MAYR in Japan is revised. Of 15 species recognized, 10 species are described as new: *L. anira*, *L. antera*, *L. basara*, *L. bikara*, *L. haira*, *L. indra*, *L. kinomurai*, *L. kubira*, *L. makora*, and *L. santra*. A key to the species is also presented.

**Introduction**

The genus *Leptothorax* MAYR is a relatively large genus, comprising 310 described species, distributed world-wide except for the Australian region (BOLTON, 1995a). *Leptothorax* in Japan has not been taxonomically revised.

Among 13 species mentioned by TERAYAMA et al. (1992), 5 are named and 8 are unnamed. Later, 2 unnamed species are added to the Japanese fauna (TERAYAMA et al., 1994; TERAYAMA, 1998). In this paper we briefly revise the Japanese species of the genus *Leptothorax*, with the descriptions of 10 new species. The species treated here are summarized in Table 1. The holotypes and paratypes are preserved in the Museum of Nature and Human Activities, Sanda, Hyogo prefecture.

**Measurements and indices**

Head length (HL): maximum full-face view length from the anteriormost margin of clypeus to the posterior margin of occiput.

Head width (HW): maximum dorsal view distance across head excluding eyes.

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Table 1. Japanese species of *Leptothorax*.

This paper	Terayama et al. (1992)	Japanese name
<i>L. acervorum</i> (FABRICIUS)	<i>L. acervorum</i> (FABRICIUS)	Takane-munoboso-ari
<i>L. anira</i> sp. nov.	<i>L.</i> sp. 10	Hirase-muneboso-ari
<i>L. antera</i> sp. nov.	<i>L.</i> sp. 11	Fushinaga-muneboso-ari
<i>L. arimensis</i> AZUMA	<i>L. arimensis</i> AZUMA	Hime-muneboso-ari
<i>L. basara</i> sp. nov.	<i>L.</i> sp. 12	Yaeyama-muneboso-ari
<i>L. bikara</i> sp. nov.	<i>L.</i> sp. 13	Yadori-muneboso-ari
<i>L. congruus</i> (Fr. SMITH)	<i>L. congruus</i> (Fr. SMITH)	Muneboso-ari
<i>L. haira</i> sp. nov.	<i>L.</i> sp. 6	Ogasawara-muneboso-ari
<i>L. indra</i> sp. nov.	<i>L.</i> sp. 7	Kiiri-muneboso-ari
<i>L. kinomurai</i> sp. nov.	[ <i>L.</i> sp. 14*]	Kinomura-yadori-muneboso-ari
<i>L. koreanus</i> TERANISHI	<i>L. koreanus</i> TERANISHI	Kado-muneboso-ari
<i>L. kubira</i> sp. nov.	<i>L.</i> sp. 8	Chairo-muneboso-ari
<i>L. makora</i> sp. nov.	<i>L.</i> sp. 9	Hayashi-muneboso-ari
<i>L. santra</i> sp. nov.	[ <i>L.</i> sp. 15**]	Bohnin-muneboso-ari
<i>L. spinosior</i> FOREL	<i>L. spinosior</i> FOREL	Harinaga-muneboso-ari

\* : TERAYAMA et al. (1994), \*\* : TERAYAMA (1998)

Cephalic index (CI):  $HW / HL \times 100$ .

Scape length (SL): length of scape excluding radicle.

Scape index (SI):  $SL / HW \times 100$ .

Pronotal width (PW): maximum width of pronotum in dorsal view.

WEBER's length of mesosoma (WL): maximum diagonal distance from the base of anterior slope of pronotum (namely excluding cervix) to the propodeal lobe (=metapleural lobe).

Petiole width (PtW): maximum width of petiole in dorsal view.

Petiole height (PtH): maximum height of petiole in lateral view vertical to the longitudinal axis of petiole.

Postpetiole width (PpW): maximum width of postpetiole in dorsal view.

Total length (TL): outstretched length from the mandibular apex to the gastral apex.

### Genus *Leptothorax* Mayr

[Japanese name: Muneboso-ari-zoku]

*Leptothorax* MAYR, 1855: 431. Type species: *Formica acervorum* FABRICIUS, 1793: 358.

*Mychothorax* RUZSKY, 1904: 288. Type species: *Formica acervorum* FABRICIUS, 1793: 358. [Synonymy by M. R. SMITH, 1950: 29.]

*Nesomyrmex* WHEELER, 1910: 259. Type species: *Nesomyrmex clavipilis* WHEELER, 1910: 259. [Synonymy by BOLTON, 1982: 319.]

*Leptothorax* (*Myrafant*) M. R. SMITH, 1950: 30. Type species: *Leptothorax carvispinosus* MAYR, 1866: 508. [Synonymy by BOLTON, 1982: 319.] For full synonymy, see BOLTON (1995b).

**Diagnosis.** Small, monomorphic myrmicine ants. Mandibles usually each with 5 teeth (6 in some species); apical tooth largest; basal smallest. Palp formula 5:3. Median area of clypeus broad, extending between the frontal lobes. Anterior margin of clypeus varying in shape, from weakly convex to strongly produced medially. Frontal carinae short. Antennae 11- or 12-segmented; apical 3 segments forming a club. Eyes medium to large in size, situated at the midlength or slightly forwards on sides of head. Anterolateral corners of pronotum round to angulate in dorsal view. Metanotal groove varying from deeply impressed to obscure or absent. Propodeum with posterodorsal spines or teeth (these rarely lacking). Body hairs usually short, stout and erect, sometimes long or lacking.

**Remarks.** *Leptothorax* resembles *Tetramorium* MAYR, but it is distinguished by the following characters (BOLTON, 1982): (1) maxillary palp with 5 segments (3 or 4 segments in *Tetramorium*); (2) clypeus without carinae in front of antennal insertions (such carinae are present in *Tetramorium*); (3) mandibles generally with 5 teeth, rarely 6; the apical tooth largest and the others gradually smaller towards the base (7 teeth are usually present in *Tetramorium*, with the apical 3 enlarged).

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

(*L. kinomurai* sp. nov., known only from ergatoid females, is not included.)

- 1 Anterolateral corners of pronotum angulate (Fig. 13); antennae with 11 segments ..... *L. koreanus* TERANISHI
- Anterolateral corners of pronotum rounded, not angulate (Fig. 12); antennae with 11 or 12 segments ..... 2
- 2 Antennae with 11 segments; in profile anterior slope of petiole relatively very steep (Fig. 5) ..... *L. acervorum* (FABRICIUS)
- Antenna with 12 segments; in profile anterior slope of petiole relatively gentle ..... 3
- 3 Scapes short, distinctly failing to reach the posterior border of head ..... 4
- Scapes long, almost reaching to exceeding the posterior border of head (Fig. 27) ..... 5
- 4 Pronotal sides mostly smooth; propodeal spines long, about twice as

- long as their basal width; dorsal margin of petiolar node in posterior view slightly concave ..... *L. bikara* sp. nov.
- Pronotal sides rugulose; propodeal spines short, thorn-shaped, less than 1.5 times as long as their basal width; dorsal margin of petiolar node in posterior view convex  
..... *L. congruus* (Fr. SMITH)
- 5 Propodeal spines long and narrow, 2.5 times or more as long as their basal width (Fig. 4) ..... 6
- Propodeal spines relatively short, twice or more as long as their basal width ..... 11
- 6 Mesosoma black to blackish brown ..... 7
- Mesosoma yellow ..... 10
- 7 In profile anterior slope of petiole nearly straight, merging gradually into the node (Fig. 14) ..... *L. spinosior* FOREL
- In profile anterior slope of petiole distinctly concave; peduncle clearly distinguished from node ..... 8
- 8 Peduncle of petiole relatively long; anterior slope of node steeper than posterior slope (Fig. 16) ..... *L. antera* sp. nov.
- Peduncle of petiole relatively short; node an inverted U-shape, with the anterior and posterior slopes of virtually the same length  
..... 9
- 9 In profile dorsal outline of mesonotum and propodeum evenly convex (Fig. 15); mesosoma relatively short (Fig. 15)  
..... *L. makora* sp. nov.
- In profile dorsal outline of mesonotum and propodeum nearly straight (Fig. 17); mesosoma relatively long (Fig. 17)  
..... *L. anira* sp. nov.
- 10 Mesosomal dorsum with distinct longitudinal rugulae  
..... *L. indra* sp. nov.
- Mesosomal dorsum without longitudinal rugulae  
..... *L. basara* sp. nov.
- 11 Median part of clypeus nearly smooth, except for the high and prominent median carina and sometimes a pair of longitudinal carinae ..... 12
- Median part of clypeus rugulose, not smooth around the median carina ..... 13
- 12 Mesosoma reddish brown to brown; head width 0.52-0.65 mm, (usually around 0.55 mm); dorsal outline of mesonotum and propodeum almost straight (Fig. 11) ..... *L. kubira* sp. nov.
- Mesosoma yellow to yellowish brown; head width 0.40-0.54 mm, (usually less than 0.50 mm); dorsal outline of mesonotum and propodeum evenly arched ..... *L. arimensis* AZUMA
- 13 Mesosoma yellow; mesonotal and propodeal sides without rugulae;

- propodeal spines directing more posteriorly, about 30 degrees with the longitudinal axis of mesosoma ..... *L. haira* sp. nov.
- Mesosoma yellowish brown; mesonotal and propodeal sides with predominantly longitudinal rugulae; propodeal spines directing more upwardly, about 45 degrees with the longitudinal axis of mesosoma ..... *L. santra* sp. nov.

***Leptothorax acervorum* (FABRICIUS)**

[Japanese name: Takane-muneboso-ari]

(Fig. 5)

*Formica acervorum* FABRICIUS, 1793: 358.

*Leptothorax acervorum*: MAYR, 1855: 436.

*Leptothorax (Mychothorax) acervorum*: RUZSKY, 1904: 288.

*Myrmica lacteipennis* ZETTERSTEDT, 1838: 452. [Synonymy by NYLANDER, 1846: 936.]

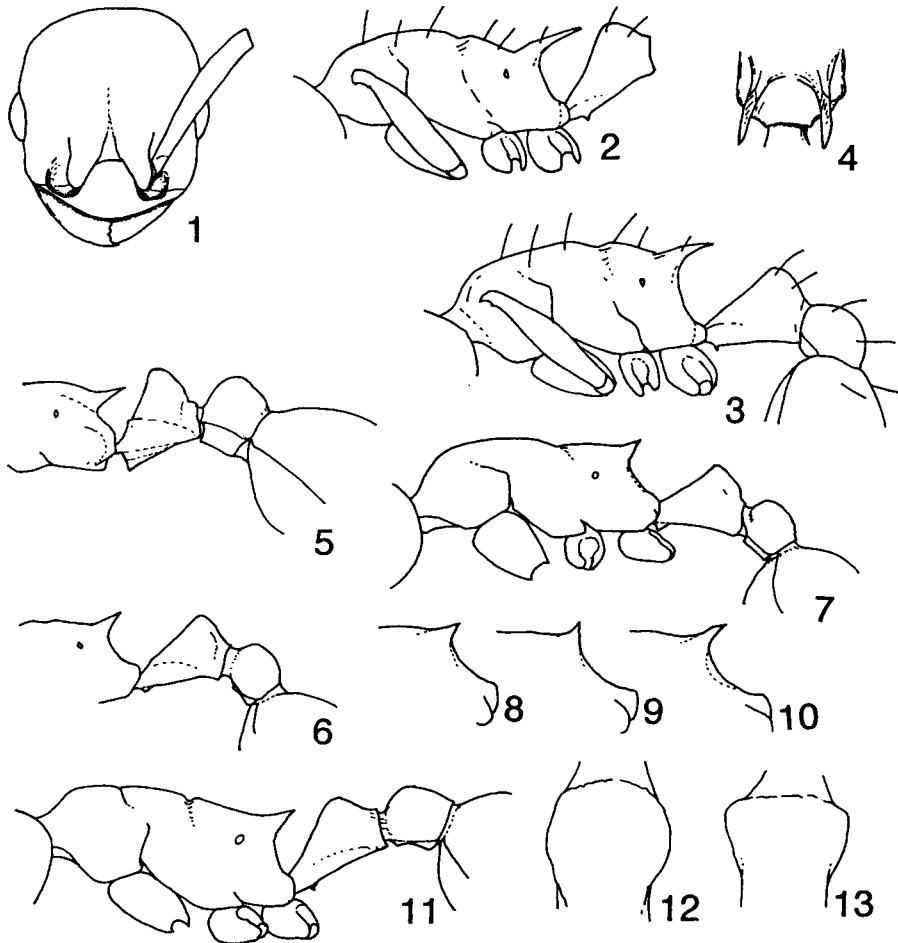
*Leptothorax acervorum kamtschaticum* RUZSKY, 1920: 78. [Synonymy by KUPYANSKAYA, 1986: 96.]

*Mychothorax acervorum orientalis* KUZNETSOV-UGAMSKY, 1928: 31. [Synonymy by KUPYANSKAYA, 1990: 137.]

**Diagnosis.** Total length of workers around 3-3.5 mm. Head and gaster black; mesosoma, petiole and postpetiole reddish brown, their dorsa blackish brown; legs brown. Antennae 11-segmented; scapes short, not reaching posterior margin of head in full-face view. Pro- and mesonotal dorsa depressed in profile. Propodeal dorsum weakly convex. Propodeal spines longer than wide in side view, with acute tips. Petiolar node high, triangular; anterior margin sloping steeply forwards in profile; peduncle obscure.

**Distribution.** Hokkaido, Honshu (mountainous regions), Shikoku (Mt. Ishizuchi), Kyushu (Mt. Kuju); Sakhalin, Korean Peninsula, Eurasia, North America.

**Remarks.** In Japan this species is distributed in the lowlands of Hokkaido and mountainous areas of Honshu, Shikoku, and Kyushu. In central Honshu *L. acervorum* is found at 1,350-2,590 m above sea level (SONOBE, 1979), at 1,900-1,980 m on Mt. Ishizuchi in Shikoku (TAKECHI, 1960a, 1960b; Sonobe, 1979), and at 1,740 m on Mt. Kuju, Kyushu (SONOBE, 1979). Monogynous and polygynous colonies are present in Japan, but even in polygynous colonies only one of the queens has functional ovaries and lays eggs (ITO, 1991), which is called "functional monogyny" (BUSCHINGER, 1968). Three socially parasitic ant species are known to associate with *L. acervorum* in Europe, but none are yet



Figs. 1-13. Japanese species of *Leptothorax* (1). — 1-4, *L. spinosior* FOREL, drawn from syntypes (MHNG); 5, *L. acervorum* (FABRICIUS); 6, *L. arimensis* AZUMA; 7-10, *L. congruus* (Fr. SMITH); 11, 12, *L. kubira* sp. nov.; 13, *L. koreanus* TERANISHI. 1, head in full-face view; 2, 3, 5-7, 11, propodeum, petiole, and postpetiole in profile; 4, propodeal spines in dorsal view; 8-10, propodeal spine in profile; 12, 13, pronotum in dorsal view.

known to occur in Japan.

***Leptothorax anira* sp. nov.**

[Japanese name: Hirase-muneboso-ari]

(Fig. 17)

*Leptothorax* sp. A: ONOYAMA, 1976: 125, 129.

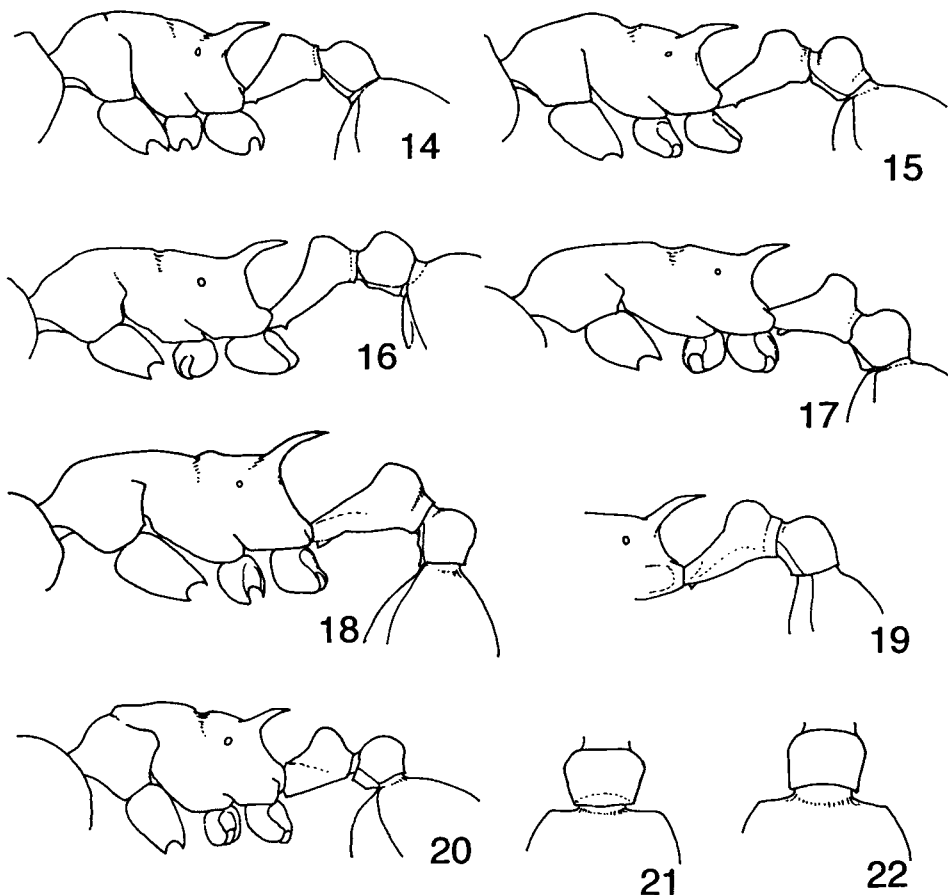
*Leptothorax* sp. 10: TERAYAMA et al., 1992: 30.

**Diagnosis.** Total length of workers around 2.5-3 mm. Body color

black to blackish brown. Scapes long, reaching posterior margin of head in full-face view. Dorsal outline of mesonotum straight in profile. Metanotal groove present but weak. Propodeal spines acute and narrow but somewhat shorter than those of *L. spinosior*; in lateral view, each is 2.5-3 times as long as its basal width. Petiolar node reverse U-shaped.

**Description of holotype. Worker.** HL 0.70 mm; HW 0.55 mm; CI 79; SL 0.55 mm; SI 100; WL 0.83 mm; PW 0.40 mm; PtW 0.15 mm; PtH 0.23 mm; TL 2.5 mm.

Head 1.3 times as long as wide, with straight posterior margin in full-face view; sides of head behind eyes slightly convergent posteriorly. Mandibles longitudinally striate. Anterior clypeal margin convex. Antennae with 12 segments; scapes long, reaching posterior margin of head in full-face view. Eyes moderate in size, maximum diameter 0.14 mm.



Figs. 14-22. Japanese species of *Leptothorax* (2). —14, 22, *L. spinosior* FOREL; 15, *L. makora* sp. nov.; 16, *L. antera* sp. nov.; 17, *L. anira* sp. nov.; 18, *L. indra* sp. nov.; 19, *L. basara* sp. nov.; 20, 21, *L. bikara* sp. nov. 14-20, mesosoma, petiole, and postpetiole in profile; 21, 22, postpetiole in dorsal view.

Dorsal outline of mesonotum straight in profile. Metanotal groove present but weak. Propodeal dorsum straight; propodeal spines acute and narrow; in lateral view, each 2.5-3 times as long as its basal width.

Petiole in profile with a long anterior peduncle; node reverse U-shaped, with almost symmetrical anterior and posterior margins; antero- and posterodorsal angles of node well developed. Small and triangular subpetiolar process present. Postpetiole slightly higher than long, with relatively strongly convex anterodorsal margin; posterior half of dorsal outline straight; in dorsal view 1.4 times as wide as long.

Head and mesosomal dorsa and pronotal sides predominantly longitudinally rugulose, the spaces between densely punctulate; sides of mesonotum and propodeum densely punctulate with irregular rugulae; petiole and postpetiole densely punctulate; gaster smooth and shining.

All dorsal surfaces of head and body with moderately abundant stout erect hairs; the hairs on head and mesosoma shorter than those on petiole, postpetiole and gaster; the longest hair on mesosoma 0.09 mm.

Color uniform black to blackish brown; mandibles, antennae, and legs dark brown.

**Holotype.** Worker, Iou-torishima, Okinawa Pref., 16.III.1983, H. TAKAMIME leg.

**Paratypes.** 14 workers, same data as holotype.

**Distribution.** Honshu, Kyushu, Yaku I., Amami-oshima I., Iou-torishima I.

**Remarks.** This species resembles *L. spinosior* and *L. makora*, but is separable by the nearly straight dorsal outline of mesosoma in profile. This species corresponds to *Leptothorax* sp. A. of ONOYAMA (1976) and *Leptothorax* sp. 10 of TERAYAMA et al. (1992).

***Leptothorax antera* sp. nov.**

[Japanese name: Fushinaga-muneboso-ari]

(Fig. 16)

*Leptothorax* sp. 11: TERAYAMA et al., 1992: 30.

**Diagnosis.** Total length of workers around 2.5-3 mm. Body color black to blackish brown. Scapes long, exceeding posterior margin of head in full-face view. Dorsal outline of mesonotum almost straight. Metanotal groove shallowly incised dorsally. Propodeal spines acute and long, each about 4 times as long as its basal width. Petiolar peduncle relatively the longest among Japanese species of *Leptothorax*. Petiolar node reverse U-shaped, but its anterior slope much steeper than



posterior slope.

**Description of holotype. Worker.** HL 0.69 mm; HW 0.60 mm; CI 87; SL 0.55 mm; SI 92; WL 0.80 mm; PW 0.38 mm; PtW 0.15 mm; PtH 0.23 mm; TL 2.8 mm.

Head 1.2 times as long as wide, with weakly convex posterior margin in full-face view. Mandibles longitudinally rugulose. Antennae with 12 segments; scapes long, slightly exceeding posterior margin of head in full-face view. Anterior margin of clypeus moderately convex. Eyes 0.13 mm in maximum diameter.

Dorsal outline of pronotum gently convex. Mesonotal dorsum feebly convex. Metanotal groove shallowly incised dorsally. Propodeal dorsum in profile almost straight; propodeal spines acute and long, each about 4 times as long as its basal width and pointing posteriorly.

Petiolar peduncle very long as in Fig. 16; node reverse U-shaped, its anterior slope much more steep than posterior slope. Subpetiolar process small, triangular. Postpetiolar node higher than long, with relatively strongly convex dorsal margin in profile; in dorsal view, 1.5 times as wide as long.

Head dorsum longitudinally rugulose with a few cross-meshes the spaces between densely punctulate; mesosomal dorsum and pronotal sides rugose, mesosomal and propodeal sides densely punctate with a few rugulae; petiole densely punctulate, postpetiole more weakly punctulate, but its dorsum weakly longitudinally striate; gaster smooth and shining.

Dorsal surfaces of head with moderately abundant erect hairs; similar hairs present on mesosoma (about 15), petiole (2 pairs), and postpetiole (3 pairs); the longest hair on mesosoma 0.11 mm; propodeal spines each with a long erect hair; gaster with moderately abundant suberect hairs.

Body including head black to blackish brown; mandibles, antennae, and legs dark brown.

**Holotype.** Worker, Gusuku, Amami-oshima I., Kagoshima Pref., 29.III. 1980, M. TERAYAMA leg.

**Paratypes.** 1 worker, same data as holotype; 2 workers, Tokunoshima I., Kagoshima Pref., 20. III. 1980, M. TERAYAMA leg.; 4 workers, Hachijo Botanical Garden, Hachijo-jima, Tokyo Pref., 1. IV. 1984, K. ONOYAMA leg.

**Distribution.** Hachijo-jima I., Amami-oshima I., Tokunoshima I.

**Remarks.** *L. anira* resembles *L. spinosior*, but distinguished by the petiolar peduncle distinct from the node. This species corresponds to *Leptothorax* sp. 11 of TERAYAMA et al. (1992).

***Leptothorax arimensis* AZUMA**  
 [Japanese name: Hime-muneboso-ari]  
 (Fig. 6)

*Leptothorax (Leptothorax) arimensis* AZUMA, 1977: 114, figs. 2, 3.

Worker, female. Type locality: Arima-onsen Shrine, Arima, Hyogo Pref. (several workers, 2. VI. 1947, M. AZUMA leg.)

**Diagnosis.** A small ant: total length of workers around 2 mm. Body color yellow to yellowish brown from mesosoma to gaster, head brown. Scapes long, slightly exceeding posterior margin of head. Dorsal outline of mesosoma gently and simply convex, almost without interruption in the metanotal section (propodeal dorsum almost straight in some individuals). Metanotal groove not incised or very shallowly incised dorsally. Propodeal teeth relatively short, slightly longer than their basal width. Petiolar node triangular, with slightly concave anterior slope in profile. Subpetiolar process very small or obscure.

**Distribution.** Hokkaido, Honshu.

**Remarks.** *L. arimensis* ranges from lowlands to mountainous areas, to about 1,000 m above sea level. It nests in soil or dead twigs. Relatively rare.

***Leptothorax basara* sp. nov.**  
 [Japanese name: Yaeyama-muneboso-ari]  
 (Fig. 19)

*Leptothorax* sp. B: ONOYAMA, 1976: 125, 129.

*Leptothorax* sp. 12: TERAYAMA et al., 1992: 30.

**Diagnosis.** Total length of workers around 2 mm. Body color yellow. Scapes reaching posterior margin of head in full-face view. Metanotal groove not incised dorsally. Dorsum of propodeum straight in profile; propodeal spines very long and thin, directing much upwards. Petiole with relatively long peduncle; node reverse U-shaped; anterior margin of node much more steeply sloping than posterior margin. Dorsum of mesosoma densely punctulate, without rugae.

**Description of holotype.** Worker. HL 0.57 mm; HW 0.47 mm; CI 82; SL 0.44 mm; SI 94; WL 0.63 mm; PW 0.33 mm; PtW 0.15 mm; PtH 0.18 mm; TL 2.1 mm.

Head 1.2 times as long as wide, with slightly convex posterior margin in full-face view; sides behind eyes a little converging posteriorly. Mandibles longitudinally rugulose. Median clypeal lobe weakly produced;

anterior margin evenly convex. Antennae with 12 segments; scapes relatively long, reaching posterior margin of head in full-face view. Eyes moderate in size, maximum diameter 0.12 mm, with about 10 facets in the longest row.

Promesonotal dorsum slightly convex in profile. Metanotal groove not incised dorsally. Dorsum of propodeum straight in profile; propodeal spines long and thin, directing much upwardly and their dorsal margin forming an angle of 120 degrees with propodeal dorsum in side view.

Petiole with relatively long peduncle; node reverse U-shaped; anterior margin of node much more steeply sloping than posterior margin. Subpetiolar process present, but small. Postpetiolar node nearly as long as high, with convex dorsal margin; in dorsal view 1.4 times as wide as long.

Head and mesosoma densely punctulate, without distinct rugae; petiole and postpetiole more weakly punctulate; gaster smooth and shining.

Head dorsum with erect hairs; mesosomal dorsum with about 18 erect hairs which are longer than those on head dorsum; petiole with 2 pairs, postpetiole with 3 pairs of erect hairs; gaster with scattered erect to suberect hairs.

Body color yellow.

**Holotype.** Worker, Shirahama, Iriomote I., Okinawa Pref., 23. III. 1975, K. ONOYAMA leg.

**Paratypes.** 2 workers, same data as holotype.

**Distribution.** Ishigaki I., Iriomote I.

**Remarks.** This species resembles *L. indra* from Okinawa I., and *L. confucii* (FOREL) from Taiwan. However, it is distinguished from the latter two by the absence of rugae on the mesosomal dorsum, the much more steeply sloping anterior margin of the petiolar node, the more upwardly directing propodeal spines, and the small body size. This species corresponds to *Leptothorax* sp. B. of ONOYAMA (1976) and *Leptothorax* sp. 12 of TERAYAMA et al. (1992).

The type specimens were collected with 3 larvae from a rotting fallen tree the part of which was buried in the soil.

***Leptothorax bikara* sp. nov.**

[Japanese name: Yadori-muneboso-ari]

(Figs. 20, 21)

*Leptothorax* sp. 13: TERAYAMA et al., 1992: 30.

**Diagnosis.** Total length of workers around 2 mm. Body color black

to blackish brown. Scapes not reaching posterior margin of head in full-face view. Pronotal sides mostly smooth. Dorsal outlines of mesonotum and propodeum straight in profile. Metanotal groove weakly incised dorsally. Propodeal spines relatively long, acute and narrow; each distinctly longer than its basal width. Petiolar peduncle short and thick, with subparallel dorsal and ventral margins in profile; node relatively narrowly reverse U-shaped; in posterior view the node has a straight or slightly concave dorsal margin, angulate dorsolateral corners, and subparallel sides at dorsal  $1/3$ . Postpetiole trapezoidal in dorsal view, broadest anteriorly.

**Description of holotype. Worker.** HL 0.60 mm; HW 0.50 mm; CI 83; SL 0.43 mm; SI 78; WL 0.68 mm; PW 0.34 mm; PtW 0.13 mm; PtH 0.21 mm; TL 2.2 mm.

Head 1.2 times as long as wide, with straight posterior margin in full-face view; sides behind eyes a little converging posteriorly. Mandibles weakly longitudinally rugulose. Anterior margin of clypeus convex. Antennae with 12 segments; scapes short, not reaching posterior margin of head in full-face view. Eyes moderately large, maximum diameter 0.15 mm, with about 13 facets in the longest row.

Pronotum short as in Fig. 20. Dorsal outline of mesonotum straight in profile. Metanotal groove weakly incised dorsally. Dorsal outline of propodeum straight in profile; propodeal spines moderately long, acute and narrow; each about twice as long as its basal width.

Petiole short, as long as high; peduncle short and thick, with subparallel dorsal and ventral margins in profile; node relatively narrowly reverse U-shaped; node in posterior view with straight dorsal margin, angulate dorsolateral corners and parallel sides at dorsal  $1/3$ . Subpetiolar process small. Postpetiole higher than long, with entirely convex dorsal margin; node in dorsal view trapezoidal, twice as wide as long, broadest anteriorly; maximum width 1.2 times its minimum width.

Dorsum of head longitudinally rugulose, with a few cross-meshes; mesosomal dorsum shallowly punctulate with some irregular rugulae, pronotal sides mostly smooth, mesonotal and propodeal sides reticulate-punctate; petiole and postpetiole weakly punctulate; gaster smooth and shining.

All dorsal surfaces of head and body with relatively long erect hairs; the longest hair of mesosoma 0.13 mm.

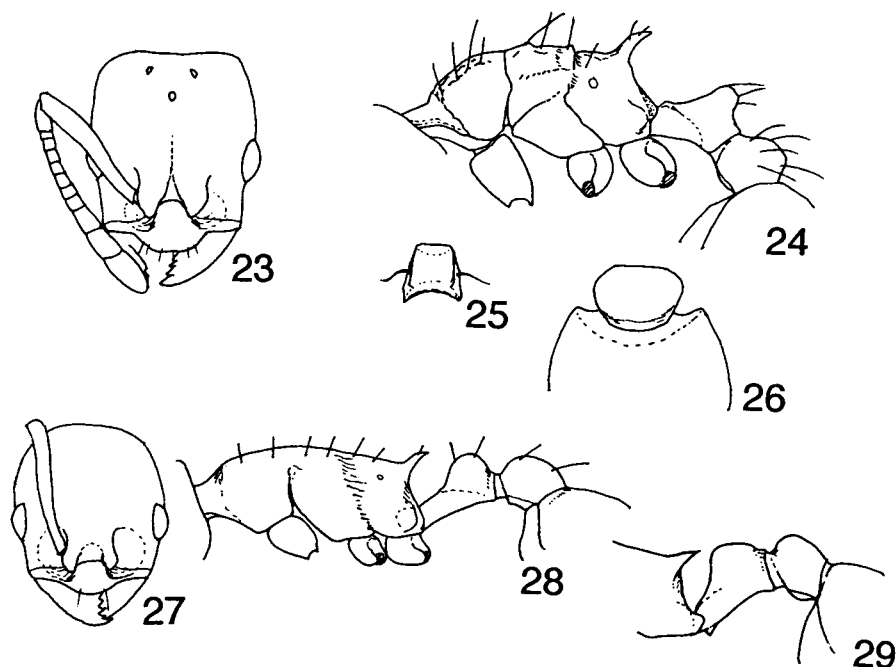
Body color black to blackish brown; mandibles, antennae, and legs brown.

**Holotype.** Worker, Kinka-zan, Gifu-shi, Gifu Pref., 29. III. 1981, K. KINOMURA leg.

**Paratypes.** 5 workers, same data as holotype.

**Distribution.** Honshu (Gifu Pref.).

**Remarks.** *L. bikara* might be a social parasite of other *Leptothorax* species. Twenty-six workers have been collected from a nest of *L. spinosior* and a putative alate female has been taken in a nest of *L. makora* (KINOMURA, pers. comm.). This species is distinguished from *L. spinosior* and *L. makora* by the shorter scapes, the thick petiolar peduncle, and the higher than long postpetiole. This species corresponds to *Leptothorax* sp. 13 of TERAYAMA et al (1992).



Figs. 23-29. Japanese species of *Leptothorax* (3). — 23-26, *L. kinomurai* sp. nov.; 27, 28, *L. santra* sp. nov.; 29, *L. haira* sp. nov. 23, 27, head in full-face view; 24, 28 mesosoma, petiole, and postpetiole in profile; 25, petiole in posterior view; 26, postpetiole and anterior portion of gaster in dorsal view; 29, propodeum, petiole, and postpetiole in profile.

***Leptothorax congruus* (Fr. SMITH)**

[Japanese name: Muneboso-ari]

(Figs. 7-10)

*Leptothorax congruus* Fr. SMITH, 1874: 406. Worker. Type Locality: Hiogo. [Holotype worker in BMNH examined.]

*Leptothorax congruus*: WHEELER, 1906: 316-317. Worker, female.

*Leptothorax (Myrafant) congruus*: ONOYAMA, 1980: 197.

**Diagnosis.** Total length of workers around 2.5-3 mm. Body color

black to blackish brown. Scapes short, not reaching posterior margin of head. Dorsal outline of mesosoma almost straight in profile. Propodeum with short, triangular spines of variable size (Figs. 7-10). Petiolar node triangular, its dorsal margin angulate in profile.

**Distribution.** Hokkaido, Honshu, Shikoku, Kyushu; Korean Peninsula.

**Remarks.** *L. congruus* is distinguished from other Japanese *Leptothorax* species by the black body, the short scapes, and the short propodeal spines.

This is an arboreal species, nesting in dead twigs of standing trees. Nuptial flights occur in mid July (SONOBE, 1980). The chromosome number is  $2n = 18$  (IMAI & KUBOTA, 1972). It is common in Honshu, Shikoku, and Kyushu, but rare in Hokkaido.

***Leptothorax haira* sp. nov.**

[Japanese name: Ogasawara-muneboso-ari]

(Fig. 29)

*Leptothorax* sp. 6: TERAYAMA et al., 1992: 29.

**Diagnosis.** A small species: total length of workers around 2 mm. Head and gaster brownish, rest of body yellow. Scapes reaching posterior margin of head in full face view. Mesosomal dorsum weakly convex. Metanotal groove not incised dorsally. Propodeal spines relatively long, about twice as long as their basal width. Petiolar peduncle short; node low, with straight anterior slope in profile. Subpetiolar process small, triangular.

**Description of holotype. Worker.** HL 0.65 mm; HW 0.54 mm; SL 50 mm; CI 83; SI 93; WL 0.77 mm; PW 0.39 mm; PtW 0.16 mm; PtH 0.21 mm; TL 2.3 mm.

Head 1.2 times as long as wide, with straight posterior margin in full face view; sides behind eyes a little converging posteriorly. Mandibles longitudinally rugulose. Anterior margin of clypeus weakly convex. Antennae with 12 segments; scapes reaching posterior margin of head in full-face view. Eyes moderate in size, maximum diameter 0.13 mm.

Mesosomal dorsum weakly convex; metanotal groove not incised dorsally. Propodeal spines relatively long, 2.4 times (left) or 1.8 times (right) as long as their basal width. Petiolar peduncle short; node low, rounded dorsally, with straight and steep anterior slope and rounded and gentle posterior slope in profile. Subpetiolar process small, triangular. Postpetiole higher than long and higher than petiole in profile;

dorsum of node in profile nearly straight; in dorsal view node 1.8 times as wide as long, with subparallel sides and straight anterior margin.

Head dorsum longitudinally rugulose, the spaces between densely punctulate; pronotal dorsum rugose, the spaces between densely punctulate; dorsa of mesonotum and propodeum densely punctulate with longitudinal rugulae; mesonotal and propodeal sides, petiole, and postpetiole densely punctulate; gaster smooth and shining.

Head dorsum with short stout erect hairs; mesosomal dorsum with about 14 stout erect hairs; dorsa of petiole and postpetiole each with 2 pairs of erect hairs; gaster with suberect hairs.

Head dorsum brownish yellow, gaster yellowish brown, the rest of body yellow; mandibles and scapes brownish yellow, funiculi brown, legs brownish yellow to yellowish brown.

**Holotype.** Worker, Ani-jima, Ogasawara Is., Tokyo Pref., 16. III. 1986, T. SATOH leg.

**Paratype.** 1 worker, same data as holotype (gaster lacking).

**Distribution.** Ogasawara Is (Ani-jima I.).

**Remarks.** *L. haira* is distinguished from other yellowish species by the shorter propodeal spines (from *L. basara* and *L. indra*), by the rugulose clypeus (from *L. arimensis* and *L. kubira*), and by the yellow mesosoma and mesonotal sides without rugulae (from *L. santra*).

This species is known only from two individuals from Ani-jima Island, the Ogasawara Islands. *L. haira* corresponds to *Leptothorax* sp. 6 of TERAYAMA et al. (1992).

***Leptothorax indra* sp. nov.**

[Japanese name: Kihiro-muneboso-ari]

(Fig. 18)

*Leptothorax* sp. 7: TERAYAMA et al., 1992: 29.

**Diagnosis.** Total length of workers around 3 mm. Body color yellow. Scapes long, reaching posterior margin of head in full-face view. Metanotal groove incised, but in some specimens obscure to absent. Propodeal spines slender and long, about 4 times as long as their basal width, and a little downcurved near the tips. Petiole with long peduncle and a reverse U-shaped node. Subpetiolar process very small, triangular. Promesonotal dorsum covered with rugae.

**Description of holotype. Worker.** HL 0.68 mm; HW 0.54 mm; CI 79; SL 0.53 mm; SI 98; WL 0.78 mm; PW 0.40 mm; PtW 0.16 mm; PtH 0.20 mm; TL 2.5 mm.

Head 1.3 times as long as wide, with feebly convex posterior margin

in full-face view; sides behind eyes slightly converging posteriorly. Mandibles longitudinally rugulose. Anterior margin of clypeus moderately convex. Antennae with 12 segments; scapes long, slightly exceeding posterior margin of head in full-face view. Eyes 0.16 mm in maximum diameter.

Promesonotal dorsum feebly convex in profile. Metanotal groove shallowly incised dorsally. Propodeal dorsum flat with a small convexity near the anterior end; propodeal spines slender and long, about 4 times as long as their basal width, and a little downcurved near the tips.

Petiole long, with long peduncle and reverse U-shaped node. Subpetiolar process a very small tooth, triangular. Postpetiole slightly longer than high; node in profile with convex anterior and straight posterior slopes; in dorsal view 1.5 times as wide as long, with convex sides and nearly straight anterior margin.

Head dorsum longitudinally rugulose, the spaces between densely punctulate. Mesosomal dorsum and pronotal sides rugose. Mesonotal and propodeal sides and petiole densely punctulate. Postpetiole more weakly punctulate. Gaster smooth and shining.

Head dorsum with stout erect hairs; mesosomal dorsum with about 14 erect hairs; the longest hair on mesosoma 0.10 mm; petiole with 2 pairs, and postpetiole with 5 pairs of erect hairs; gaster moderately abundant stout erect hairs.

Head, body, and appendages yellow.

**Holotype.** Worker, Mt. Yonaha-dake, Okinawa I., Okinawa Pref., 16. V. 1982, H. TAKAMINE leg.

**Paratypes.** 9 workers, same data as holotype; 7 workers, 1 female, same locality, 21. VIII. 1991, M. TERAYAMA leg.

**Distribution.** Okinawa I.

**Remarks.** *L. indra* is similar to *L. basara*, but distinguished by the mesosomal dorsum with longitudinal rugulae.

This species nests in dead twigs on standing trees. *L. indra* corresponds to *Leptothorax* sp. 7 of TERAYAMA et al. (1992).

***Leptothorax kinomurai* sp. nov.**

[Japanese name: Kinomura-yadori-muneboso-ari]

(Figs. 23-26)

*Leptothorax* sp. 14: TERAYAMA et al., 1994: 6.

**Diagnosis.** Total length of ergatoid female around 2.5 mm. Head to postpetiole mostly yellow, gaster brown. Scapes short, not reaching posterior margin of head in full-face view. Three ocelli distinct. Dorsal



outline of pronotum and mesoscutum weakly convex. Tegulae absent. Metanotum distinct. Propodeal spines acute, with relatively broad bases, about twice as long as their basal width and somewhat downcurved. Petiole short and high, node reverse U-shaped. Postpetiole high, with strongly convex dorsal margin in profile. Gaster with angulate anterolateral corners in dorsal view.

**Description of holotype. Ergatoid female.** HL 0.71 mm; HW 0.56 mm; CI 79; SL 0.49 mm; SI 88; WL 0.87 mm; PW 0.44 mm; PtW 0.20 mm; PtH 0.26 mm; TL 2.6 mm.

Head 1.3 times as long as wide, with almost straight, very slightly concave posterior margin in full-face view; sides of head behind eyes almost parallel, very slightly convergent posteriorly. Mandibles weakly longitudinally rugulose, apical  $1/3$  nearly smooth. Anterior margin of median clypeal lobe moderately convex. Antennae with 12 segments; scapes short, not reaching posterior margin of head in full-face view. Eyes relatively large, 0.19 mm in maximum diameter, with about 18 facets in the longest row. Three ocelli distinct, forming a right triangle.

Pronotum short, with weakly convex dorsal margin in profile. Mesoscutal dorsum evenly convex in profile. Mesepisternum with a deep oblique furrow. Mesoscutellum moderately developed and metanotum very short, but tegulae absent. Propodeal spines acute, with relatively broad bases, about twice as long as their basal width and somewhat downcurved.

Petiole short and high, peduncle thick, not distinctly converging anteriorly in profile; node reverse U-shaped; anterodorsal and posterodorsal corners each forming a dull angle; dorsal margin of node relatively short and straight in profile (Fig. 25). Small subpetiolar process present. Postpetiole higher than long, with relatively strongly convex dorsal margin in profile; node in dorsal view 1.8 times as wide as long, with convex sides and convex anterior margin (Fig. 26). Gaster with angulate anterolateral corners in dorsal view.

Head dorsum longitudinally rugulose with sparse cross-meshes. Pronotum weakly rugulose with dense punctulation, mesoscutum longitudinally rugulose and densely punctulate, mesoscutellum superficially rugulose, mesepisternum, metapleura and propodeum reticulate-punctulate. Petiole and postpetiole weakly but densely punctulate. Gaster smooth and shining.

Head dorsum moderately with relatively long erect hairs. Long erect hairs present on the pronotum (3 pairs), mesoscutum (3 pairs), mesoscutellum (2 pairs), metanotum (1 pair), propodeum (1 pair), petiole (3 pairs), and postpetiole (6 pairs); the longest hair on mesosoma 0.15 mm; propodeal spines each with 1 subdecumbent hairs. Gaster with moderately abundant suberect to subdecumbent hairs.

Head, mesosoma, petiole, postpetiole, and legs yellow; gaster brown.

**Holotype.** Ergatoid female, Gifu City, Gifu Pref., 18. I. 1992, K. KINOMURA leg.

**Paratypes.** 1 alate female, 4 ergatoid females, Nagara, Gifu, 14. VI. 1993, K. KINOMURA leg.

**Distribution.** Honshu (Gifu Pref.).

**Remarks.** Four colonies of *L. kinomurai* were collected from nests of *L. makora*, and all consisted entirely of ergatoid females (KINOMURA, pers. comm.). Therefore, *L. kinomurai* might be a social parasite on other *Leptothorax* species. Further, no worker caste may not be produced in this species.

The ergatoid females of *L. kinomurai* may resemble those of *L. bikara* (if present), as short scapes, shapes of propodeal spines, petiole (especially the thick peduncle) and postpetiole suggest, but may be distinguished by the yellow body coloration in contrast to the black to blackish brown body coloration of *L. bikara*.

***Leptothorax koreanus* TERANISHI**

[Japanese name: Kado-muneboso-ari]

(Fig. 13)

*Leptothorax (Nesomyrmex) koreanus* TERANISHI, 1940: 16-17. Worker.

Type locality: Suigen, Korea (8 workers, C. TERANISHI leg.) [Types presumably lost (ONOHAMA, 1982).]

*Leptothorax (Nesomyrmex) koreanus* : MORISITA, 1945: 25. [First record to Japan.]

**Diagnosis.** Total length of workers around 2-2.5 mm. Body yellowish brown to blackish brown. Antennae 11-segmented; scapes short, distinctly not reaching posterior margin of head in full-face view. Anterolateral corners of pronotum distinctly angled in dorsal view. Mesosoma rugose. Propodeal spines long, about 3 times as long as wide. Petiole with a reverse U-shaped node.

**Distribution.** Hokkaido, Honshu, Shikoku, Kyushu; Korean Peninsula.

**Remarks.** *L. koreanus* is easily distinguished from its Japanese congeners by the distinctly angulate pronotal humeri. A relatively rare species.

*Leptothorax kubira* sp. nov. ✓

[Japanese name: Chairō-muneboso-ari]

(Figs. 11, 12)

*Leptothorax* sp. 2: SONOBE, 1977: 113.*Leptothorax* sp. 3: KINOMURA et al., 1982: 435.*Leptothorax* sp. 8: TERAYAMA et al., 1992: 29.

**Diagnosis.** Total length of workers around 2.5-3 mm. Body color reddish brown to brown; in some individuals the head and gaster are darker than the mesosoma, brown to blackish brown; legs yellow. Clypeus with a conspicuous median carina. Scapes relatively long, just reaching posterior margin of head in full-face view. Metanotal groove distinctly incised dorsally, but obscure in some individuals. Propodeal dorsum straight in profile. Propodeal spines narrowly triangular, about 1.7 times as long as their basal width. Petiolar node triangular or reverse U-shaped in profile, subpetiolar process very small.

**Description of holotype. Worker.** HL 0.70 mm; HW 0.55 mm; CI 79; SL 0.55 mm; SI 100; WL 0.85 mm; PW 0.40 mm; PtW 0.15 mm; PtH 0.21 mm; TL 2.8 mm.

Head 1.3 times as long wide, with evenly convex posterior margin in full-face view; sides behind eyes slightly converging posteriorly. Mandibles longitudinally rugulose. Anterior margin of median clypeal lobe weakly convex. Antennae with 12 segments; scapes relatively long, just reaching posterior margin of head in full-face view. Eyes moderate in size, maximum diameter 0.15 mm.

Promesonotal dorsum slightly convex in profile. Metanotal groove incised dorsally. Propodeal dorsum straight in profile; propodeal spines in profile narrowly triangular, about 1.7 times as long as their basal width.

Petiolar node rather triangular in profile; dorsal margin of node forming an obtuse angle, anterior margin weakly concave, posterior margin evenly convex. Subpetiolar process present, but very small. Postpetiole longer than high; node with almost straight dorsal margin in profile, in dorsal view 1.7 times as wide as long, with subparallel sides and straight anterior margin.

Clypeus with a distinct, long median carina, but smooth around the carina. Head dorsum longitudinally rugulose with a few cross-meshes. Occiput more reticulate, the spaces between densely punctulate. Mesosomal dorsum and pronotal sides rugulose-punctulate, mesonotal and propodeal sides densely punctulate with some rugulae. Petiole and postpetiole densely punctulate. Gaster smooth and shining.

All dorsal surfaces on head and body with erect hairs, which are

acute (not blunt) and relatively fine; the longest hair on mesosoma 0.10 mm.

Body color reddish brown to brown; gaster slightly darker than the mesosoma, grading brown to blackish brown; mandibles, antennae, and legs yellow.

**Holotype.** Worker, Hanayama, 1,650 m alt., Yaku I., Kagoshima Pref., 17. IX. 1983, Sk. YAMANE leg.

**Paratypes.** 4 workers, 1 female, same data as holotype; 3 workers, Hanayama, 1,300 m alt., Yaku I., Kagoshima Pref., 19. VII. 1983, Sk. YAMANE leg.; 1 worker, Mt. Kumotori, Saitama Pref., 5. VIII. 1976, M. TERAYAMA leg.; 1 worker, Yaku Pass, Ogano, Saitama Pref., 16. IV. 1988, T. NAMBU leg.

**Distribution.** Hokkaido, Honshu, Shikoku, Yaku I.

**Remarks.** *L. kubira* is similar to *L. arimensis*, but distinguished by the reddish brown to brown mesosoma and the more straight dorsal outline of mesonotum and propodeum.

This species occurs in mountainous regions, and is known from about 600 m to 2,000 m above sea level in central Honshu (KINOMURA et al., 1982), and from 1,300 m to 1,900 m on Yaku Island (TERAYAMA & YAMANE, 1984). Several populations from Hokkaido, Honshu, and Yaku Island show variations, but we treat here these as geographic variants within a single species. Further comparative studies are needed to determine their exact taxonomic statuses. This species corresponds to *Leptothorax* sp. 2 of SONOBE (1977), *Leptothorax* sp. 3 of KINOMURA et al. (1982), and *Leptothorax* sp. 8 of TERAYAMA et al. (1992).

***Leptothorax makora* sp. nov.**

[Japanese name: Hayashi-muneboso-ari]

(Fig. 15)

*Leptothorax* sp. 1: KINOMURA et al., 1982: 435.

*Leptothorax* sp. 9: TERAYAMA et al., 1992: 29.

**Diagnosis.** Total length of workers around 2-2.5 mm. Body color black to blackish brown. Scapes long, reaching posterior margin of head in full-face view. Mesosomal dorsum moderately convex in profile. Metanotal groove weakly incised dorsally. Propodeal spines long, about 3 times as long as their basal width. Petiolar node high and reverse U-shaped.

**Description of holotype. Worker.** HL 0.58 mm; HW 0.50 mm; CI 86; SL 0.48 mm; SI 96; WL 0.70 mm; PW 0.35 mm; PtW 0.14 mm; PtH 0.20 mm; TL 2.2 mm.

Head 1.2 times as long as wide, with straight posterior margin in full-face view; sides behind eyes subparallel. Mandibles longitudinally rugulose. Anterior margin of clypeus moderately convex. Antennae with 12 segments; scapes long, just reaching posterior margin of head in full-face view. Eyes moderate in size, maximum diameter 0.14 mm, with about 10 facets in the longest row.

Mesosomal dorsum moderately convex in profile. Metanotal groove weakly incised dorsally. Propodeal dorsum almost straight in profile; propodeal spines acute and long, about 3 times as long as their basal width; posterior half slightly downcurved.

Petiole longer than high, with long peduncle; node high and reverse U-shaped. Subpetiolar process small and triangular, in profile the anterior margin vertical to the petiolar longitudinal axis. Postpetiole slightly longer than high, with relatively strongly convex dorsal margin in profile; node in dorsal view about 1.4 times as wide as long, with convex sides and nearly straight anterior margin.

Clypeus and frontal triangle each with a distinct, long median carina, but nearly smooth around the carinae. Head dorsum longitudinally rugulose and with some cross-meshes, the spaces between densely punctulate. Pronotum longitudinally rugose, mesonotal and propodeal dorsa rugulose, mesonotal and propodeal sides longitudinally rugulose. Petiole and postpetiole densely punctulate. Gaster smooth and shining.

Head dorsum with moderately abundant erect hairs; erect and stout hairs present on mesosoma (about 20), petiole (2 pairs), and postpetiole (3 pairs); gaster with suberect hairs; propodeal spines each with a short erect hair; the longest hair on dorsum of mesosoma 0.11 mm.

Body color black to blackish brown; mandibles, antennae and legs brown.

**Holotype.** Worker, Gifu City, Gifu Pref., 28. IX. 1980, K. KINOMURA leg.

**Paratypes.** 15 workers, same data as holotype; 5 workers, Nawari City, Mie Pref., 10. VIII. 1986, A. AMAGASU leg.

**Distribution.** Hokkaido, Honshu, Kyushu.

**Remarks.** This species resembles *L. spinosior* and *L. anira*. It is distinguished from *L. spinosior* by the reverse U-shaped petiolar node, and from *L. anira* by the convex mesosomal dorsum. *L. makora* nests in dead twigs on standing trees in forests or forest margins, while *L. spinosior* nests in the soil of open habitats or grasslands. This species corresponds to *Leptothorax* sp. 1 of KINOMURA et al. (1982) and *Leptothorax* sp. 9 of TERAYAMA et al. (1992).

*Leptothorax santra* sp. nov.

[Japanese name: Bohnin-muneboso-ari]

(Figs. 27, 28)

*Leptothorax* sp. 15: TERAYAMA, 1998: 15

**Diagnosis.** Total length of workers around 2.5 mm. Body color yellowish brown; head darker than mesosoma and gaster. Scapes slightly exceeding posterior margin of head in full-face view. Dorsal outline of mesonotum weakly convex. Metanotal groove very weakly incised dorsally. Propodeal spines relatively short: each about twice as long as its basal width when viewed laterally; its dorsal margin forming an angle at its midlength. Petiolar peduncle relatively short, in profile not distinctly narrowed anteriorly; node reverse U-shaped.

**Description of holotype. Worker.** HL 0.61 mm; HW 0.50 mm; CI 82; SL 0.48 mm; SI 96; WL 0.73 mm; PW 0.35 mm; PtW 0.16 mm; PtH 0.20 mm; TL 2.5 mm.

Head 1.2 times as long as wide, with weakly convex posterior margin in full-face view; sides of head behind eyes slightly converging posteriorly; posterodorsal corners rounded. Mandibles finely and longitudinally rugulose. Anterior margin of median clypeal lobe gently convex. Antennae with 12 segments; scapes slightly exceeding posterior margin of head in full-face view. Eyes 0.14 mm in maximum diameter, with about 12 facets in the longest row.

Dorsal outline of mesonotum in profile weakly convex. Metanotal groove very shallowly incised dorsally. Propodeal dorsum straight in profile. Propodeal spines in lateral view acute and relatively short, each about twice as long as its basal width, its dorsal margin forming a distinct angle of 150 degrees at its midlength, ventral margin straight at its posterior 2/3.

Petiolar peduncle relatively short, in profile not distinctly narrowed anteriorly; node reverse U-shaped, anterior and posterior margins gradually converging to the dorsum. Subpetiolar process vestigial. Postpetiole higher than long, with almost straight dorsal margin in profile; node in dorsal view 1.8 times as wide as long, with parallel sides.

Clypeus longitudinally rugulose, with a long, conspicuous median carina. Head dorsum longitudinally rugulose with sparse cross-meshes, the spaces between densely punctulate. Pronotal dorsum rugose, pronotal sides longitudinally rugulose; the rest of mesosoma mostly longitudinally rugulose with punctulae except for propodeal declivity which is densely punctulate. Petiole and postpetiole densely punctulate. Gaster smooth.

Head dorsum with relatively abundant erect hairs. Mesosomal

dorsum with 8-9 pairs, petiole with 2 pairs, and postpetiole with 5-6 pairs of stout, erect hairs. Propodeal spines each with a short erect hair slightly behind the angled corner at the midlength of dorsal margin. Gaster with moderately abundant erect hairs.

Body and appendages yellowish brown; head (excluding mandibles) and antennal clubs brown.

**Holotype.** Worker, Hatsune-yama, Chichi-jima I., Ogasawara Is, Tokyo Pref., 29. VII. 1996, T. K. leg.

**Paratype.** 1 worker, Kita-futago-yama, Ani-jima I., Ogasawara Is, Tokyo, 1. VIII. 1996, T. K. leg.

**Distribution.** Ogasawara Is. (Chichi-jima I., Ani-jima I.).

**Remarks.** *L. santra* resembles *L. haira*, but distinguished by the mesonotal and propodeal sides with predominantly longitudinal rugulae and the more upwardly directing propodeal spines.

A rare species. The known specimens were collected in leaf litter samples using a BERLESE funnel.

### *Leptothorax spinosior* FOREL

[Japanese name: Harinaga-muneboso-ari]

(Figs. 1-4, 14, 22)

*Leptothorax congruus* var. *spinosior* FOREL, 1901: 371. Worker. Type locality: Sapporo (MATSUMURA leg.).

[Two syntype workers in MHNG examined.]

*Leptothorax* (*Leptothorax*) *congruus* var. *spinosior*: EMERY, 1922: 253.

*Leptothorax* (*Myrafant*) *congruus* var. *spinosior*: ONOYAMA, 1980: 197.

*Leptothorax spinosior*: TERAYAMA & SATOH, 1990: 532.

[Raised to species rank.]

**Diagnosis.** Total length of workers around 2 mm. Body color black to blackish brown. Scapes almost reaching posterior margin of head in full-face view. Dorsal outline of mesosoma weakly and evenly convex in profile. Metanotal groove incised dorsally. Propodeal spines long, acute and narrow; somewhat downcurved. Petiolar node in profile triangular (in some specimens dorsum narrowly convex and not angulate), with weakly convex posterior margin (almost straight in some specimens).

**Distribution.** Hokkaido, Honshu, Kyushu; Korean Peninsula.

**Remarks.** *L. spinosior* is found in dry open areas, such as grasslands and bare places. It nests in the soil. A queen body size dimorphism is known (HAMAGUCHI & KINOMURA, 1996). Most larger queens are found in monogynous colonies while most smaller queens are found

in polygynous colonies. Workers are found on the ground, seldom on trees. Nuptial flights occur in July (SONOBE, 1980). The chromosome number is  $2n = 24$  (IMAI & YOSIDA, 1965). All the previous records of *L. spinosior* from Yaku Island (TERAYAMA & YAMANE, 1984) were *L. anira*, and no reliable record of this species is known from the island.

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