

**A NEW SPECIES OF THE ANT GENUS *CAREBARA* WESWOOD
(FORMICIDAE, MYRMICINAE) FROM THE YAEYAMA ISLANDS,
RYUKYUS ARCHIPELAGO, JAPAN**

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Summary. A new species of the ant genus *Carebara* Westwood, 1840 is described based on the major and minor workers from Yonaguni-jima, Yaeyama Islands, the Southern Ryukyu Islands, Japan. Among the Japanese congeners it is the only species with a pair of large vertexal horns that are widely separated from each other and connected with a complete transverse carina in the major worker. *Carebara lithophila* sp. n. is compared with the most closely related species *C. sakamotoi* Terayama, Liu et Eguchi, 2012 from Taiwan and *C. bihornata* Xu, 2003 from China.

Key words: *Carebara*, new species, major and minor workers, nesting site, Yonaguni-jima.

Ск. Ямане, Х. Сасаки, Р. Хосокава. Новый вид муравьев рода *Carebara* Westwood (Formicidae, Myrmicinae) с островов Яэяма, архипелаг Рюкю, Япония // Дальневосточный энтомолог. 2025. N 523. С. 8-15.

Резюме. Из Йонагунидзима на островах Яэяма, архипелаг Рюкю, Япония по рабочим особям описывается новый вид муравьев из рода *Carebara* Westwood, 1840. Среди японских представителей рода *Carebara* это единственный вид с парой больших темных рогов, которые широко разделены друг от друга и соединены полным поперечным килем. Приведено сравнение *Carebara lithophila* sp. n. с близкими видами *C. sakamotoi* Terayama, Liu et Eguchi, 2012 из Тайваня и *C. bihornata* Xu, 2003 из Китая.

INTRODUCTION

Most of the *Carebara* species are very small ants with cryptic subterranean life. In Japan five species of the genus (all are members of the former '*Oligomyrmex*') have so far been known (Terayama *et al.*, 2014). In only one of them, *C. oni* (Terayama, 1996), the major worker often lacks a pair of vertexal horns, and has large eyes and the mesopleuron divided into the upper and lower sections with a distinct furrow. Others have vertexal horns of variable

size, but the horns are generally low with their height smaller than their basal width and/or located relatively close to each other; the horns are not connected by a complete transverse carina.

In the course of our myrmecofaunal surveys in the Southern Ryukyu Islands, Japan, one *Carebara* species with a pair of large vertexal horns that are higher than broad at base, widely separated from each other, and connected with a complete transverse carina. It resembles some species recently described from China and Taiwan (cf. Xu, 2003; Terayama et al., 2012; Xu et al., 2024), but differs from the latter in some important points and is considered to be an undescribed species. In this paper we describe it as new to science based on the major and minor workers.

MATERIAL AND METHODS

The material was collected on Yonaguni-jima, Yaeyama Islands, Japan and preserved in alcohol. Part of the specimens were point-mounted and examined under a Nikon SMZ18 stereomicroscope. The specimen photos were taken with a Sony α 6300 connected to an Olympus MVX10 and stacked using Zerene Stacker (version 1.04).

The specimens were compared with those of other Japanese species and descriptions in Terayama et al. (2014). They were also compared with four paratypes (2 majors and 2 minors) of *Carebara sakamotoi* (Terayama, Lin et Eguchi, 2012) (one of the most closely related species) borrowed from Dr. Mamoru Terayama. Keys to the Chinese species of *Carebara* were also very useful to learn important characters (Xu, 2003; Liu et al., 2024; AntWiki, 2024).

Measurements (in mm) and indices: TL – Total body length roughly measured from tip of head to tip of gaster; HW – Maximum head width in full-face view; HL – Head length in full-face view from anterior margin of clypeus to mid-point of line across posterior margin of head (in major worker, across basal points of horns); SL – Scape length excluding basal constriction and condylar bulb; PrW – Maximum pronotal width in dorsal view; PtW – Maximum petiolar width in dorsal view; PtL – Maximum length of dorsum of petiolar node in dorsal view*; PptW – Maximum width of postpetiole in dorsal view; PptL – Maximum length of dorsum of postpetiole node in dorsal view*; G1W – Maximum width of gastral tergite I (abdominal tergite IV) in dorsal view; CI – Head width divided by head length x 100; SI – Scape length divided by head width x 100. (*) – lengths of the petiole and postpetiole are more or less arbitrary because in dorsal view the distinction of dorsum and posterior slope is obscure.

TAXONOMY

Genus *Carebara* Westwood, 1840

DIAGNOSIS (workers; applicable to Japanese species only). With features shared by myrmicine ants. Small ants with total body length ranging from 0.8 to 5 mm. Worker caste strikingly dimorphic with major worker (soldier) and minor worker (worker) subcastes. Antenna with 7 flagellomeres (9 antennomeres); antennal club distinct consisting of 2 apical flagellomeres. Anterior margin of clypeus with single pair of long hairs straddling midpoint. Mandible with 5 teeth. Compound eye (simply called eye hereafter) of minor worker very small, generally with only one ommatidium, which is often vestigial. Major worker often with vertexal horns of variable shape and size. Propodeal spines often absent. (For more information including world species, see AntWiki, 2024).

***Carebara lithophila* Yamane, Sasaki et Hosokawa, sp. n.**

<https://zoobank.org/NomenclaturalActs/E31139EA-A4CA-41DD-89EC-0580F516040E>

Figs 1–3, 4 A,C,D

TYPE MATERIAL. Holotype – major worker, Agarisaki, Yonaguni-jima, Yaeyama Islands, Southern Ryukyus, Japan, 11.iii.2020, nest under big stone, Sk. Yamane leg. (deposited in SKYC, Kitakyushu Museum of Natural History and Human History, Japan). Paratypes: all specimens originated from the same colony as the holotype. Four majors and nine minors collected by Sk. Yamane (SKYC), 2 majors and 2 minors collected by F. Ito (Kagawa Univ.), and 5 majors and 6 minors collected by R. Hosokawa (Kagawa Univ.).

WORKER DIAGNOSIS. Antenna with 7 flagellomeres (9 antennomeres); mandible with 5 teeth, of which basal tooth low and reduced. *Major worker*. Body 2.5–2.7 mm in total length; head width 0.58–0.59 mm. In profile view dorsal (‘anterior’) outline of head nearly straight. Vertex with pair of well-developed horns that are longer than their basal width and connected with complete carina. Eye small with one or two indistinct ommatidia. Anterior ocellus always present, but sometimes ill developed. Dorsum of mesosoma essentially smooth and shiny. Metapleural gland bulla entirely sculptured. Propodeal spine absent. Propodeal lobe with evenly curved posterior margin. Petiolar node in profile subtriangular, narrowed apicad. *Minor worker*. Body 0.85–1.00 mm in total length; head width 0.27–0.29 mm. Dorsum of head only superficially punctate and shiny. Obsolete eye generally present. Pronotum with scattered shallow punctation but smooth and shiny. Propodeal spine absent. Petiolar node in profile low, broadly rounded apically. Body yellow.

MAJOR WORKER DESCRIPTION (Fig. 1, 2, Fig. 4A,C,D). Measurements (in mm) and indices (n=5). TL 2.5–2.7, HW 0.58–0.59, HL 0.78–0.79, SL 0.28–0.30, PrW 0.38–0.40, PtW 0.17–0.18, PtL 0.09–1.00, PtH 0.20–0.22, PptW 0.19–0.20, PptL 0.11, PptH 0.13–0.14. CI 73.4–74.7, SI 47.5–51.7. Head *in full-face view* distinctly longer than broad, with deeply concave posterior margin, nearly parallel lateral margins and pair of well-developed horns near posterolateral corners of head; horns widely separated from each other (distance 0.35–0.38 mm), connected with transverse carina, and tapered apicad. Anterior ocellus always present, but sometimes obsolete. Weak mid-cranial line (often obsolete) starting at anterior ocellus and reaching posterior end of unsculptured triangular area of frons behind clypeus. Frontal carina very short, extending slightly beyond level of posterior margin of torulus; frontal lobe broad; distance between frontal lobes subequal to lobe width. Clypeus roughly divided into sloping anterior disc + transverse lateral areas and posterior narrow area, the last being flanked by frontal carinae, and posteriorly not clearly demarcated from frons by suture; anterior disc roughly trapezoidal, almost flat, flanked by strong lateral carinae that are divergent apicad, anteriorly shallowly convex; anterior margin of the disc medially straight to shallowly concave. Mandible triangular, stout, with five teeth on masticatory margin; size of teeth decreasing from apical to basal tooth, the last being low and often obsolete. With head *in profile view*, dorsal (‘anterior’) outline almost flat and ventral (‘posterior’) outline more convex. Eye small, composed of one or two indistinct ommatidia, located distinctly anteriorly on gena at 1/3 length. Antenna with 7 flagellomeres (9 antennomeres) with basal segments of flagellum poorly differentiated; scape short, when laid straight back from its insertion not attaining midlength of cranium, in frontal view with its 2/5 very narrow and apical 3/5 broad and spindle-shaped; pedicel longer than preapical flagellomere; apical flagellomere very long but shorter than remaining flagellomeres combined, apically pointed.

With mesosoma *in dorsal view*, pronotum largest, round, with posterior margin broadly concave; promesonotal suture well defined; mesoscutum broader than long, narrower than pronotum, narrowed posteriad; mesoscutellum weakly differentiated from mesoscutum, narrower than the latter, transverse; metanotal groove sharply defined; propodeal dorsum

slightly longer than broad, widened posteriad, triangularly concave; declivity laterally margined with carinae. With mesosoma *in profile view*, promesonotum forming single dome but divided into two sclerites by promesonotal suture, roundly convex, not smoothly continuous to dorsal outline of propodeum. Pronotum large, posteriorly with small dent at mid-height, ventrally carinate. Mesopleuron clearly demarcated from pronotum but vaguely from mesonotum. Metapleuron fused with propodeum in lower portion; metathoracic spiracle much smaller than propodeal spiracle, often obscure. Propodeum with almost straight dorsal outline; its posterolateral corner roundly angulate; posterior margin shallowly concave; propodeal lobe posteriorly evenly curved; spiracle located near center of lateral face of propodeum.

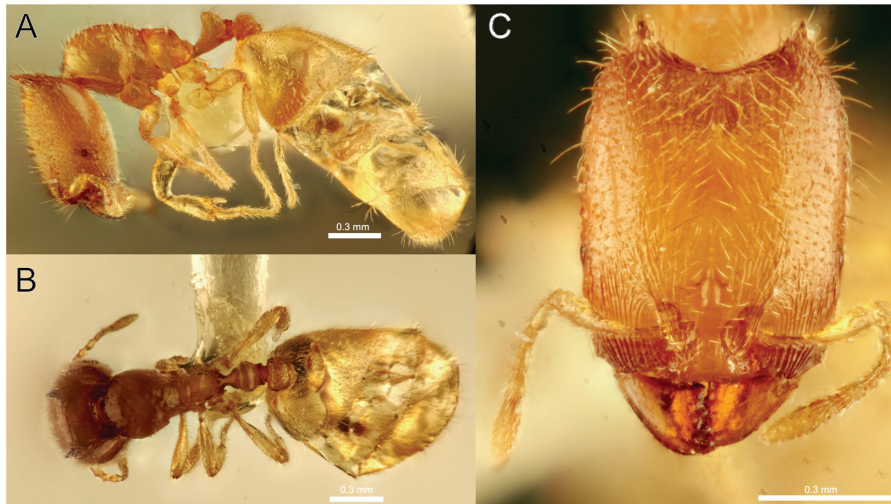


Fig. 1. Major worker of *Carebara lithophila* sp. n. A – habitus in profile, B – habitus in dorsal view, C: head in full-face view.

With waist *in dorsal view*, petiolar node broader than long, with straight anterior and convex lateral margins; postpetiole only slightly broader than petiole, broader than long, with straight anterior and convex lateral margins. With waist *in profile view*, petiole with distinct anterior peduncle; petiolar node with long steep anterior slope, short dorsum and gently sloping posterior slope that is longer than dorsum; ventral margin of petiole straight, without subpetiolar process. Postpetiole lower than petiole, with round apex and long posterior slope that is not clearly separated from dorsum.

Gaster voluminous, much larger than head, mesosoma and waist combined; cinctus on gastral tergite 1 (abdominal tergite 4) well defined, formed by chain of elongate punctures. Legs relatively short; femora basally distinctly flattened; tibiae each shorter than femora, widened apicad.

Body extensively shiny. Anterior half of head dorsum densely with longitudinal striation and matt; posterior half with punctation and rather shiny. Area in front of horn and around anterior ocellus irregularly sculptured. Areas in front of and behind carina connecting horns with fine irregular transverse striae; occiput smooth and shiny. Temple and gena smooth and shiny in posterior 2/3, but space between eye and mandibular base densely longitudinally striate (not reticulate) and matt. Venter of head extensively smooth except in anterolateral area striate. Anterior area of clypeus densely sculptured and matt. Mandible entirely smooth.

Antenna and legs predominantly smooth and shiny. Dorsum of mesosoma largely smooth to very superficially sculptured and shiny; pronotum with irregular striation along its posterior margin. Lateral face of pronotum smooth, with median zone puncto-striate. Mesopleuron extensively smooth, but anteroventrally and posteriorly sculptured. Metapleuron and lateral face of propodeum extensively striate; metapleural gland bulla entirely sculptured. Dorsum of waist smooth; remaining parts sculptured. Gastral tergites and sternites essentially smooth and shiny, with sparse piligerous punctures; pretergite of gastral segment 1 minutely sculptured and matt. Antenna and legs predominantly smooth and shiny; coxae and trochanters irregularly sculptured.

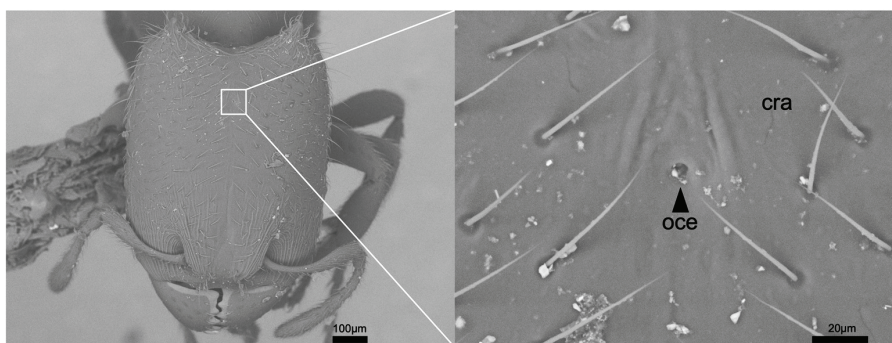


Fig. 2. Head of major worker of *Carebara lithophila* sp. n., showing anterior ocellus.

Head dorsum with suberect hairs of variable length; with head in full-face view its lateral margin posteriorly with sparse long hairs, anteriorly without erect hairs; venter of head with relatively long appressed hairs and sparse erect hairs. Mandible with sparse minute hairs only, but several longer decumbent hairs present along masticatory margin. Clypeus essentially glabrous. Antenna covered with suberect hairs. Mesosomal dorsum with sparse erect/suberect hairs. Waist dorsally with long erect hairs. Dorsum of gastral tergite 1 with erect/suberect hairs of variable length; tergites 2–4 glabrous except for apical zones, which bear long erect hairs; sternite 1 with sparse erect hairs; sternites 2–4 with erect hairs only apically; apical tergite and sternite with erect hairs. Coxae with suberect hairs; femora basally with relatively short suberect hairs on ventral face; fore- and hindtibiae with near-appressed hairs on dorsal (outer) faces, and longer slanting hairs in apical 1/3 of ventral (inner) face; midtibia with longer, often slanting hairs on dorsal face; all tibiae with longer suberect hairs on apicoventral areas; tarsi covered with numerous suberect hairs. Body entirely yellowish brown; clypeus and mandible slightly darker.

MINOR WORKER DESCRIPTION (Fig. 3). Measurements (in mm) and indices (n=5). TL 0.85–1.00, HW 0.27–0.29, HL 0.33–0.36, SL 0.18–0.20, PrW 0.18, PtW 0.08–0.09, PtL 0.05–0.07, PtH 0.09, PptW 0.09, PptL 0.07, PptH 0.07. CI 80.0–82.4, SI 64.3–67.9. Head *in full-face view* longer than broad, with posterior margin very shallowly emarginate, lateral margins parallel and posterolateral corner roundly angulate; occipital margin not carinate. With head *in profile view*, dorsal ('anterior') and ventral ('posterior') margins straight and almost parallel. Frontal carinae very short and parallel; frontal lobe small, only partly covering antennal socket. Clypeus composed of posterior small area flanked by frontal lobes and anterior large transverse area bridged by narrow median disc with posterior area, anteriorly shallowly convex, with anterior margin curved. Mandible elongate-triangular with five teeth; apical tooth large and basal one very small. Eye very small, sometimes vestigial,

located anterior to midlength of cranium. Antenna with 7 flagellomeres (9-antennomeres); scape when laid straight back from its insertion reaching midlength of cranium, with apical 3/5 distinctly widened and flattened: pedicel relatively large, only slightly shorter than flagellomeres 1-5 that are each very small and broader than long; preapical flagellomere globular, slightly longer than broad; apical flagellomere large, parallel-sided in basal half, then narrowed apicad.



Fig. 3. Minor worker of *Carebara lithophila* sp. n. A – habitus in profile, B – habitus in dorsal view, C – head in full-face view.

Mesosoma *in dorsal view* much narrower than head, distinctly constricted at metanotal groove; promesonotal suture almost invisible; promesonotum slightly longer than broad, roundly convex laterally, distinctly narrowed posteriad to metanotal groove at which mesosoma is narrowest; propodeum slightly broader than long, laterally convex. With mesosoma *in profile view*, its dorsal outline rather straight but interrupted by metanotal groove; lateral face of pronotum large, round; mesopleuron demarcated from pronotum but not from mesonotum; metapleuron separated from mesopleuron with distinct furrow but fused with lateral face of propodeum to form single sclerite; propodeum posteriorly carinate. Legs short; hindtibia shorter than hindfemur, distinctly widened apicad.

With waist *in dorsal view*, petiolar node broader than long, with anterior margin straight and lateral margin convex; postpetiole node broader than long, with parallel anterior and posterior margins, and weakly convex lateral margin. With waist *in profile view*, petiole with distinct anterior peduncle; petiolar node low, globular, with broadly rounded apex; subpetiolar process absent; postpetiole much lower than petiole, with less convex apex. Gastral segment 1 occupying major part of gaster, with flat dorsal and convex ventral outlines; tergite 1 in dorsal view with deeply emarginate anterior margin and convex lateral margin.

Body extensively shiny. Almost entire dorsum of head covered with piligerous punctures of moderate density but shiny; frontal lobe rugosopunctate; lateral portion of anterior transverse area of clypeus longitudinally rugose. Lateral and ventral faces of head essentially smooth. Mandible essentially smooth with scattered punctures, shiny. Antenna extensively smooth with sparse punctation and shiny. Mesosoma essentially smooth, with sparse punctation and

shiny; pronotal lobe (neck) sculptured but shiny; punctures on mesopleuron small and dense. Waist mostly smooth and shiny dorsally, but punctate laterally; postnodal area of petiole densely punctate and matt on both dorsal and lateral faces. Gaster essentially smooth and shiny. Legs smooth with superficial punctation and shiny.

Entire dorsum of body densely covered with short erect/suberect hairs and very sparse longer erect hairs, but gastral tergite 1 almost lacking long hairs. Anterior margin of clypeus with pair of long hairs straddling midpoint and 2–3 pairs of shorter hairs laterally. Antenna and legs covered with short suberect hairs.

COMPARATIVE NOTES. In the major worker, *Carebara lithophila* sp. nov. is separated from all the other Japanese congeners by the following combination of characteristics: 1) horns on vertex very large, longer than its basal width, widely separated from each other, and connected with complete transverse carina; 2) posterior half of head dorsum only sparsely punctate and shiny; 3) anterior ocellus present (Fig. 2), 4) basal tooth of mandible low and apically blunt; 5) mesopleuron without suture separating it into upper and lower sections; 6) posterodorsal corner of propodeum roundly angulate (Fig. 4C,D); 7) petiolar node in profile subtriangular, narrowed apicad; 8) subpetiolar process absent. In the minor worker, the new species is easily separated from all the other Japanese congeners by the following combination of characteristics: 1) head dorsum with punctures, but smooth and shiny, 2) pronotal dorsum essentially smooth, scattered with shallow punctures, and shiny, 3) propodeal spine absent, 4) body yellow.

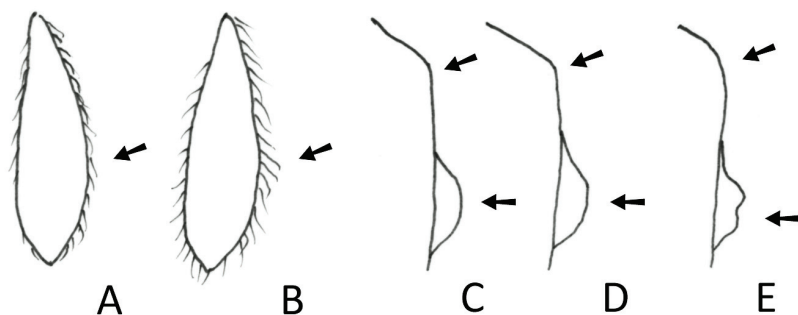


Fig. 4. Pilosity on foretibia in major worker (A, B), and posterior margin of propodeum in profile view in major worker (C–E). A, C, D – *Carebara lithophila* sp. n.; B, E – *C. sakamotoi*.

The new species seems most closely related to *Carebara sakamotoi* Terayama, Lin et Eguchi, 2012 from Taiwan. In the major worker it can be distinguished from the latter by 1) head in full-face view with almost parallel lateral margins (lateral margins weakly convex in *sakamotoi*), 2) anterior ocellus present (absent in *sakamotoi*), 3) space between mandibular base and eye (malar space) with strong longitudinal striae (striation more irregular and weaker in *sakamotoi*), 4) posterodorsal area of ventral face of head smooth (ventral face of head largely weakly sculptured in *sakamotoi*), 5) mesopleuron smooth and very shiny in its anterior 3/4 (more extensively sculptured in *sakamotoi*), 6) metapleural gland bulla entirely sculptured (smooth in posterior half in *sakamotoi*), 7) dorsal (outer) face of fore- and hind tibiae with short appressed to decumbent hairs (with longer suberect hairs in *sakamotoi*) (Fig. 4A vs. B), 8) with mesosoma in full-profile view, posterior corner of propodeum slightly angulate (rounded in *sakamotoi*; note that the propodeal corner should be viewed exactly from the same direction, otherwise its shape looks very differently) (Fig. 4C & D vs. E),

9) propodeal lobe with posterior margin evenly curved (posterior margin more irregular in shape in *sakamotoi*) (Fig. 4C & D vs. E). The last character is variable in the new species, and might be a poor marker. In the minor worker, the new species is very difficult to separate from *C. sakamotoi*. The hairs on the dorsal (outer) face of the foretibia tend to be short and somewhat decumbent in the new species (condition variable), while they are rather long and distinctly suberect in the latter. The propodeal lobe is generally higher ('broader') and with more smoothly curved posterior margin (but shape variable) in the new species, but it is lower ('narrower') and with irregular posterior margin. According to the original description of *C. sakamotoi* the minor worker lacks the eye (Terayama *et al.*, 2012), but in the two paratypes of *C. sakamotoi* examined this time an obsolete ommatidium is seen as in the new species; the head dorsum is said to be reticulate, but actually distinctly punctate as in the new species; the metanotal groove is said to be absent, but it can be seen in both dorsal and lateral views as in the new species.

Carebara lithophila sp. n. also resembles *C. bihornata* (Xu, 2003) in having a pair of well-developed vertexal horns that are connected with a complete transverse carina, and nearly straight dorsal ('anterior') outline of head when viewed in profile (see also Xu *et al.*, 2024). However, the new species can be distinguished from the latter in the following combination of features in the major worker: 1) eye much smaller with only one or two ill-defined facets (larger, with four facets in *bihornata*), 2) anterior ocellus always present (absent in *bihornata*), 3) petiole subtriangular, distinctly narrowed apicad (more globular in *bihornata*; see Fig. B on page 177 in Xu *et al.*, 2024), 4) mesosomal pilosity sparser (rather dense in the latter). In the minor worker, *C. bihornata* seems to lack any sign of the eye, while in the new species the vestigial facet of the eye generally exists.

ETYMOLOGY. The specific epithet refers to the nesting site of the colony from which the type series was collected ('litho-' means stone, and '-phila' means favoring).

ACKNOWLEDGEMENTS

We would like to express our sincere thanks to Prof. Fuminori Ito (Kagawa University) for his help in collecting the material, Dr. Mamoru Terayama (Tokyo metropolitan University) for his kindness in lending us paratype specimens of *Carebara sakamotoi* and valuable comments on the manuscript, and Prof. Xheng-hui Xu (Southwest Forestry University, Kunming) for the gift of the splendid book on the type material described by him. This study was partly supported by KAKENHI (18K06421, leader Fuminori Ito).

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