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A NEW SPECIES OF THE ANT GENUS *CALYPTOMYRMEX* EMERY, 1887 (HYMENOPTERA: FORMICIDAE: MYRMICINAE) FROM LAOS AND NEW RECORDS OF *C. RECTOPILOSUS* FROM THAILAND AND HONG KONG

Weeyawat Jaitrong[1*] and Seiki Yamane[2]

ABSTRACT

A new species of the ant genus *Calyptomyrmex* Emery, 1887 is described from Laos under the name *C. laotius* sp. nov. based on the worker caste. This species is easily distinguished from other congeners by having sparse, very long hairs and dense, fine deep punctures on the head and promesonotum. *Calyptomyrmex rectopilosus* Dlussky & Radchenko, 1990 is recorded from Hong Kong and Thailand for the first time. A key to the species of the genus of Continental Southeast Asia is provided. The distributional pattern of *Calyptomyrmex* in continental Southeast Asia is also discussed.

Keywords: ant, *Calyptomyrmex laotius*, new species, new record, distribution, Laos, Continental Southeast Asia

INTRODUCTION

Members of the genus *Calyptomyrmex* Emery, 1887 are rare ants which are most often encountered as ground foragers or in leaf litter (SHATTUCK, 2011). Currently, 37 valid species names are known (ANTWEB, 2017). The genus is distributed in the Old World tropics and subtropics occurring in tropical Africa, Bhutan, India, Sri Lanka, China, Indo-China, Sundaland and Australasian region (BARONI URBANI, 1975; BOLTON, 1981; JAITRONG & NABHITABHATA, 2005; SHATTUCK, 2011; EGUCHI *ET AL.*, 2011; AKBAR & BHARTI, 2015; BHARTI *ET AL.*, 2016). The distribution of most species of the genus seems to be restricted. So far, eight species have been recorded from Southeast Asia (SHATTUCK, 2011). Among them only two species, *C. beccarii* Emery, 1887 and *C. rectopilosus* Dlussky & Radchenko, 1990 were recorded from Continental Southeast Asia (JAITRONG & NABHITABHATA, 2005; SHATTUCK, 2011; EGUCHI *ET AL.*, 2011; HOSOISHI *ET AL.*, 2013).

Recently, we collected an undescribed species of *Calyptomyrmex* from Laos that has very long hairs and dense, fine deep punctures on the head and promesonotum. In this paper we describe this new species based on the worker caste, and discuss the distribution pattern of the three Continental Southeast Asian species.

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[1] Thailand Natural History Museum, National Science Museum, Technopolis, Khlong 5, Khlong Luang, Pathum Thani, 12120 Thailand.
[2] Kagoshima University Museum, 1-21-30, Kagoshima-shi, 890-0065 Japan.
*Corresponding author. E-mail: polyrhachis@yahoo.com
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MATERIALS AND METHODS

The new species was collected on 13 June 2010 from leaf litter in the dry evergreen forest located at ca. 300 m a.s.l., in Phang Dang Village, Pak Gnum District, Vientiane Province, Laos. The holotype and paratypes are pin-mounted dry specimens and deposited in the Natural History Museum of the National Science Museum, Thailand (THNHM) and Seiki Yamane's Collection at the Kitakyushu Museum of Natural History and Human History, Japan (SKYC). The specimens of other species deposited in Ant Museum at the Faculty of Forestry, Kasetsart University, Thailand (AMK), SKYC and THNHM were also examined.

Most observations were made with a ZEISS Discovery.V12 stereoscope. Multi-focused montage images were produced using Helicon Focus 4.75 Pro from a series of source images taken by a Canon EOS Kiss×4 digital camera attached to a Nikon ECLIPSE E600 microscope. Five workers (holotype and paratypes) were measured using a micrometer. All measurements are expressed in millimeters to the hundredths place.

The general terminology of the worker ants follows HÖLLDOBLER & WILSON (1990) and BOLTON (1994). For the important characters of the worker in the genus *Calyptomyrmex* used in this paper, see BOLTON (1981) and SHATTUCK (2011).

The abbreviations used for the measurements and indices are as follows (cf. SHATTUCK, 2011):

CFW	Clypeal fork width measured between the anterior-most points of the teeth.
HL	Head length in full-face view, measured in straight line from the anterior clypeal margin to the mid-point of a line drawn across the posterior margin of the head.
HW	Maximum width of the head capsule measured in full-face view.
ML	Mesosomal length, the diagonal length of the mesosoma in profile, from the point at which the pronotum meets the cervical shield to the posterior margin of the metapleuron.
MTL	Maximum length of mid tibia, excluding the proximal part of the articulation which is received into the distal end of the femur.
PetL	Maximum length of the petiolar node in dorsal view.
PetW	Maximum width of the petiolar node in dorsal view.
PronW	Maximum width of the pronotum in dorsal view.
SL	Length of the scape (first antennal segment), excluding the basal constriction and condylar bulb.
CI	Cephalic index, HW×100/HL.
PetI	Petiolar index, PetW×100/PetL.
SI	Scape index, SL×100/HW.

SYSTEMATICS

Genus *Calyptomyrmex* Emery, 1887

Calyptomyrmex Emery, 1887: 471. Type-species: *Calyptomyrmex beccarii* Emery, 1887: 472, by monotypy.

Weberidris Donisthorpe, 1949a: 281. Type-species: *Weberidris rufobrunnea* Donisthorpe, 1949a: 281, by original designation. Synonymy by DONISTHORPE, 1949b: 186; BROWN, 1949: 84.

***Calyptomyrmex laotius* Jaitrong & Yamane, sp. nov.**
(Figs. 1–3)

Types: Holotype worker (THNHM-I-00208, deposited in THNHM), Laos, Vientiane Province, Pak-Gnum Distrist, Phang Dang Village, 13 June 2010, W. Jaitrong leg. Paratypes: two workers, same data as holotype (THNHM-I-00209 and THNHM-I-00210, deposited in THNHM); two workers, same locality and date, Sk. Yamane leg. (THNHM-I-00211 and THNHM-I-00212, deposited in SKYC and THNHM, respectively); two workers, same locality and date, Sk. Yamane leg. (SKYC).

Measurements (in mm).—*Holotype*: CFW 0.13, HL 0.73, HW 0.76, ML 0.69, MTL 0.36, PetL 0.17, PetW 0.30, PronW 0.56, SL 0.36, CI 104, PetI 180, SI 47. *Paratypes* (n = 4): CFW 0.12–0.13, HL 0.69–0.76, HW 0.76–0.79, ML 0.69–0.73, MTL 0.36–0.38, PetL 0.17–0.20, PetW 0.30–0.36, PronW 0.56–0.59, SL 0.33–0.36, CI 104–110, PetI 180–200, SI 42–46.

Diagnosis.—The hairs on head and body are fine (same width through entire length), simple and blunt at the apex. The promesonotal hairs are much longer, often more than two times as long as those on the head. The propodeal spine in profile is triangular and short, shorter than broad at the base. The entire head and promesonotum are covered with dense, fine, deep punctures or fine macropunctures. The first gastral tergite is reticulate and opaque.

Description (holotype and paratypes).—Head in frontal view almost as long as broad or slightly shorter than broad, subtriangular, broader posteriorly, with straight posterior margin and convex posterolateral corner; antennal scrobe deep and broad, with dorsal and posterior margins lamellate; mandible subtriangular, masticatory margin with large apical tooth followed by medium-sized subapical tooth, a smaller tooth, diastema, and a series of 4–5 denticles, the series reduced in size toward basal tooth; basal margin of mandible almost straight, lacking denticles; eyes at ventral margin of antennal scrobe, relatively small, with 4–5 ommatidia in greatest diameter; scape short, broadest at mid-length. Mesosoma short, with strongly convex dorsal outline; propodeal spines triangular and short, shorter than broad at base; propodeal declivity flat; propodeal lobes low, with weakly curved posterior margin, uniform in thickness. Petiole in profile with node slightly higher and narrower than postpetiole, its ventral outline almost straight; in dorsal view petiolar node subrectangular, much broader than long, subequal in width to postpetiole; postpetiole in dorsal view much broader than long, with convex lateral margins.

Head, promesonotum, propodeum, propodeal declivity and petiole with dense fine deep punctures; bottom of antennal scrobe densely and superficially reticulate and weakly shiny; punctures on meso- and metapleura larger than those on head and pronotum; dorsalmost portion of metapleura with several short irregular rugae; antennal scrobes and coxae with fine macropunctures; entire antennal scape, femora, and tibiae covered with micropunctures; mandible striate in basal two-thirds, smooth and shiny apically; entire first gastral tergite finely and superficially reticulate and opaque.

Dorsum of head, petiole, postpetiole and first gastral tergite with sparse, fine, standing hairs of similar lengths; promesonotum with 12–14 longer hairs (often > 2 times as long as those on head); ventral surface of head with sparse, short, appressed hairs; antennae with dense short pubescence, scapes with 3–4 short, fine hairs on anterior margin (Fig. 1).

Entire body dark reddish brown to dark brown; legs, terminal segment of antennae (XI) and apex of gaster paler than other parts; petiole, postpetiole and first gastral segment darker than other parts.

Etymology.—The specific epithet is an adjective meaning "of Laos".

Distribution.—Laos (Vientiane Province, Fig. 7).

Ecology. The type series of the new species was collected from leaf litter and soil surface in a dry evergreen forest at an elevation of ca. 300 m above sea level during the rainy season.

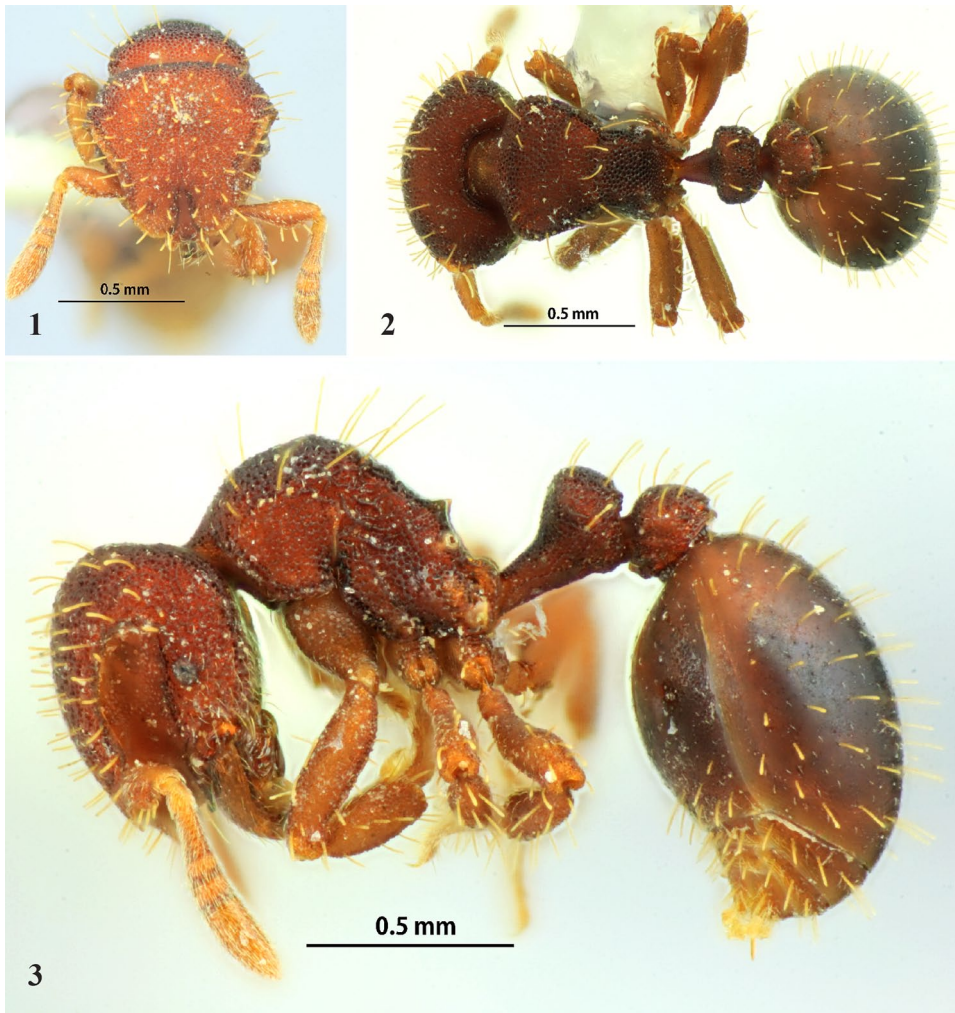
Comparative notes.—Our new species, *C. laotius*, can be easily distinguished from other species of the genus by the fine, very long hairs on promesonotum and dense, fine deep punctures on the head and promesonotum. *C. laotius* sp. nov. is most similar to *C. rectopilosus* in general appearance, but very distinct. *C. laotius* can be easily distinguished from *C. rectopilosus* by the following characteristics: head and mesonotal dorsum with fine deep punctures (with macropunctures and bearing several longitudinal rugae on dorsa of head and mesosoma in *C. rectopilosus*); distinctly larger with HW 0.76–0.79 (0.56–0.66 in *C. retopilosus*); promesonotal hairs often 2 times as long or more as those on head (almost as long as those on head in *C. rectopilosus*); promesonotum with 12–14 hairs (more than 20 in *C. rectopilosus*).

Calyptomyrmex rectopilosus Dlussky & Radchenko, 1990
(Figs. 4–6)

Calyptomyrmex rectopilosus Dlussky & Radchenko, 1990: 124, Figs. 7, 8; SHATTUCK, 2011: 17; EGUCHI *ET AL.*, 2011: 13.

Types: Holotype worker "Vietnam, Arch [ipelago] Baitylong, Isl. Dongkho, No. 36-87, 22.03.[19]87, A. Radchenko leg." (label in Russian); (Schmalhausen Institute of Zoology, National Academy of Sciences of Ukraine (A. Radchenko, pers. comm.); this is Quang Ninh Province of Vietnam (see also SHATTUCK, 2011).

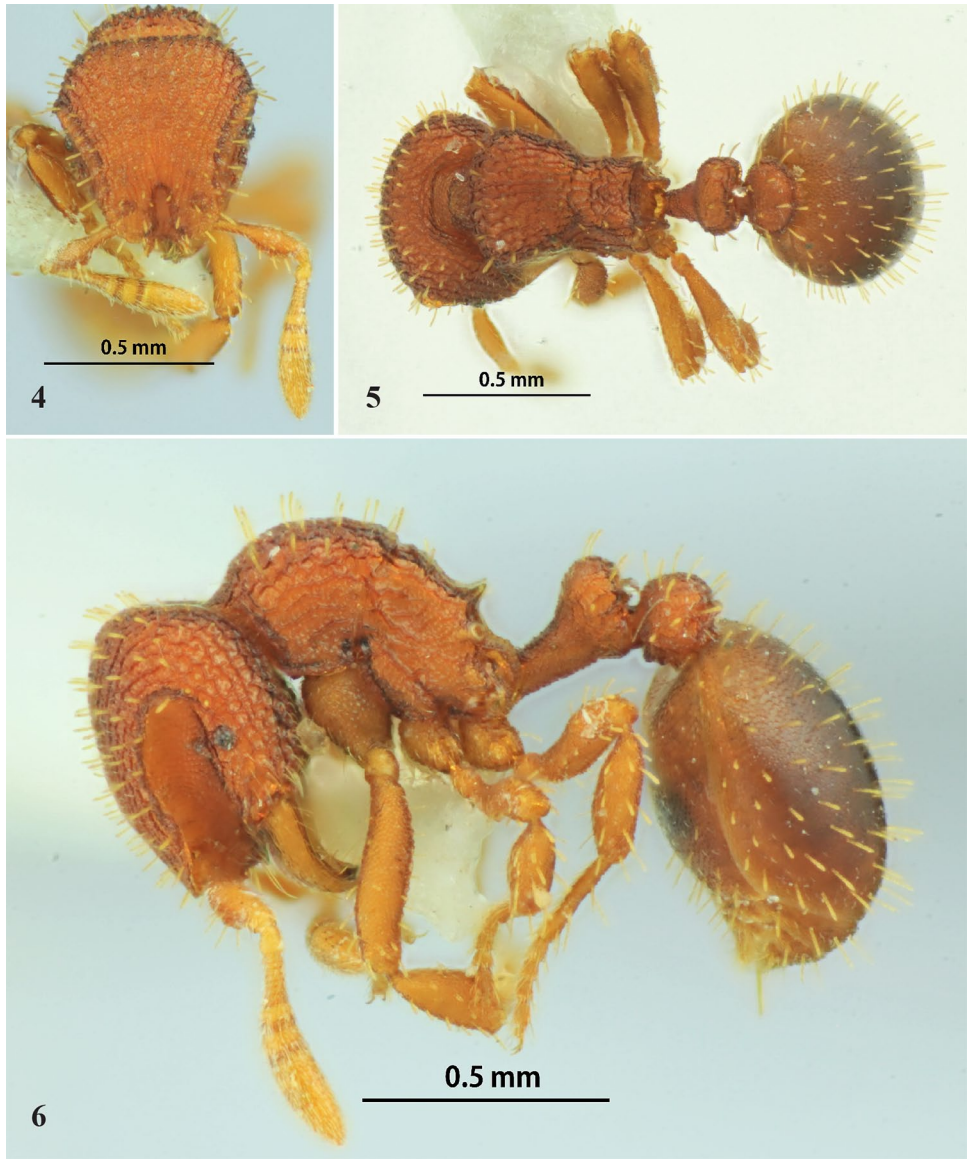
Material examined: ***Hong Kong.*** One worker, Taipo Kau, Girassol, 25 September 2000, Sk. Yamane leg. (SKYC). ***Thailand.*** One worker, N Thailand, Chiang Mai Province, Muang District, Doi Suthep-Pui National Park, 8 June 2000, S. Hasin leg. (AMK); one worker, W Thailand, Tak Province, Umphang District, Umpang Wildlife Sanctuary, Namtok Thilosu, 560 m a.s.l., rotten wood, 29 May 2015, Sk. Yamane leg., TH15-SKY-211 (THNHM); one worker, W Thailand, Kanchanaburi Province, Thong Pha Phum District, dry evergreen forest, 311 m a.s.l., 15 April 2004, C. Bourmas leg. (THNHM); one worker, W Thailand, Kanchanaburi Province, Sinakarin Dam National Park, 265 m a.s.l., 18 and 19 January 2014, P. Pitaktunskul leg. (THNHM); four workers, NE Thailand, Nakhon Ratchasima Province, Wang Nam Kheao District, Sakaerat Environmental Research Station, 250 m a.s.l., 17 August 2009, W. Jaitrong leg., WJT09-TH-22/15 (THNHM, SKYC); two workers, NE Thailand, Nakhon Ratchasima Province, Khao Yai National Park, 350 m a.s.l., 17 June 2000, W. Jaitrong leg. (AMK, THNHM); one worker, central Thailand, Saraburi Province, Khao Yai National Park, Kor kod Waterfall, 300 m a.s.l., 16 August 2002, D. Wiwatwitaya leg. (AMK); one worker, central Thailand, Saraburi Province, Pukae Botanical Garden, 78 m a.s.l., 29 June 2002, Sk. Yamane leg. (SKYC); one worker central Thailand, Nakhon Nayok Province, Nang Rong Waterfall, 30 March 2005, Sk. Yamane leg. (SKYC); one worker, E Thailand, Chachoengsao Province, Tha Takiab District, Khao Ang Reu Nai Wildlife Sanctuary, collected from leaf litter, 250 m a.s.l., 22 August 2003, W. Jaitrong leg., WJT03-TH-258 (THNHM); one worker, same locality, 21 August 2003, W. Jaitrong leg. (THNHM); two workers, same locality, 20 and 21 August 2003, Sk. Yamane (SKYC); one worker, E Thailand, Chanthaburi Province, Soi Dao District, Khao Soi Dao Wildlife Sanctuary, 19 July 1997, Sk. Yamane leg. (SKYC); one worker, same locality, 3 June 2001, C. Bourmas leg. (AMK); four workers, same locality, date and collector (AMK, THNHM); four workers, same locality and date, Sk. Yamane leg. (THNHM, SKYC); four workers, same



Figures 1–3. *Calyptomyrmex laotius* sp. nov., holotype worker. 1, head in frontal view; 2, body in dorsal view; 3, body in lateral view.

locality, 4 June 2001, Sk. Yamane leg. (THNHM); two workers, S Thailand, Ranong Province, Khong Naca Wildlife Sanctuary, Evergreen Forest, 30 December 2000, S. Hasin leg. (THNHM); 14 workers, S Thailand, Nakhon Si Thammarat Province, Tapi Watershed Research Station, collected from rotten wood, 13 October 2011, W. Jaitrong leg., TH11-WJT-79 (THNHM, SKYC); two workers, same locality and date, Sk. Yamane leg., TH11-SKY-080 (=TH11-WJT-79) (AMK, THNHM, SKYC); 11 workers, S Thailand, Nakhon Si Thammarat Province, Noppitam District, Khao Luang, Krung Ching Waterfall, 20 May 2003, W. Jaitrong leg., TH03-WJT-339 (THNHM).

Measurements.—*Non-types* (n = 10): CFW 0.12–0.17, HL 0.63–0.76, HW 0.56–0.66, ML 0.56–0.66, MTL 0.26–0.35, PetL 0.12–0.17, PetW 0.25–0.30, PronW 0.43–0.59, SL 0.26–0.33, CI 86–90, PetI 160–225, SI 47–53.



Figures 4–6. *Calyptomyrmex rectopilosus*, non-type worker (Thailand). 4, head in frontal view; 5, body in dorsal view; 6, body in lateral view.

Diagnosis.—The hairs on the head, mesosoma and gaster are fine (same width through entire length or slightly and gradually expanded distally) and blunt at the apex. The promesonotal hairs are almost as long as those on the head or slightly longer. The eye is small, with 2–3 ommatidia in the greatest diameter. The propodeum in profile is armed with a pair of moderately long, narrow teeth. The mandible is striate basally, essentially smooth apically.

The rugae on the dorsum of the head are widely spaced, the underlying punctate surface is clearly visible and the rugae are essentially absent near the posterior margin. The upper portion of the mesosoma is covered with irregular, sinuous rugae that superimpose over the punctate background. The lower portions of the mesosoma, propodeum, petiole and postpetiole are punctate; the gaster is finely and indistinctly punctate and with a semi-matte appearance. The body colour is yellow-red with the gaster slightly darker.

Comparative notes. —This species can be separated from other Continental Southeast Asian congeners by the fine body hairs compared to *Calyptomyrmex* species with spatulate hairs (promesonotal hairs almost as long as those on head or slightly longer), narrow propodeal teeth and the coarse rugae superimposing over a punctate background on dorsum of head.

Distribution. —Vietnam (SHATTUCK, 2011; EGUCHI *ET AL.*, 2011), Cambodia (HOSOISHI *ET AL.*, 2013), Hong Kong, Thailand (new records).

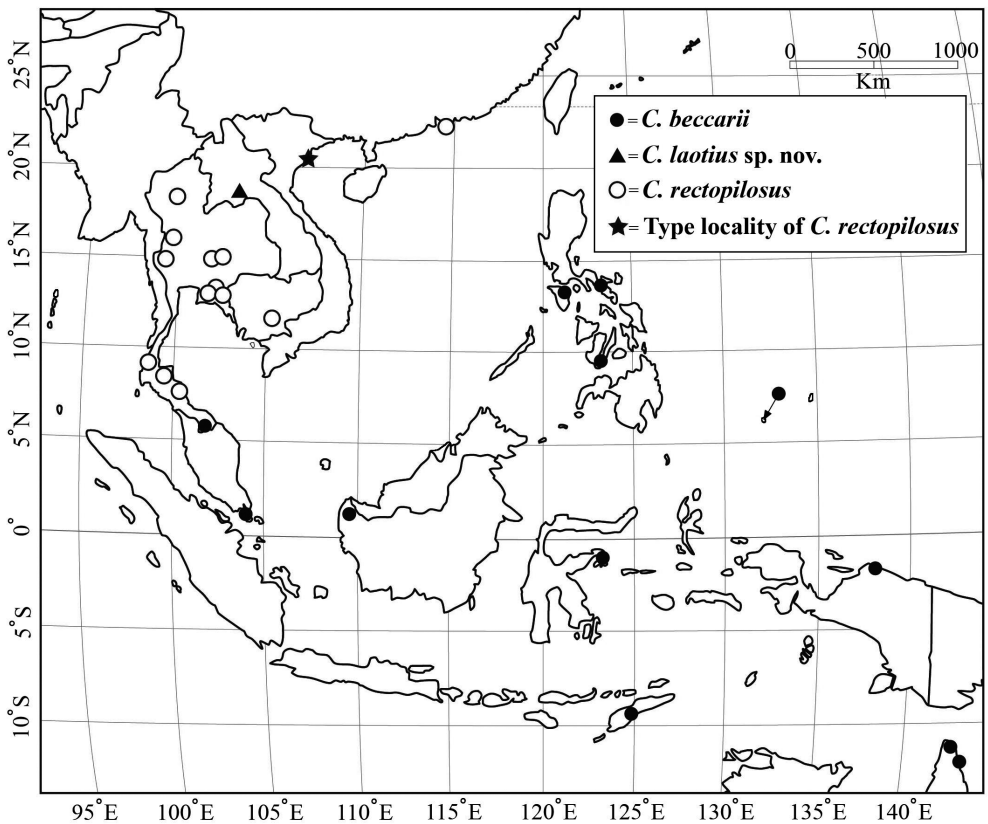


Figure 7. Distribution of *Calyptomyrmex beccarii*, *C. laotius* sp. nov. and *C. rectopilosus* in Southeast Asia based on literature and material examined.

Key to workers of Continental Southeast Asian species of *Calyptomyrmex*

1 Hairs on head and mesosoma spatulate (narrow basally and expanded distally, with a rounded tip); propodeal teeth absent.....*C. beccarii* Emery, 1887
- Hairs on head and mesosoma fine (same width through entire length), simple and blunt at apex; propodeal teeth present.....2
2 Head and mesonotum with only fine deep punctures or macropunctures (Figs. 1 and 2); head width 0.76–0.79 mm; promesonotal hairs often ≥ 2 times as long as those on head (Fig. 3); promesonotum with 12–14 hairs.....*C. laotius* sp. nov.
- Head and mesonotum with macropunctures and bearing several longitudinal rugae (Figs. 4 and 5); head width 0.56–0.66 mm; promesonotal hairs almost as long as those on head (Fig. 6); promesonotum with more than 20 hairs..... .....*C. rectopilosus* Dlussky & Radchenko, 1990

DISCUSSION

The shape and length of hairs on the body, the configuration of the propodeal teeth and sculpturing on body surfaces were used by SHATTUCK (2011) to distinguish Southeast Asian species of *Calyptomyrmex*. Three species of *Calytomyrmex* are now known from Continental Southeast Asia and can be divided into two groups: 1) species that have spatulate hairs (narrow basally and expanded distally, with a rounded tip) and lack propodeal teeth (*C. beccarii* Emery, 1887), and 2) species that have fine hairs (with the same width throughout entire length) and have propodeal teeth (*C. laotius* sp. nov. and *C. rectopilosus* Dlussky & Radchenko, 1990).

C. rectopilosus was previously recorded from Vietnam and Cambodia (DLUSSKY & RADCHENKO, 1990; EGUCHI *ET AL.*, 2011; SHATTUCK, 2011; HOSOISHI *ET AL.*, 2013). Here we report this species from Hong Kong and Thailand for the first time. *C. rectopilosus* was known to nest in rotten twigs and small fragments of rotten wood in well-developed forests in Vietnam (SHATTUCK, 2011) and it was collected from leaf litter in a rubber plantation in Cambodia (HOSOISHI *ET AL.*, 2013, cited as *Calyptomyrmex* sp. 6 of SKY). In Thailand, *C. rectopilosus* is rare, but occurs in several parts of the country (Fig. 7); its southernmost known distribution is in Nakhon Si Thammarat Province, ca. 350 km south of the Isthmus of Kra. This species inhabits lowland (78–570 m a.s.l.), where the highest altitude is in Chiang Mai Province, northern Thailand. We collected this species from leaf litter and rotten wood in primary forests, disturbed forests and rubber plantations.

Calyptomyrmex laotius is known only from the type series collected in Pak-Gnum Distrist, Vientiane Province, central Laos, northern part of Indo-China. *C. beccarii* was recorded from the southernmost part of Thailand, Narathiwat Province (JAITRONG & NABHITABHATA, 2005, cited as *C. emeryi* Forel, junior synonym of *C. beccarii*), Singapore, north-east to the Philippines and south to Papua New Guinea and northern Australia (SHATTUCK, 2011). *C. rectopilosus* occurs in continental Southeast Asia from northern Vietnam, Cambodia to southern Thailand, ca. 350 km south of the Isthmus of Kra (Fig. 7).

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