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Redefinition of the genus *Bannapone* and description of *B. cryptica* sp. nov. (Hymenoptera: Formicidae: Amblyoponinae)

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Abstract

The ant genus *Bannapone* was established by Xu in 2000 and has been recognized as one of the rarest ant genera in the world. In the course of our careful examination of Asian species of *Stigmatomma*, we have found that the following *Stigmatomma* species share a unique morphological characteristic in mandibular dentition with *Bannapone mulanae* and *B. scrobiceps*: *Stigmatomma caliginosum* (Onoyama, 1999), *Stigmatomma fulvida* (Terayama, 1987), *S. pertinax* (Baroni Urbani, 1978), *S. zwaluwenburgi* Williams, 1946 and an unnamed species “*Stigmatomma* sp. eg-3”. In the present paper, we redefine *Bannapone*, describe “*Stigmatomma* sp. eg-3” as a new species of *Bannapone*, and transfer *S. caliginosum*, *S. fulvida*, *S. pertinax* and *S. zwaluwenburgi* Williams, 1946 to *Bannapone*.

Key words: *Bannapone*, *Stigmatomma*, new species, new combination, Vietnam

Introduction

The ant genus *Bannapone* was established in the subfamily Ponerinae by Xu (2000) based on a single dealate queen (*B. mulanae* Xu, 2000) collected from a soil sample in a semi-evergreen monsoon forest of Yunnan Province, China. The genus was then assigned by Bolton (2003) to the subfamily Amblyoponinae. The genus has been recognized as one of the rarest ant genera in the world, and very recently Guénard *et al.* (2013) described a second species, *B. scrobiceps*, on the basis of two workers from Yunnan, and then modified the concept of the genus. In addition, K. Eguchi (one of the present authors) collected a colony of an amblyoponine species with peculiar mandibles in northern Vietnam, and recognized the dealate queen of the colony resembled that of *Bannapone mulanae*. However, Eguchi *et al.* (2014) did not refer to Guénard *et al.* (2013) and treated the species as “*Stigmatomma* sp. eg-3”, not a member of *Bannapone*.

In the course of our careful examination of Asian species of *Stigmatomma*, we have found that the following five *Stigmatomma* species shared a unique morphological characteristic in mandibular dentition with *Bannapone mulanae* and *B. scrobiceps*: *Stigmatomma caliginosum* (Onoyama, 1999), *S. fulvida* (Terayama, 1987), *S. pertinax* (Baroni Urbani, 1978), *S. zwaluwenburgi* Williams, 1946 and an unnamed species “*Stigmatomma* sp. eg-3”. In the present paper, we redefine *Bannapone*, describe “*Stigmatomma* sp. eg-3” as *Bannapone cryptica* sp. nov., and transfer *S. caliginosum*, *S. fulvida*, *S. pertinax* and *S. zwaluwenburgi* Williams, 1946 to *Bannapone*.

Material and methods

Abbreviations of the specimen depositories are: VNMN, Vietnam National Museum of Nature, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam; MCZC, Museum of Comparative Zoology, Harvard University, Cambridge,

Massachusetts, USA; MHNG, Muséum d'Histoire Naturelle, Geneva, Switzerland; NHMB, Naturhistorisches Museum, Basel, Switzerland; NIAES, National Institute for Agro-Environmental Sciences, Ibaraki, Japan; OMNH, Osaka Museum of Natural History, Osaka, Japan. The images of type material provided by AntWeb (<http://www.antweb.org/>) were also examined.

Multi-focused, montage images were produced using Helicon Focus Pro 5.3.10 or 6.2.2 (Helicon Soft Ltd., <http://www.heliconsoft.com/>) from a series of source images (5184x3456 pixels) taken using a Canon Eos Kiss X5 digital camera attached to a Nikon AZ100 microscope. Fine hairs and other features that were not recognized automatically were copied from the focused parts from the source images on to the montage image using the retouching function of Helicon Focus Pro. Artifacts (ghost images) and unnecessary parts (unfocused appendages, etc.) surrounding or covering target objects were erased and cleaned up using the retouching function of Helicon Focus Pro. Finally, the background was cleaned up, and the color balance, contrast and sharpness were adjusted using Adobe Photoshop CS6.

Photographs for measurement were taken using a Nikon Coolpix 8400 digital camera attached to a Nikon AZ100 microscope under suitable magnification, and the following parts were measured with ImageJ 1.49m (National Institute of Mental Health, USA, available at <http://imagej.nih.gov/ij/>) and then indices were calculated: HL, maximum length of head from the tip of the median peg-like seta of the anterior clypeal margin to the level crossing the posterolateral ends of head; HW, maximum width of head in full-face view (excluding eyes in queens); MBL, maximum length of mandible from outer side of mandibular insertion to mandibular apex; SL, maximum measurable length of scape, from the proximal point of scape shaft, not including the condyle, to the distal end of scape; ML, mesosomal length in dorsal view measured from the mid-point of anterior margin of promesonotal dome to the mid-point of a transverse line spanning the posteriormost points of metapleuron; PNW, maximum width of pronotum; HFL, length of hind femur; PL, maximum diagonal length of petiole (abdominal segment II) in lateral view measured from the apex of subpetiolar process to the posterodorsal corner of the petiole; PW, maximum width of the node of petiole; A3W, maximum width of abdominal tergite III (gastral tergite I); A4W, maximum width of abdominal tergite IV (gastral tergite II); $CI=HW/HL \times 100$; $MBI=MBL/HW \times 100$; $SI=SL/HW \times 100$; $MI=ML/PNW \times 100$; $HFI=FL/HW \times 100$; $A3I=A3W/PW \times 100$; $A4I=A4W/A3W \times 100$.

Discussion of the status of *Bannapone*

Molecular phylogenies (Saux *et al.* 2004, Moreau *et al.* 2006, Brady *et al.* 2006) have supported an amblyoponine clade composed of *Concoctio* and *Prionopelta*, both of which show reduced numbers of teeth on the mandibles (2 and 3, respectively). Guénard *et al.* (2013) inferred that *Bannapone* belongs to the *Concoctio*+*Prionopelta* clade because it possesses a 3-toothed mandible. And then they redefined *Bannapone* as the genus characterized by “the peculiar shape of the mandibles formed of three teeth on the masticatory margin with the apical tooth very long and followed by 2 blunt finger-like basal teeth”. They also noted, “*Bannapone* is also distinct from *Prionopelta* by the high ratio of the mandible length relative to head length (> 0.75), the indistinct constriction between the abdominal segments III and IV, and with the limitations presented above, by the presence of the abdominal segments III and IV as large as the other segments, which combined length represents less than half of the total length of the gaster”. Our careful examination of Asian species of *Stigmatomma*, however, revealed that *S. caliginosum*, *S. fulvida*, *S. pertinax*, *S. zwaluwenburgi* and “*Stigmatomma* sp. eg-3” (described below as *Bannapone cryptica* sp. nov.) share a peculiar shape of the mandibles (for *B. cryptica* see Figs. 1, 2, 5; for the other species see AntWeb and original description): mandible elongate and slender; apical tooth forming an elongate and falcate apical blade; a preapical denticle often present near the apex of the blade; 4–5 blunt or truncate teeth arranged in a single row on the middle to basal part of the inner margin of mandible (mid-basal tooth row). The characteristics of these mandibles are very similar to the diagnosis of *Bannapone* sensu Guénard *et al.* (2013). Thus, we here transfer these five species to *Bannapone*.

The genus *Bannapone* redefined below is morphologically similar to *Stigmatomma*, and the former is distinguishable from the latter by a single character seen in the worker and queen: in *Bannapone* the middle to basal part of the inner margin of mandible has 2–5 blunt or truncate teeth which are arranged in a single row; on the other hand in *Stigmatomma* the inner margin of mandible has triangular teeth arranged in two rows, or at least a part of the inner margin of mandible has more or less bifid teeth (see Yoshimura & Fisher, 2012). The monophyly and phylogenetic placement of the genus *Bannapone* needs to be reconfirmed by future molecular analyses.

Redefinition of *Bannapone* Xu, 2000

The concept of the genus redefined by Guénard *et al.* (2013) is partly modified here.

Diagnosis of the worker and queen. Mandible elongate and slender; apical tooth forming an elongate and falcate apical blade; a preapical denticle often present near the apex of the blade; 2–5 blunt or truncate teeth arranged in a single row in the middle to basal part of the inner margin of mandible (mid-basal tooth row).

Worker (*B. caliginosa* comb. nov., *B. cryptica* sp. nov., *B. fulvida* comb. nov., *B. pertinax* comb. nov., *B. scrobiceps*, *B. zwaluwenburgi* comb. nov.). Monomorphic; head in full-face view subrectangular, in lateral view flattened dorsoventrally (Figs. 1, 3); median furrow present in its posteriormost part of vertex or from frons to posterior border of vertex; anterolateral corner of head beside each mandibular insertion angular but not forming a tooth (Fig. 1); preoccipital carina absent dorsally and laterally; frontal lobes present, narrowly separated by posteromedian portion of clypeus, or closely approximate to each other; frontal carina reaching vertex, or short and extending by no more than the length of frontal lobe; antennal scrobe faintly to moderately impressed; anterior margin of clypeus slightly to weakly convex, with 4–8 peg-like or teat-like setae that are based on tubercles (Fig. 5); mandible elongate and slender; apical tooth forming an elongate and falcate apical blade; a preapical denticle often present near the apex of the blade; 2–5 blunt or truncate teeth arranged in a single row in the middle to basal part of the inner margin of mandible (mid-basal tooth row); antennal socket concealed by frontal lobe; antenna 10- or 11-segmented (see Remarks); eye absent; mesosoma in lateral view almost flat dorsally or weakly convex dorsally; promesonotal suture present and flexible; mesonotum in dorsal view constricted; mesopleuron not subdivided into anepisternum and katepisternum; metanotal groove faint or absent on the dorsum of mesosoma; propodeum unarmed; orifice of propodeal spiracle round; propodeal lobe present but very low; petiole essentially sessile, broadly attached to abdominal segment III, in lateral view without a free posterior face; subpetiolar process lobate, producing anteroventrad, without translucent fenestra; abdominal segment III with free anterior face below helcium only; pygidium large, convex across, laterally and posteriorly unarmed; hypopygium not armed with a series of spines posteriorly; sting well developed.

Queen (*B. caliginosa* comb. nov., *B. cryptica* sp. nov., *B. mulanae*). The queen similar to the worker except in the following features: compound eye relatively well developed, situated behind midlength of side of head (Fig. 4); ocelli present; median ocellus in full-face view located at or a little behind the level of posterior margin of compound eye; peg-like setae and their basal tubercles on anterior clypeal margin well developed to much reduced; mesosoma fully segmented (Figs. 9, 11); mesoscutum without parapsidal and notaular lines; axillae separated from the remainder part of mesoscutum by inconspicuous scutal suture; scuto-scutellar suture distinct; mesopleuron not or partly subdivided into anepisternum and katepisternum; propodeum unarmed; orifice of propodeal spiracle round; propodeal lobe absent, or present but low, with a roundly convex outline.

Remarks. Concerning the antennal segmentation of the worker of *B. zwaluwenburgi*, Onoyama (1999) wrote, “the antennae of the paratype are 11-segmented, although in the Williams’ (1946) illustration the holotype has 12-segmented antennae (the present holotype bears no head)”.

The key to Vietnamese genera of the subfamily Amblyoponinae based on the worker caste given in Eguchi (2014) needs to be partly modified as below.

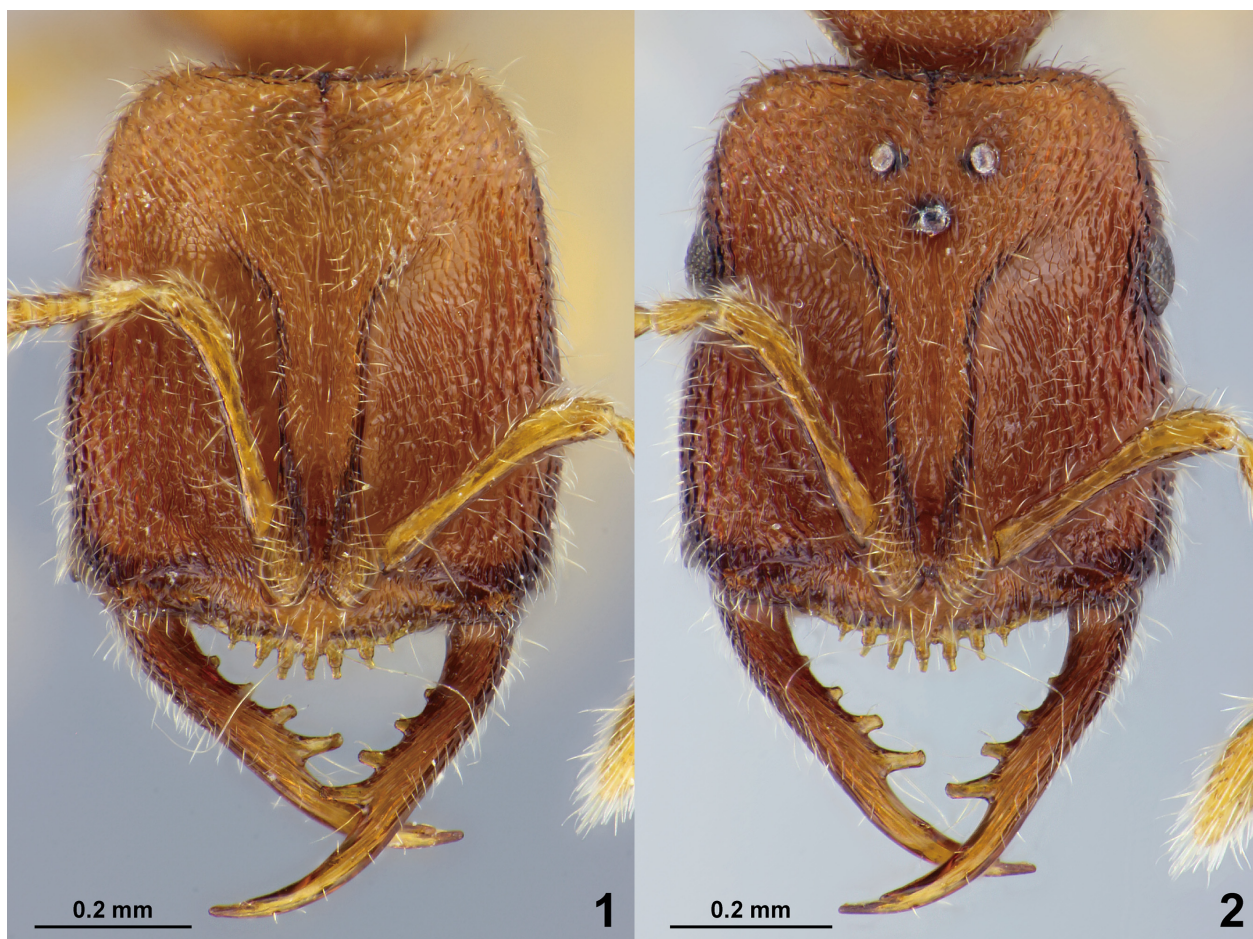
- 4 A few apical segments of antenna distinctly flattened (Figs. 19, 20). *Myopopone*
- All of antennal segments terete, not flattened (Figs. 21, 22) 5
- 5 Middle to basal part of inner margin of mandible with triangular teeth arranged in two rows, or with more or less bifid teeth arranged in a single row. *Stigmatomma*
- Middle to basal part of inner margin of mandible with 2–5 blunt or truncate teeth arranged in a single row. *Bannapone*

Enumeration of the species of *Bannapone*

Bannapone cryptica sp. nov.

(Figs. 1–11)

Stigmatomma sp. eg-3: in Eguchi *et al.* 2014.

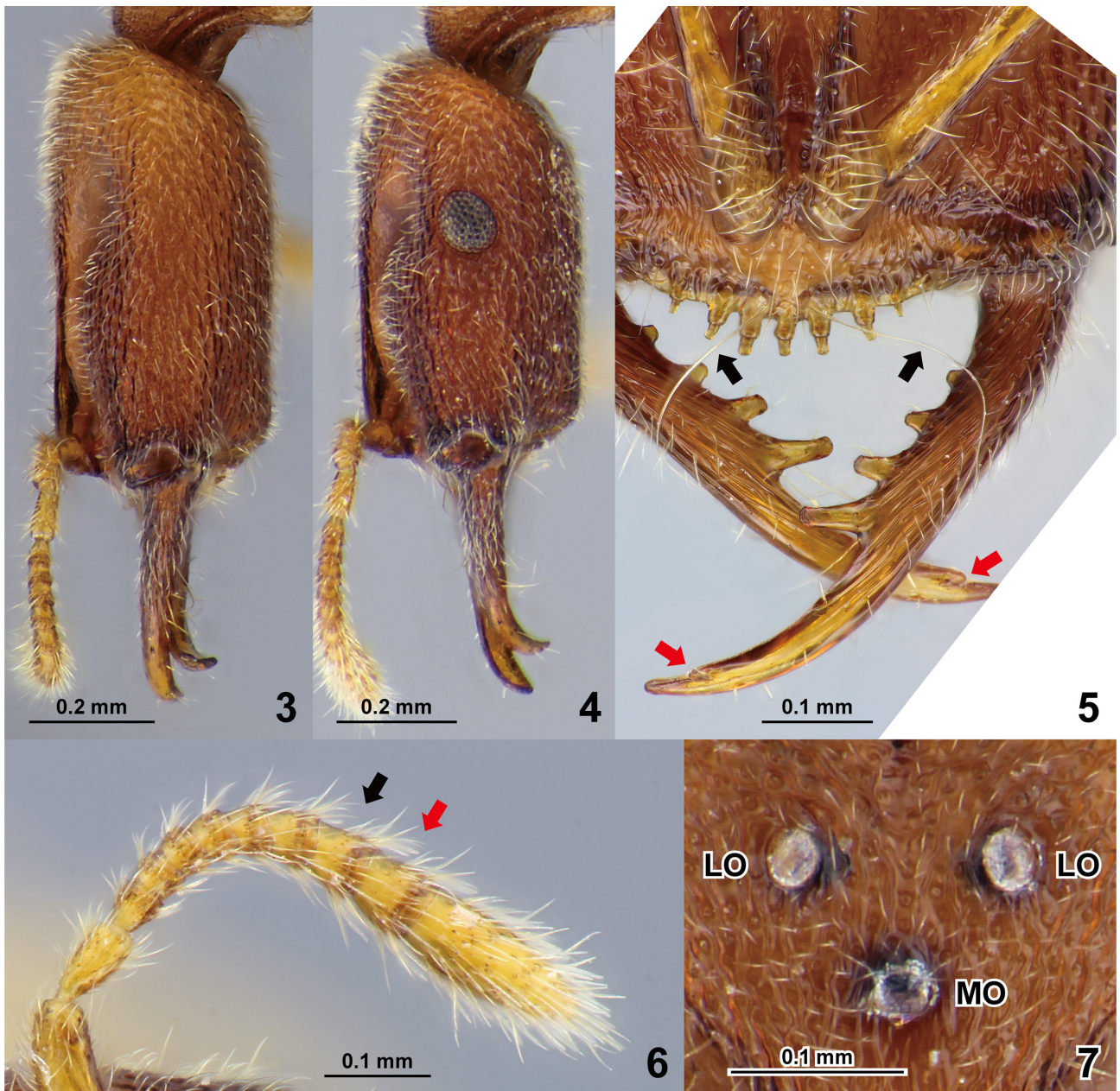


FIGURES 1–2. *B. cryptica* sp. nov., head of a paratype worker (Fig. 1) and a paratype queen (Fig. 2) in full-face view.

Holotype: worker [voucher: IMG20150208-1; VNMN], Vietnam: Nghe An: Tuong Duong: “Sang Le Forest”, < ca. 220 m alt., K. Eguchi leg., 02/iv/2006 [colony: Eg02iv06-19]. Paratypes: 2 workers, 2 dealate queens from the same colony as holotype [MCZC].

Non-type material examined. China: Hong Kong: Taipo Kau N. P. [colony: Eg00-HK-17 (6 workers)].

Worker. Body relatively densely covered with short suberect to decumbent hairs (Figs. 1, 3, 8, 10). Median furrow present only in posteriormost part of vertex; frontal lobes closely approximate to each other (Fig. 5); frontal carinae conspicuous, reaching vertex, weakly divergent posteriad from the end of frontal lobe, then becoming almost parallel, and finally divergent strongly (Fig. 1); antennal scrobe moderately impressed, running along frontal carina; anterior margin of clypeus slightly convex, with 7 peg-like setae, each being based on short tubercle (Fig. 5); sets of setae and tubercles decreasing in size laterad (mesal five conspicuous, but lateralmost often reduced); anteromedian portion of clypeus bearing a pair of extremely long and flexible setae (black arrow in Fig. 5); apical blade of mandible with a small preapical denticle (red arrow in Fig. 5); mid-basal tooth row of mandible consisting of 4 blunt teeth which decrease in size toward the base; 1st and 2nd extremely elongated trapezoidal; 3rd and 4th trapezoidal; antennal scape weakly bent near its apex; funiculus incrassate apically but not forming a distinct club; 9th and 10th antennal segments each a little longer than broad (black and red arrows in Fig. 6); posterolateral part of propodeum strongly produced posteriad; metapleural gland bulla, when seen through the sclerite, large and bean-shaped (Fig. 8); petiole in lateral view with anterior face almost as long as or a little longer than dorsal face in lateral view; the two faces meeting at a blunt angle; subpetiolar process spatulate and weakly curved, produced anteroventrad, without translucent fenestra (Fig. 8); abdominal segment III shorter and narrower than IV (Fig. 8); girdling constriction between abdominal segments III and IV weak (Fig. 8). Dorsum of head distinctly rugoso-reticulate; mandible distinctly rugose longitudinally; anterior and anterolateral part of pronotum faintly reticulate; remainder part of mesosoma nearly smooth except for hair pits; dorsal and lateral face of petiole and gaster and legs smooth with hair pits.



FIGURES 3–7. *B. cryptica* sp. nov. Figs. 3–4, head of a paratype worker (Fig. 3) and a paratype queen (Fig. 4) in lateral view. Fig. 5, clypeus and mandibles of a paratype worker (black and red arrows indicating anteromedian setae of clypeus, and preapical denticle of apical blade, respectively). Fig. 6, left antenna of a paratype worker (black and red arrows indicating 9th and 10th antennal segments respectively). Fig. 7, vertex of a paratype queen (“MO” and “LO” indicating median and lateral ocelli, respectively).

Measurements and indices of the holotype: HL 0.786 mm; HW 0.645 mm; MBL 0.565 mm; SL 0.358 mm; ML 0.889 mm; PNW 0.416 mm; HFL 0.429 mm; PL 0.314 mm; PW 0.292 mm; A3W 0.411 mm; A4W 0.527 mm; CI 82; MBI 88; SI 56; MI 214; HFI 67; A3I 141; A4I 128.

Measurements and indices of the paratypes (n=2) and nontypes (n=2): HL 0.711–0.786 mm; HW 0.581–0.640 mm; MBL 0.516–0.562 mm; SL 0.326–0.360 mm; ML 0.815–0.890 mm; PNW 0.370–0.409 mm; HFL 0.381–0.424 mm; PL 0.297–0.317 mm; PW 0.266–0.293 mm; A3W 0.383–0.415 mm; A4W 0.475–0.520 mm; CI 81–83; MBI 88–91; SI 56–58; MI 213–228; HFI 66; A3I 138–144; A4I 124–126.

Queen (Vietnamese material only). The queen similar to the worker except for the following features: with head in full-face view median ocellus located at level of posterior margin of compound eye; distance between median ocellus (MO in Fig. 7) to lateral ocellus (LO in Fig. 7) shorter than that between lateral ocelli; mesopleuron

partly subdivided into anepisternum and katepisternum with a faint sulcus (Fig. 9); pronotum and propodeum moderately reticulate; mesoscutum moderately rugose longitudinally; mesoscutellum nearly smooth with hair pits; mesopleuron weakly rugoso-reticulate; dorsal and lateral face of petiole weakly reticulate.

Measurements and indices of the paratypes (n=2): HL 0.757–0.765 mm; HW 0.621–0.637 mm; MBL 0.567 mm; SL 0.356–0.361 mm; ML 1.032–1.071 mm; PNW 0.454–0.469 mm; HFL 0.420–0.431 mm; PL 0.350–0.371 mm; PW 0.327–0.336 mm; A3W 0.464–0.479 mm; A4W 0.582–0.604 mm; CI 82–83; MBI 89–91; SI 57; MI 227–228; HFI 68; A3I 142–143; A4I 125–126.

Remarks. This species is most similar to *B. caliginosa* comb. nov., *S. fulvida* comb. nov., *B. pertinax* comb. nov. and *B. zwaluwenburgi* comb. nov., but easily distinguished from them as mentioned in the remarks of the following species and the keys to species.

The holotype and paratypes belong to a single polygynous colony probably at an early stage of colony development (because only a few workers were present). The colony nested underground (in soil) in “Sang Le Forest” dominated by *Lagerstroemia tomentosa* C. Presl, 1844 (family Lythraceae).



FIGURES 8–9. *B. cryptica* sp. nov., thorax and abdomen of the holotype worker (Fig. 8) and a paratype queen (Fig. 9) in lateral view.

***Bannapone caliginosa* (Onoyama, 1999), comb. nov.**

Amblyopone caliginosa Onoyama, 1999: 158. Combination in *Stigmatomma*: Yoshimura & Fisher, 2012: 19.

Holotype: worker, Japan: Kanagawa: Cape Manazuru, 13/xii/1981, K. Masuko leg., Type No. OMNH TI 102,

OMNH, not examined. Paratypes: 1 female and 4 workers, same data as the holotype, not examined; 1 worker, Japan: Kanagawa: Cape Manazuru, 19/ix/1982, K. Masuko leg., not examined.

Non-type material examined. Japan: Chiba: Kamogawa, 1 queen [viii/2001]; Kanagawa: Cape Manazuru, 1 worker [K. Masuko leg.], 1 worker [K. Masuko leg., 19/ix/1982]; Ishikawa: Kanazawa: Kakuma, 1 worker [S. Iwanishi leg., 23/ix/2007].

Remarks. The worker and queen of *B. caliginosa* is easily distinguished from those of *B. cryptica* by: (1) anteromedian portion of clypeus lacking a pair of extremely long and flexible setae; (2) frontal carinae inconspicuous, extending by no more than the length of frontal lobe; (3) posterolateral part of propodeum feebly produced posteriad. Furthermore, the worker of *B. caliginosa* is distinguished from that of *B. cryptica* by the 9th and 10th antennal segments each (a little) shorter than long.



FIGURES 10–11. *B. cryptica* sp. nov., thorax and abdomen of the holotype worker (Fig. 10) and a paratype queen (Fig. 11) in dorsal view.

***Bannapone fulvida* (Terayama, 1987), comb. nov.**

Amblyopone fulvida Terayama, 1987: 31–33. Combination in *Stigmatomma*: Yoshimura & Fisher, 2012: 19.

Holotype: worker, Japan: Okinawa: Yonagusuku-son: Henza-jima Is., 04/i/1985, H. Takamine leg., NIAES, examined. Paratypes: 4 workers, same data as the holotype, examined.

Remarks. The worker of *B. fulvida* is easily distinguished from those of *B. cryptica* by: (1) antenna 10-segmented; (2) frontal carinae inconspicuous, extending by no more than the length of frontal lobe; (3) posterolateral part of propodeum feebly produced posteriad.

***Bannapone mulanae* Xu, 2000**

Bannapone mulanae Xu, 2000: 301.

Holotype: dealate queen, China: Yunnan: Mengla: Manzhuang (900 m alt.), 10/iii/1998, T. Y. Liu leg., not examined (but images examined: CASENT0104980 at AntWeb).

Remarks. The queen of *B. mulanae* is easily distinguished from that of *B. cryptica* by: (1) mid-basal tooth row of mandible consisting of 2 blunt teeth; (2) both 5 peg-like seta and their basal tubercles on anterior margin of clypeus very short and indistinct; (3) a pair of setae on anteromedian portion of clypeus short; (4) frontal carinae inconspicuous, extending by no more than the length of frontal lobe; (5) the distance between median ocellus and lateral ocellus longer than that between lateral ocelli.

***Bannapone pertinax* (Baroni Urbani, 1978), comb. nov.**

Amblyopone pertinax Baroni Urbani, 1978: 48–49. Combination in *Stigmatomma*: Yoshimura & Fisher, 2012: 19.

Holotype: worker, India: Dargeeling: Chim Khona near Ghum (2200 m alt.), 28/v/1975, W. Wittmer leg., NHMB, not examined (but images examined: CASENT0906831 at AntWeb).

Remarks. The worker of *B. pertinax* is easily distinguished from that of *B. cryptica* by: (1) head a little broader than long (CI=101.9, according to the original description); (2) apical blade of mandible shorter and broader; (3) preapical denticle of apical blade of mandible developed well; (4) mid-basal tooth row of mandible consisting of 5 teeth of which basal four small and obliquely truncate apically, almost equal in size; (5) frontal carinae inconspicuous, extending by no more than the length of frontal lobe; (6) posterolateral part of propodeum feebly produced posteriad; (7) subpetiolar process large and lobate, but not spatulate.

***Bannapone scrobiceps* Guénard, Blanchard, Liu, Yang et Economo, 2015**

Bannapone scrobiceps Guénard, Blanchard, Liu, Yang et Economo, 2015: 373.

Holotype: worker, Yunnan: Mengla: Xishuangbanna Tropical Botanical Garden (21°55'07.1"N, 101°16'20.6"E, 550 m alt.), not examined (but the images in the original description examined). Paratype: 1 worker, same data as the holotype, not examined.

Remarks. The queen of *B. scrobiceps* is easily distinguished from that of *B. cryptica* by: (1) mid-basal tooth row of mandible consisting of 2 blunt teeth; (2) a pair of setae on anteromedian portion of clypeus short.

***Bannapone zwaluwenburgi* (Williams, 1946), comb. nov.**

Stigmatomma (Fulakora) zwaluwenburgi Williams, 1946: 639. Combination in *Amblyopone*: Brown, 1960a: 169; in *Stigmatomma*: Yoshimura & Fisher, 2012: 19. Redescription of the holotype and paratype: Onoyama, 1999, 158.

Holotype: worker, USA: Hawaii: Honolulu, ii/1941, R. H. Van Zwaluwenburg leg., not examined (but images examined: CASENT0249113 at AntWeb). Paratypes: 3 workers, same data as the holotype, not examined; 1 worker, USA: Hawaii: Honolulu, 26/x/1945, F. X. Williams leg., not examined.

Remarks. The worker of *B. zwaluwenburgi* is easily distinguished from that of *B. cryptica* by: (1) frontal carinae inconspicuous, extending by no more than the length of frontal lobe; (2) antennal segments VIII–X each shorter than long; (3) posterolateral part of propodeum feebly produced posteriad.

Williams (1946) described and placed this species under the subgenus *Fulakora* of the genus *Stigmatomma*. “*Fulakora*” was established by Mann (1919) for *Stigmatomma celata* Mann, 1919 (the type species), *S. armigerum* (Mayr, 1887), *S. saundersi* (Forel, 1892) and *S. minutum* Forel, 1913, and later synonymized with *Stigmatomma* by Brown 1949 and then with *Amblyopone* by Brown (1960). According to the original description of *S. celata*, and type images of *S. armigerum* (CASENT0915647 at AntWeb), *S. minutum* (CASENT0102516 and CASENT0104570 at AntWeb) and *S. saundersi* (CASENT0102518 at AntWeb), the inner margin of mandible has triangular teeth arranged in two rows, or at least a part of the inner margin of mandible has more or less bifid teeth in the worker of these species. Thus, these species do not belong to *Bannapone*.

An examination of the holotype and nontype images of *B. zwaluwenburgi* (CASENT0249113, CASENT0173925 and CASENT0187702 at AntWeb) has revealed that the mesosoma of CASENT0173925 in dorsal view is distinctly wider and shorter than that of the other specimens. To determine whether CASENT0173925 is an independent species or an ergatoid of *B. zwaluwenburgi*, colony series are needed.

Key to Known Species of *Bannapone* Based on the Worker

Bannapone mulanae is excluded from this key because the worker remains unknown.

- 1 Antenna 10-segmented *B. fulvida*
- Antenna 11-segmented 2
- 2 Mid-basal tooth row of mandible consisting of 2 blunt teeth; frontal lobes relatively distinctly separated by posteromedian portion of clypeus. *B. scrobiceps*
- Mid-basal tooth row of mandible consisting of 4–5 blunt or truncate teeth; frontal lobes closely approximated. 3
- 3 Mid-basal tooth row consisting of 5 teeth of which basal four almost equal in size; preapical denticle of apical blade of mandible developed well. *B. pertinax*
- Mid-basal tooth row consisting of 4–5 teeth which decrease in size toward base; preapical denticle of apical blade of mandible absent or reduced. 4
- 4 Frontal carinae conspicuous, reaching vertex; 9th and 10th antennal segments each a little longer than broad; posterolateral part of propodeum strongly produced posteriad. *B. cryptica* **sp. nov.**
- Frontal carinae inconspicuous, extending by no more than the length of frontal lobe; 9th and 10th antennal segments each (a little) shorter than broad; posterolateral part of propodeum feebly produced posteriad. 5
- 5 Head distinctly longer than broad. *B. caliginosa*
- Head as long as broad. *B. zwaluwenburgi*

Key to known species based on the Queen

Bannapone fulvida, *B. pertinax*, *B. scrobiceps* and *B. zwaluwenburgi* are excluded from this key because the queens remain unknown.

- 1 Mid-basal tooth row consisting of 4–5 blunt teeth; distance between median ocellus and lateral ocellus as long as or shorter than that between lateral ocelli. 2
- Mid-basal tooth row consisting of 2 blunt teeth; distance between median ocellus and lateral ocellus longer than that between lateral ocelli. *B. mulanae*
- 2 Anteromedian portion of clypeus lacking a pair of extremely long and flexible setae; frontal carinae inconspicuous, extending by no more than the length of frontal lobe. *B. caliginosa*
- Anteromedian portion of clypeus bearing a pair of extremely long and flexible setae; frontal carinae conspicuous, reaching vertex. *B. cryptica* **sp. nov.**

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