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SYSTEMATICS AND EVOLUTION

Review of the Genus *Stenamma* (Hymenoptera: Formicidae) in Korea

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Abstract A total of three species in the genus *Stenamma* are reported from Korea. Among them, *S. ussuriensis* Arnol'di is new to the Korean peninsula. In addition, we add the first locality record of *S. owstoni* from South Korea. The SEM photos and illustrations of the workers of each species are provided.

Key words Systematics, *Stenamma ussuriensis*, *Stenamma owstoni*, Korean fauna

Introduction

The genus *Stenamma* is one of the small genera of primitive ants, comprising about 30 species in the world. They are distributed primarily in the Holarctic region although some are found in the Oriental region and Central America. They often live in cool, dark, and moist forests where only a few or no other ants are found. Foraging is often seasonal and restricted to cool times of the year. Colony size is typically small, ranging from a few dozen to several hundred workers (Talbot, 1976). Nests are made in soil underneath rocks, logs, moss, or humus. These nests are often small and cryptic, and not easy to find. As a result, *Stenamma* nests are not frequently found for collection. It is much more common to take isolated workers through litter extraction. Little is known of their natural history but the larvae have been observed feeding directly on dipterous larvae (DuBois, 1998).

Historically, *S. owstoni* Wheeler was first reported from Kaeseong in North Korea by Collingwood (1976), but no additional specimens were added for the last three decades in Korea. However, the first author recently collected additional specimens of the species in a pitfall trap at Gwangreung and it is the first locality reported from South Korea for *S. owstoni*. The authors also recently described a new species of the genus, *S. koreanensis* (Lyu *et al.*, 2002). In addition, *S. ussuriensis* Arnol'di is reported for the first time from Korea. The illustrations, keys, and SEM photos of *Stenamma* species in Korea are provided.

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Systematics

Genus *Stenamma* Westwood, 1839

Stenamma Westwood, 1839: 219. Type species: *Stenamma westwoodi* Westwood, 1839: 219. TL: England.

Asemorhoptrum Mayr, 1861: 76. Type species: *Myrmica lippula* Nylander, 1849: 41.

Theryella Santschi, 1921: 68. Type species: *Theryella myops* Santschi, 1921: 68 [=*S. punctiventre* Emery].

Worker diagnosis. The genus belong to the tribe Stenammini and have the following combinations of characters.

Workers monomorphic; palpal formula 4:3; antennae 12-segmented with indistinct 3- or 4-segmented club. Grooves lacking on each side of occipital foramen. Propodeum armed with a pair of spines. Inferior propodeal plates prominent. Petiole pedunculate with low, convex to flat node. Gaster mostly glassy-smooth with small carinae near base of first segment.

This genus is morphologically similar to *Aphaenogaster* and *Pheidole*. They can be distinguished from the former by their short antennal scapes and paired longitudinal clypeal striae, and *Stenamma* can be distinguished from the latter by the lack of a 3-segmented antennal club.

Key to the species of *Stenamma* in Korea, based on workers.

1. Gastral tergite I with basal carinae as long as the length of postpetiole. Compound eye length 0.11 - 0.18 mm. Mandible with 7 - 8 teeth
---------- *S. owstoni* Wheeler

- Gastral tergite I with basal carinae shorter than the length of postpetiole. Compound eye length less than 0.12 mm. Mandible with 7 - 11 teeth ---------- 2

2. Gastral tergite I with basal carinae as long as 1/5 to 1/4 the length of postpetiole ---------- *S. koreanensis* Lyu, DuBois and Cho
- Gastral tergite I with basal carinae as long as 1/2 the length of postpetiole ---------- *S. ussuriense* Arnol'di

Stenamma koreanensis Lyu, DuBois and Cho, 2002 오대산개미 (신칭)(Figs. 1-4)

Stenamma koreanensis Lyu, DuBois and Cho, 2002, *Sociobiology* 40 (3): 512.

Diagnosis. Mandible with 8-9 teeth. Metanotal impression weakly scrobiculate with surrounding sculpture blending into sculpture of impression. First gastral tergite base carinate with numerous carinae diverging towards posterior; majority of carinae 1/4 to 1/5 length of postpetiole.

Distribution. Korea (Central).

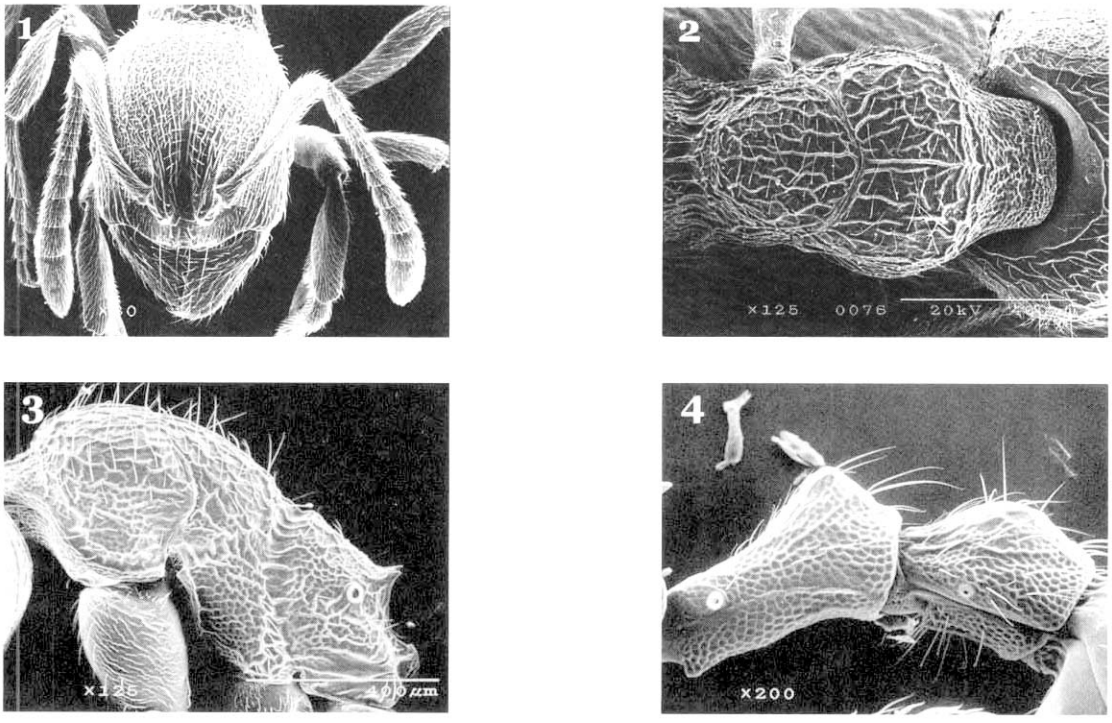
Remarks. It is possible that *S. koreanensis* may be confused with *S. nipponense*. However, the compound eyes of *S. nipponense* are smaller than those of *S. koreanensis*. The length of the propodeal spines is significantly longer in *S. nipponense* and the petiole is more pedunculate. At present, it is known from the single collection, but we think further collecting in the region can yield additional specimens.

This species belongs to the *Stenamma owstoni* species group as defined by DuBois (1998). It appears to be most closely related to *S. ussuriense*. The nest was located about 5 m away from an intermittent stream. It was under a rock. The majority of the nest structure ran parallel to the stream with chambers for gyne and brood located near the center of the nest. The detailed description about the collection locality can be found in Lyu *et al.* (2002).

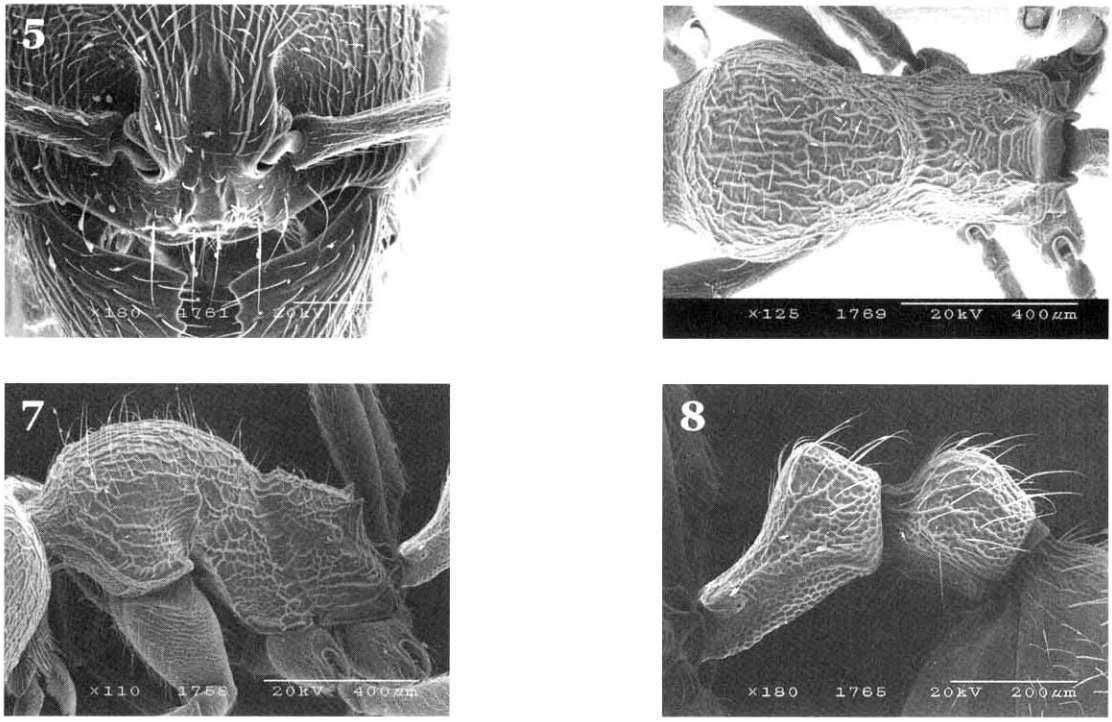
Stenamma owstoni Wheeler, 1906 오스톤개미 (Figs. 5-8)

Stenamma owstoni Wheeler, 1906, *Bull. Am. Mus. Nat. Hist.* 22: 314; Yasumatsu and Murakami, 1960: 30; Collingwood, 1976: 302; Terayama *et al.*, 1992: 25; Choi *et al.*, 1993: 343; Choi, 1996: 46; Kim, 1996: 176; Choi, 1997: 54; Choi and Park, 1998: 59.

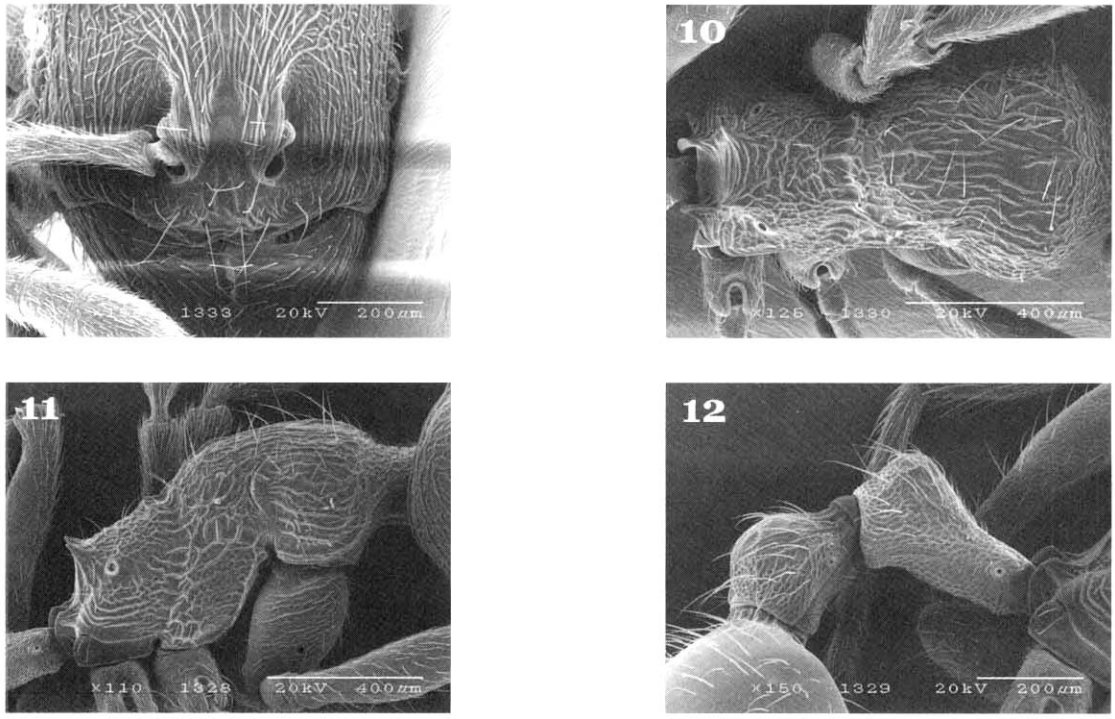
Diagnosis. Mandible 7-8 teeth. Anterior clypeal margin in frontal view with median lobe emarginate; apex in lateral view flat to slightly concave. Propodeal



Figs. 1-4. *Stenamma koreanensis* Lyu, DuBois and Cho: 1. Head, frontal view; 2. Alitrunk, dorsal view; 3. Pronotum, lateral view; 4. Petiolar node, lateral view.



Figs. 5-8. *Stenamma owstoni* Wheeler: 5. Head, frontal view; 6. Alitrunk, dorsal view; 7. Pronotum, lateral view; 8. Petiolar node, lateral view.



Figs. 9-12. *Stenamma ussuriense* Arnol'di: 9. Head, frontal view; 10. Alitrunk, dorsal view; 11. Pronotum, lateral view; 12. Petiolar node, lateral view.

dorsum transversely carinate. Propodeal spines short, less than 1/4 length of declivitous face of propodeum. Petiolar dorsum and sides carinate, lower 1/2 of sides and remaining surfaces punctulate. Postpetiolar dorsum and sides carinate; lower 2/3 of sides and remaining surfaces punctulate.

Specimens examined. **[GG]** 2w, Gwangreung, 23. vii. 2003 (DP Lyu).

Distribution. Korea (Central), China (Szechwan), and Japan (Hokkaido, Honshu, Kyoto, Kyushu, Nagasaki).

Remarks. It should be easily distinguished from *S. ussuriensis*. It has significantly larger eyes and the petiolar dorsal plate is flatter. There are no basal carinae between the propodeal spines, and the metanotal impression is deeper and wider.

The species is usually found in a broad-leaved deciduous forest or evergreen forest ranging from plains to mountainous regions (from 80 m up to 1,450 m). The nests have been found in rotting logs, leaf litter, in litter and humus around the base of a tree, and under stones. Gwangreung is the first locality in South Korea.

Stenamma ussuriense Arnol'di, 1975 우수리개미 (신칭)(Figs. 9-12)

Stenamma ussruriense Arnol'di, 1975, *Zool. Zh.* 54: 1825; DuBois, 1998: 299.

TL: Primoriskaya (southern maritime region in Far Eastern Russia)

Diagnosis. Mandible with 7-9 teeth. Metanotal impression very shallow, depth approximately 1/4 length of propodeal spines. Petiolar node dorsum rugose; remaining surfaces heavily punctulate.

Specimens examined. **[JN]** 3w, Is. Wan-do, 24. vi. 1994 (DP Lyu).

Distribution. Korea (South) and Russia.

Remarks. It is the first record of the species in Korea. The petiole is longer and more pedunculate and the metanotal impression is shallower and the thoracic dorsum sculpture is much more longitudinally carinate than in *S. koreanensis*. It is possible that this species may also be confused with *S. owstoni*, but it has significantly larger eyes and flatter petiolar plate than *S. owstoni*. There are no basal carinae between the propodeal spines, and the metanotal impression is deeper and wider in *S. owstoni* than in *S. ussuriense*.

Discussion

Oriental ants of the genus *Stenamma* belong to *S. owstoni* species group that is the second largest species group in the genus. The main characters of this group are as follows. They have variable head and thoracic sculpture, and enlarged eyes. Most species show a degree of punctation on the body. The petiole is pedunculate, with stalk approximately 1/2 the length of node, and the node rises gradually. Base of first gastral tergite has distinct carinae extending from the juncture with postpetiole.

Currently, seven species are recognized: *S. owstoni*, *S. nipponense*, *S. koreanensis*, *S. kurilense*, *S. ussuriense*, *S. bhutanense*, and *S. gurkhalis*. DuBois (1998) grouped these based on their similar morphology though the grouping may be changed later when more characters with additional collections are available, especially for less surveyed intervening areas. Since only five species (*S. owstoni*, *S. nipponense*, *S. koreanensis*, *S. kurilense*, and *S. ussuriense*) occur in Far East Asia, the following comparisons can be made.

S. koreanensis in most likely to be confused with *S. ussuriense* and *S. kurilense* in terms of overall sculpture and color. Those species have punctate mesopleuron and a bump representing the anterior petiolar process. They also have rather medium-sized eyes. The metanotal impression of *S. ussuriense* is as wide as that of *S. kurilense* and is deeper than that of *S. koreanensis*. The dorsal postpetiolar node of *S. kurilense* is flatter than that of *S. ussuriense*. The petiole is longer and more pedunculate in *S. ussuriense* than in *S. koreanensis*. The propodeal spiracle of *S. koreanensis* is not enlarged than that of *S. kurilense*. *Stenamma koreanensis* has a more rugose thoracic dorsum, and has several transverse carinae on propodeal dorsum and the area between the propodeal spines.

When compared to *S. koreanensis*, the compound eyes of *S. nipponense* are smaller, the length of the propodeal spines is significantly longer, the petiole is more pedunculate, the carinae on the base of the first gastral tergite are longer, the sculpture is more scabrous on the thoracic dorsum, the metanotal impression is deeper, and the mesopleuron is more rugose.

Stenamma owstoni is typically larger in body size, and has larger compound eyes than *S. koreanensis*. As with *S. nipponense*, the petiole is more pedunculate with a longer stalk in *S. owstoni* than in *S. koreanensis*. Similarly, the thoracic dorsum is more scabrous in *S. owstoni*. Although the length of the carinae on the first gastral tergite is similar in size, the apical two mandibular teeth are less pronounced in *S. owstoni*.

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