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Short Communication

Taxonomic review of the genus *Aphaenogaster* (Hymenoptera: Formicidae: Myrmicinae) in Korea with a newly recorded species



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ABSTRACT

The species of the *Aphaenogaster lepida* Wheeler, 1930 (Hymenoptera: Formicidae) were recorded in Korea for the first time. Morphological characteristics of workers of this species and a taxonomic key of species to the Korean *Aphaenogaster* are provided.

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Taxonomic key

Introduction

Genus *Aphaenogaster* is a genus of elongate, slender ants, which are very fast and agile in the field. Most species nest in the soil under stones or logs; some of the desert species nest in the soil with the nest entrance surrounded by pebbles. These ants are omnivorous, collecting dead insects and tending Homoptera or collect nectar. The colonies are moderately large to very large (modified from Mackay and Mackay 2002).

The worker of *Aphaenogaster* is similar to the worker of *Myrmica*. In the worker of *Myrmica*, the promesonotum is only slightly raised and the propodeal lobe is well developed as a triangular or sharp lamella. In addition, the palp formula is always 6:4 in *Myrmica* as opposed to 5:3 or 4:3 in *Aphaenogaster* (Eguchi et al 2011).

This study is to review the taxonomic works on the genus *Aphaenogaster* and provide a key to the Korean species with the morphological characteristics and distribution and a newly recorded species.

Material and methods

The specimens examined in this study were deposited at Sangji University, South Korea. Specimens were photographed using a Leica DMS 1000 microscope and an S8APO microscope (Leica Microsystems, Germany). Images were captured using Leica Application Suite, v. 4.9 (Leica Microsystems) and Deltabio MOT Leica software, v. 4.0, to produce multifocus images. The terminology used to describe worker individuals followed Bolton (2003).

The following abbreviations for insect castes and provinces in which specimens were collected and examined were used: Q (queen), w (worker), TL (type locality), GG (Gyeonggi-do), GW (Gangwon-do), CB (Chungcheongbug-do), CN (Chungcheongnam-do), JB (Jeonlabug-do), JN (Jeonlanam-do), GB (Gyeongsangbuk-do), GN (Gyeongsangnam-do), and JJ (Jeju-do).

Systematic accounts

Family Formicidae Latreille, 1809

Subfamily Myrmicinae Lepeletier de Saint-Fargeau, 1835

Genus *Aphaenogaster* Mayr, 1853

Type species: *Aphaenogaster sardoa* Mayr, 1853: 107.

Deromyrma Forel, 1913: 350. Type species: *Aphaenogaster (Ischnomyrmex) swammerdami* Forel, 1886: 106.

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- Planimyrma* Viehmeyer, 1914: 604. Type species: *Stenamma (Ischnomyrmex) loriai* Emery, 1897: 563.
- Novomessor* Emery, 1915: 73. Type species: *Aphaenogaster (Ischnomyrmex) cockerelli* André, 1893: 150.
- Attomyrma* Emery, 1915: 70. Type species: *Formica subterranea Latreille*, 1798: 49.
- Nystalomyrma* Wheeler, 1916: 215. Type species: *Myrmica longiceps Smith*, 1858: 128.
- Brunella* Forel, 1917: 234. Type species: *Aphaenogaster belti* Forel, 1895: 248.
- Sinaphaenogaster* Zhang 1989: 266. Type species: *Paraphaenogaster shanwangensis* Zhang
- Aphaenogaster* revived status as genus: Emery, 1908: 309.

Diagnosis. Worker caste monomorphic (or feebly polymorphic). Head oval, longer than broad; posterior border rounded or narrowly straight, with distinct occipital carina. Mandibles large, subtriangular; masticatory margin dentate, with two larger apical teeth followed by small denticles. Palp formula 5:3 or 4:3. Anterior margin of frons rounded, sometimes shallowly emarginated in the middle. Frontal region impressed. Frontal carinae short, not reaching the level of compound eyes, covering antennal insertions partly. Antennae 12-segmented; scape long, extending beyond posterior border of head; funiculus incrassate, sometimes apical four segments forming indistinct club. Compound eyes prominent, medium in size, situated almost at midlength of sides of head. In profile, propodeum substantially depressed below the level of the pronotum; mesonotum forms a more or less sloping link between them. Metanotal impression distinct. Propodeum usually with a pair of spines. Ventral processes absent on meso- and metasternum. Legs long and slender; middle and hind tibiae each with a simple small spur apical. Petiole with long peduncle anteriorly; node subtriangular with more or less rounded crests in lateral view; subpetiolar process usually absent. Postpetiole globular; anterior margin narrower than posterior one. Sting reduced.

Male. Head small, subrectangular with rounded posterior corners and low occipital carina. Mandibles usually broad, subtriangular; masticatory margin dentate. Palp formula 5:3. Frons produced anteriorly; anterior margin rounded, sometimes slightly emarginated in the middle. Frontal carina indistinct, short and low. Antennal insertions exposed, close to posterior margin of frons. Antenna 13-segmented; scape short, not reaching posterior margin of head; funiculus filiform, incrassate. Compound eyes large and prominent; inner margin not concave. Ocelli well developed. Trunk slender; pronotum small, completely overhung by mesonotum; mesonotum massive; mesoscutum convex dorsally with notaui and parapsidal furrows; mesoscutellum convex, overhanging metanotum; propodeum usually long and narrow, sometimes distinctly elongate, constricted just anterior to propodeal spiracle; propodeal spines reduced to form obtuse lobes. Legs long and slender; middle and hind tibiae each with a small simple spur. Petiole and postpetiole like those of worker but lower and more rounded nodes. Basal ring thin; paramere with distinct gonocoxal arm and rounded apex; volsella projected posteroventrally; digitus slender, curved ventrally; cuspis small, lamelliform aedeagal plate rounded apical, with simple serrate ventral margin in lateral view (Ogata 1991).

Female. General form of head as in worker; antennal scape relatively shorter than that of worker; compound eyes large; ocelli present. Trunk massive, distinctly high; pronotum small, completely overhung by mesoscutum; mesonotum large and thick, slightly convex dorsally; notaui absent but parapsidal furrows present on mesoscutum; mesoscutellum overhanging metanotum; propodeal spines more distinct, longer and stouter than those of

worker. The remainder of body and appendages like those of worker, but more massive.

Key to the Species of Korean Genus Aphaenogaster

1. Head rounded posteriorly in frontal view; middle tibiae longer than head (excluding the eyes) is wide *A. famelica*
 - Head with more or less straight posterior margin in frontal view; middle tibiae subequal to or shorter than head width (excluding eyes) 2
2. Body concolorous brown to dark brown; posterior portion of head and pronotal dorsum covered with punctures and opaque; shoulders of pronotum angulate; propodeal spines rather thick *A. japonica*
 - Body bicolored reddish brown and dark brown; posterior portion of head and pronotal dorsum with superficial punctures, but shining; shoulders of pronotum not angulate; propodeal spines thin 3
3. Head largely smooth, scattered small punctures, and without longitudinal rugae, epinotum and mesonotum of the male not overhang the head anteriorly *A. lepida*
 - Head with longitudinal rugae, propodeal spine thick and triangular, epinotum and mesonotum of the male overhang the head anteriorly *A. tipuna*

Aphaenogaster famelica (Smith, 1874) 황장다리개미

Ischnomyrmex famelicus Smith, 1874: 405; Wheeler, 1928: 102; Wheeler and Wheeler, 1953: 60; Imai, 1966: 131.

Aphaenogaster famelica: Mayr, 1879: 669; Emery, 1908: 324; Wheeler, 1928: 102 – 104; Imai, 1971: 137; Choi et al, 1985: 445; Terayama et al, 1992: 26; Choi and Bang, 1992b: 16; Choi et al, 1993: 343; Choi et al, 1993: 47; Choi, 1996a: 9; Choi, 1996b: 46; Kim, 1996: 174; Choi, 1997a: 54; Choi, 1997b: 125; Choi, 1998: 231; Choi and Park, 1998: 59.

Aphaenogaster famelica ruida Wheeler, 1928: 104; Ogata, 1991: 86.

Aphaenogaster ruida: Collingwood, 1976: 302; Bolton, 1995: 71; Kim, 1996: 174.

Specimens examined. [Korea] 2w, Gijang, KN, 11 vi 2001. (DP Lyu); 23w, Haeundae, Busan, KN, 11 x 2018. (DP Lyu)

Distribution. Korea, China, Japan.

Aphaenogaster japonica Forel, 1911 일본장다리개미

Aphaenogaster schmitzi japonica Forel, 1911: 267; Wheeler, 1928: 102; Kim et al, 1993: 122; Choi, 1998: 231.

Aphaenogaster (Attomyrma) japonica: Emery, 1921: 60.

Aphaenogaster (Attomyrma) syriaca japonica: Emery, 1921: 60.

Aphaenogaster (Attomyrma) smythiesi japonica: Wheeler, 1928: 101; Nishizono and Yamane, 1990: 34; Terayama et al, 1992: 26; Choi et al, 1993: 47; Kim, 1996: 175.

Aphaenogaster (Attomyrma) smythiesii japonica: Bolton, 1995: 73.

Aphaenogaster japonica: Choi et al, 1985: 445; Choi, 1985: 411; Choi, 1986: 297; Kim and Choi, 1987: 125; Choi and Kim, 1987: 360; Choi, 1988: 222; Kim et al, 1989: 217; Choi and Park, 1991a: 69; Choi and Park, 1991b: 83; Choi and Bang, 1992a: 106; Choi and Bang, 1992b: 25; Choi and Bang, 1992c: 36; Kim et al, 1992: 350; Choi and Bang, 1993: 321; Choi et al, 1993: 344; Kim et al, 1996: 122; Choi, 1996a: 9; Choi, 1996b: 46; Kim, 1996: 175; Yamane, 1996: 111; Choi, 1997a: 54; Choi, 1997b: 130; Choi, 1998: 217; Choi and Park, 1998: 59; Choi, 1999: 504; Choi and Lee, 1999: 2; Choi and Park, 1999: 25; Park and Kim, 2000: 108.

Specimens examined. [Korea] 1w, Gwangleung, GG, 11 v 2001. (DP Lyu); 36w, Mangweolsa, GG, 7 vii 1999. (DP Lyu); 1w, Mt.Taehwa-san, GG, 22 v 1998. (DP Lyu); 8w, Mt. Suli-san, GG, 21 vii 1999. (DP Lyu); 10w, Mt.Suli-san, GG, 15 x 1999. (DP Lyu); 58w,

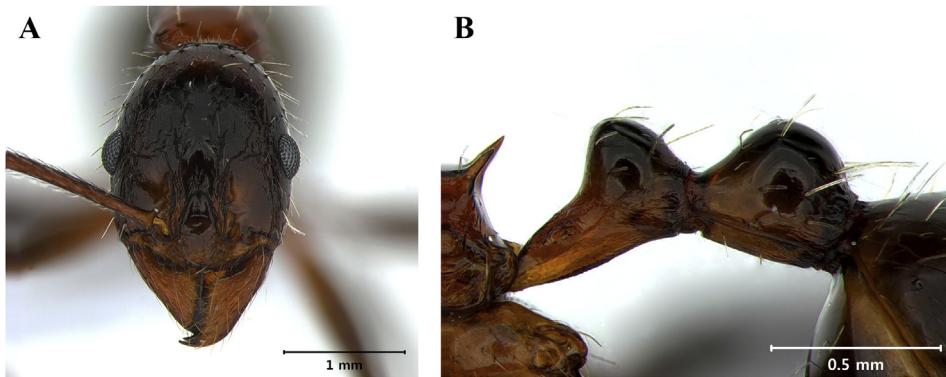


Figure 1. *Aphaenogaster lepida* Wheeler: A, frontal view of the head; B, lateral view of the petiole.

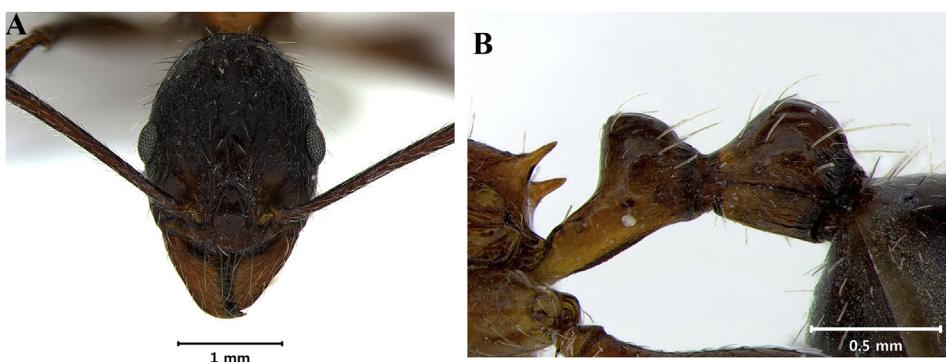


Figure 2. *Aphaenogaster tipuna* Forel: A, frontal view of the head; B, lateral view of the petiole.

Yangyang, GW, 25 v 2002. (DP Lyu); 48w, Mt. Chiag-san, GW, 21 vii 1998. (DP Lyu); 78w, Mt. Weolag-san, CB, 21 vi 2001.

(DP Lyu); 6w, Mt. Sogli-san, CB, 6 viii 1994. (BM Choi); 1w, Muju, JB, 14 vi 1998. (DP Lyu); 8w, Is. Odong-do, JN, 21 vii 1984. (BM Choi); 2w, Is. Soan-do, JN, 13 ix 1991. (BM Choi); 3w, Sancheong, GN, 17 v 2000. (DP Lyu); 16w, Sangumburi, JJ, 4 viii 1984. (BM Choi); 9w, Sangumburi, JJ, 8 vi 2001. (DP Lyu); 10w, Goepyeong, JJ, 8 vi 2001. (DP Lyu); 2Q, 21w, Mt. Hanla-san, JJ, 27 viii 1998. (DP Lyu); 11w, Sangumburi, JJ, 18 x 2002 (DP Lyu); 6w, Seongpanag, JJ, 24 ix 1998 (DP Lyu); 117w, Seongpanag, JJ, 15 vi 2001. (DP Lyu); 14w,

Seongpanag, JJ, 18 x 2002. (DP Lyu); 7w, Seogwipo, JJ, 27 ix 2000. (DP Lyu); 1w, Is. Mala-do, JJ, 24 v 2000. (DP Lyu).

Distribution. Korea (Central, South, Jeju-do), Taiwan, China, Japan.

***Aphaenogaster lepida* Wheeler, 1930** 여서장다리개미 (신칭)
([Figures 1 and 3](#))

Aphaenogaster (Attomyrma) lepida Wheeler, 1930: 96. TL: Taiwan
Aphaenogaster funkikoensis Creighton, 1950: 152; Brown, 1954: 10.
Aphaenogaster phillipi Menozzi, 1932: 311; Brown, 1954: 10.



Figure 3. *Aphaenogaster lepida* Wheeler: lateral view of the thorax of male.



Figure 4. *Aphaenogaster tipuna* Forel: lateral view of the thorax of male (photo by Antweb).

Full description of worker and male: see Wheeler (1930)

Diagnosis. Worker (Figure 1A, 1B): Body length 4–6mm. Head largely smooth, small punctures scattered without longitudinal rugae.

Male (Figure 3): Body length 3.5 - 4 mm. Epinotum and mesonotum not overhang head anteriorly

Material examined. Korea: 1Q, 80w, Mt. Janggungsan, Yeosu, JN, 10 vii 2018. (SW Yoon & DO Shin); 1Q, 40w, Yeoseodo, Wando, JN, 15 iv 2019. (SW Yoon & DO Shin); 1Q, 50w, Yeoseodo, Wando, JN, 15 iv 2019. (SW Yoon & DO Shin); 1Q, 70w, Yeoseodo, Wando, JN, 15 iv 2019. (SW Yoon & DO Shin).

Distribution. Korea (new record), Taiwan, China.

***Aphaenogaster tipuna* Forel, 1913 흑산도장다리개미 (Figures 2 and 4)**

Aphaenogaster rothneyi tipuna Forel, 1913: 195; Hung et al, 1972: 1024.

Aphaenogaster (Attomyrma) tipuna: Emery, 1921: 59.

Aphaenogaster tipuna: Santschi, 1937: 361; Hung et al, 1972: 1024; Terayama et al, 1992: 26; Kim et al, 1992: 350; Choi and Bang, 1993: 321; Choi et al, 1993: 344; Choi et al, 1993: 47; Choi, 1996a: 9; Choi, 1996b: 46; Kim, 1996: 175; Choi, 1997a: 54; Park and Kim, 2000: 108.

Specimens examined. 8w, Is. Wonsan-do, CN, 6 x 1990. (BM Choi); 36w, Gochang, JB, 4 v 1995. (BM Choi); 5w, Is. Cheongsan-do, JN, 27 iv 1991. (BM Choi); 8w, Is. Daeheungsan-do, JN, 7 viii 1986. (BM Choi); 2w, Is. Soheungsan-do, JN, 4 ix 1991. (JR Bang); 36w, Is. Chuja-do, JJ, 12 vi 2001. (DP Lyu).

Distribution. Korea (Southand, Jeju-do), Taiwan, China, Japan.

Conflict of interest

The authors declare that there is no conflict of interest.

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