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Three new records of wolf spiders (Araneae: Lycosidae) from Korea

Chang Moon Jang[1], Yang Seop Bae[1], Jung Sun Yoo[2], Sue Yeon Lee[3] and Seung Tae Kim[3,*]

[1]*Division of Life Sciences, College of Life Sciences and Bioengineering, Incheon National University, Incheon 22012, Republic of Korea*
[2]*Species Diversity Research Division, National Institute of Biological Resources, Incheon 22689, Republic of Korea*
[3]*Life and Environment Research Institute, Konkuk University, Seoul 05029, Republic of Korea*

**Correspondent: stkim2000@hanmail.net*

Three wolf spiders of the family Lycosidae Sundevall, 1833 are newly described from Korea: *Arctosa labiata* Tso & Chen, 2004, *Pardosa altitudis* Tikader & Malhotra, 1980, and *Pardosa laevitarsis* Tanaka & Suwa, 1986. These spiders were collected during a seasonal survey of the spider fauna of National Parks located in Gangwon-do and Gyeongsanbuk-do in 2018–2019; two males of *A. labiata* from Mt. Songnisan National Park, one female of *P. altitudis* from Mt. Chiaksan National Park, and two males of *P. laevitarsis* from Mt. Odaesan and Sobaeksan National Parks. The three newly recorded spiders have previously been known to be distributed in Taiwan, India, China, and Japan. These spiders were collected by hand in mixed forest leaf litter in mountainous terrains. The present paper taxonomically describes these three wolf spiders with measurements and morphological illustrations.

Keywords: *Arctosa labiata*, Korea, Lycosidae, *Pardosa altitudis*, *Pardosa laevitarsis*, taxonomy

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Introduction

Lycosidae Sundevall, 1833 is one of the most diverse families in which 127 genera and 2,450 species have been recorded worldwide (World Spider Catalog, 2023). There are currently 58 species of wolf spider of nine genera in Korea, 11 species in *Arctosa* C. L. Koch, 1847 and 17 species in *Pardosa* C. L. Koch, 1847 (Kim *et al*., 2015; Kim and Ye, 2016; Kim, 2019; Kim and Yoo, 2019). The wolf spiders are very active and have been reported in agricultural ecosystems, forest ecosystems, and various types of natural ecosystems in Korea (Kim *et al*., 2016). The spider fauna of Korean National Parks in Gangwon-do and Gyeongsanbuk-do was intensively explored in 2018–2019. During the seasonal surveys, two males of *A. labiata* Tso & Chen, 2004 from Mt. Songnisan National Park, one female of *P. altitudis* Tikader & Malhotra, 1980 from Mt. Chiaksan National Park, and two males of *P. laevitarsis* Tanaka & Suwa, 1986 from Mt. Odaesan and Sobaeksan National Parks were collected by hand in mixed forest leaf litter in mountainous terrains. These three wolf spiders have previously been known to be distributed in Taiwan, India, China, and Japan. The present paper taxonomically describes these three wolf spiders with measurements and morphological illustrations.

Materials and Methods

All specimens were preserved in 98% ethyl alcohol and external morphology was examined under a Leica S8APO (Singapore) stereomicroscope. Images were captured with a Dhyana 400DC zoom digital camera (China) mounted on a Leica S8APO and assembled using Helicon Focus 8.2.0 image stacking software (Khmelik *et al*., 2006). Measurements of body parts were made with an ocular micrometer and are recorded in millimeters. Leg and palp (left) measurements are given as leg number, followed by total length (femur, patella + tibia, metatarsus, tarsus). Female vulva was removed and treated in 10% KOH for two hours before illustration. All specimens studied are deposited in the National Institute of Biological Resources, Incheon (NIBR), Korea.

Taxonomy

Family Lycosidae Sundevall, 1833
Genus *Arctosa* C. L. Koch, 1847
Type species. *Arctosa cinerea* (Fabricius, 1777).

***Arctosa labiata* Tso & Chen, 2004**
입술논늑대거미 (신칭) (Fig. 1)
Arctosa labiata Tso & Chen, 2004: 401, f. 6–10.

Materials examined. 2♂, Mt. Songnisan National Park, Jangam-ri, Hwabuk-myeon, Sangju-si, Gyeongsangbuk-do (36.58N, 127.89E, alt. 406 m), 2 August 2019, S.T. Kim & S.Y. Lee leg.
Description. Male. Total length 4.92. Carapace: 2.08 long / 1.97 wide. Anterior eye row 0.42. Posterior eye row 0.55. Chelicera: 0.93 long / 0.73 wide. Endite: 0.73 long / 0.30 wide. Labium: 0.25 long / 0.30 wide. Sternum: 1.20 long / 1.00 wide. Legs: I 5.75 (1.70, 2.10, 1.17, 0.78) / II 5.04 (1.50, 1.62, 1.22, 0.70) / III 5.08 (1.58, 1.65, 1.15, 0.70) / IV 7.43 (2.00, 2.28, 2.10, 1.05). Abdomen: 2.13 long / 1.50 wide. Palp: 0.72 (0.98, 0.92, - , 0.72).

Habitus as in Fig. 1A. Carapace ovoid, dark yellowish brown, longer than wide, cervical and radial furrows distinct, longitudinal fovea needle-shaped (Fig. 1A). Eight eyes, posterior eye row longer than anterior eye row (Fig. 1B). Chelicera strongly developed with three small promarginal teeth and three small retromarginal teeth. Sternum heart-shaped, pale and turbid yellowish brown, margin covered sparsely with long black hairs, posterior end blunt unprotruding between coxae of leg IV (Fig. 1C). Legs stout and strongly developed, turbid yellowish brown, broad and vague annuli present, leg formula IV-I-III-II (Fig. 1A). Palp: cymbium with two thick apical se-

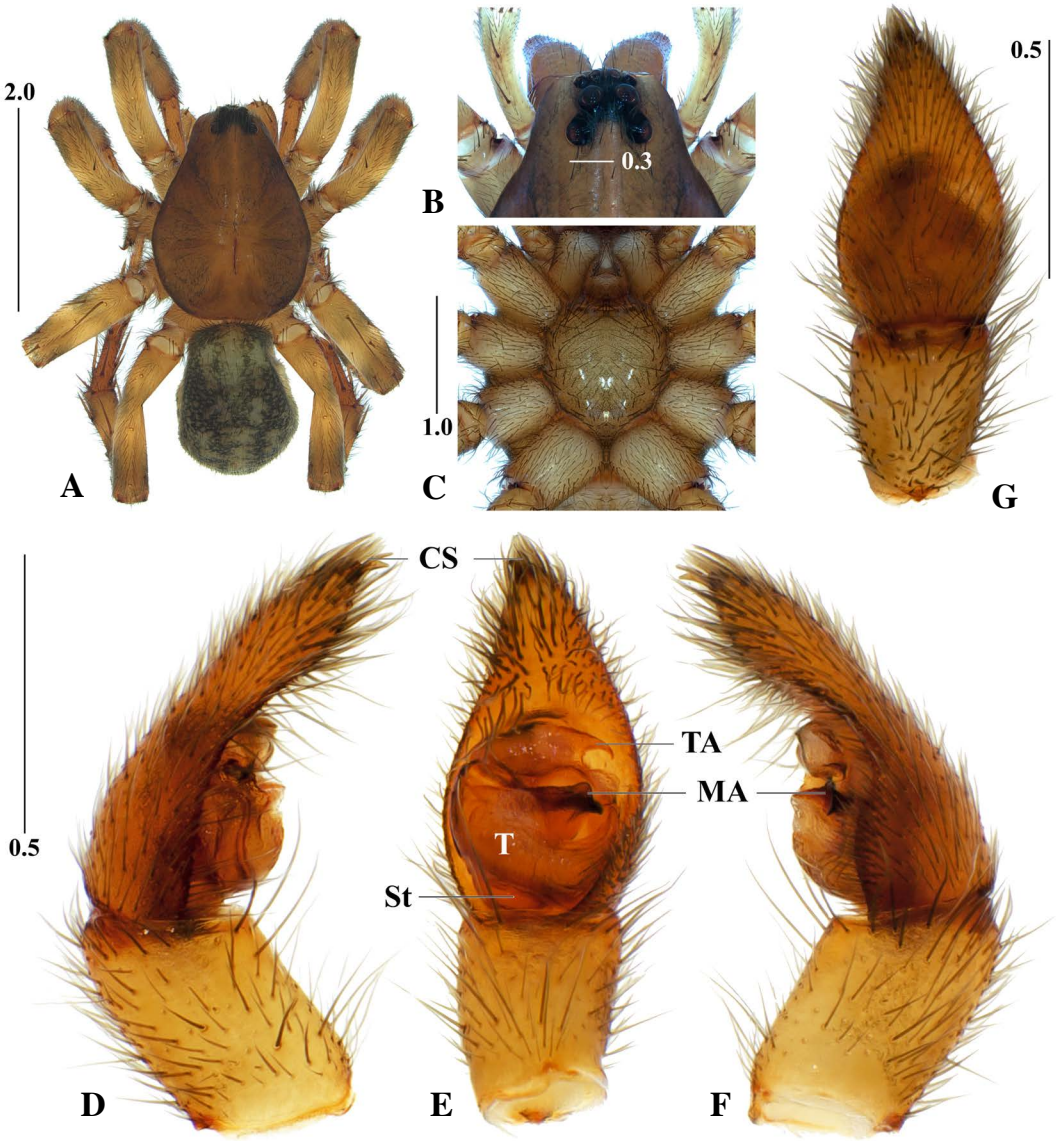

Fig. 1. *Arctosa labiata* Tso & Chen, 2004, male. A. Habitus in dorsal view; B. Eye area from above; C. Sternum; D. Palp in prolateral view; E. Palp in ventral view; F. Palp in retrolateral view; G. Palp in dorsal view (CS, cymbial setae, MA, median apophysis; St, subtegulum; T, tegulum; TA, terminal apophysis). Scale bars in mm.

tae; median apophysis large with a pointed tip, upper half almost black, anterior margin concave, stretched laterally and curved ventrally; conductor round and membranous; terminal apophysis large with a pointed tip (Fig. 1D–G).
Habitat. The species was collected by hand in mixed forest leaf litter in mountainous terrain.
Distribution. Korea (new record), Taiwan.

Genus *Pardosa* C. L. Koch, 1847
Type species. *Pardosa alacris* (C. L. Koch, 1833).

***Pardosa altitudis* Tikader & Malhotra, 1980**
검은가슴늑대거미 (신칭) (Fig. 2)
Pardosa altitudis Tikader & Malhotra, 1980: 328, f. 160–162; Hu & Li, 1987b: 291, f. 24.3–4; Yin *et al*., 1997c: 191, f. 88a–g; Song, Zhu & Chen, 1999: 329, f. 193A, I; Hu, 2001: 181, f. 84.1–2.

Material examined. 1♀, Mt. Chiaksan National Park, Seongnam-ro, Sillim-myeon, Wonju-si, Pyeongchang-gun, Gangwon-do (37.29N, 128.07E, alt. 545 m), 4 May 2018, S.T. Kim & S.Y. Lee leg.
Description. Female. Total length 6.88. Carapace: 3.52 long / 2.70 wide. Eyes: AER 0.68, PER 1.47. Chelicera: 1.22 long / 0.60 wide. Endite: 0.82 long / 0.47 wide. Labium: 0.30 long / 0.45 wide. Sternum: 1.73 long / 1.35 wide. Legs: I 11.21 (3.10, 4.05, 2.65, 1.41) / II 11.10 (3.07, 3.85, 2.70, 1.48) / III 11.64 (3.10, 3.70, 3.28, 1.56) / IV 15.12 (3.90, 4.90, 5.02, 1.90). Abdomen: 3.75 long / 2.78 wide. Palp: 4.11 (1.24, 1.47, - , 1.40).

Habitus as in Fig. 2A, B. Carapace pear-shaped, dark blackish brown, longer than wide, cervical and radial furrows distinct, longitudinal fovea very long and needle-shaped, posterior part of head region yellowish red, thoracic region with one yellowish red median band and four pairs of yellowish red markings along the margin (Fig. 2A). Eight eyes, eye region black, covered densely with black and white hairs, posterior eye row longer than anterior eye row (Fig. 2C). Chelicera strongly developed with three promarginal teeth (proximal and distal small, middle large) and three large retromarginal teeth. Sternum heart-shaped, completely black, posterior end pointed protruding between coxae of leg IV (Fig. 2D). Legs stout and strongly developed, yellowish red, femora with two–three broad and dark annuli and tibia with two broad and dark annuli, leg formula IV-III-I-II. (Fig. 2A, B). Abdomen ovoid, black, yellowish red cardiac pattern present, two pairs of muscle impressions present, covered densely

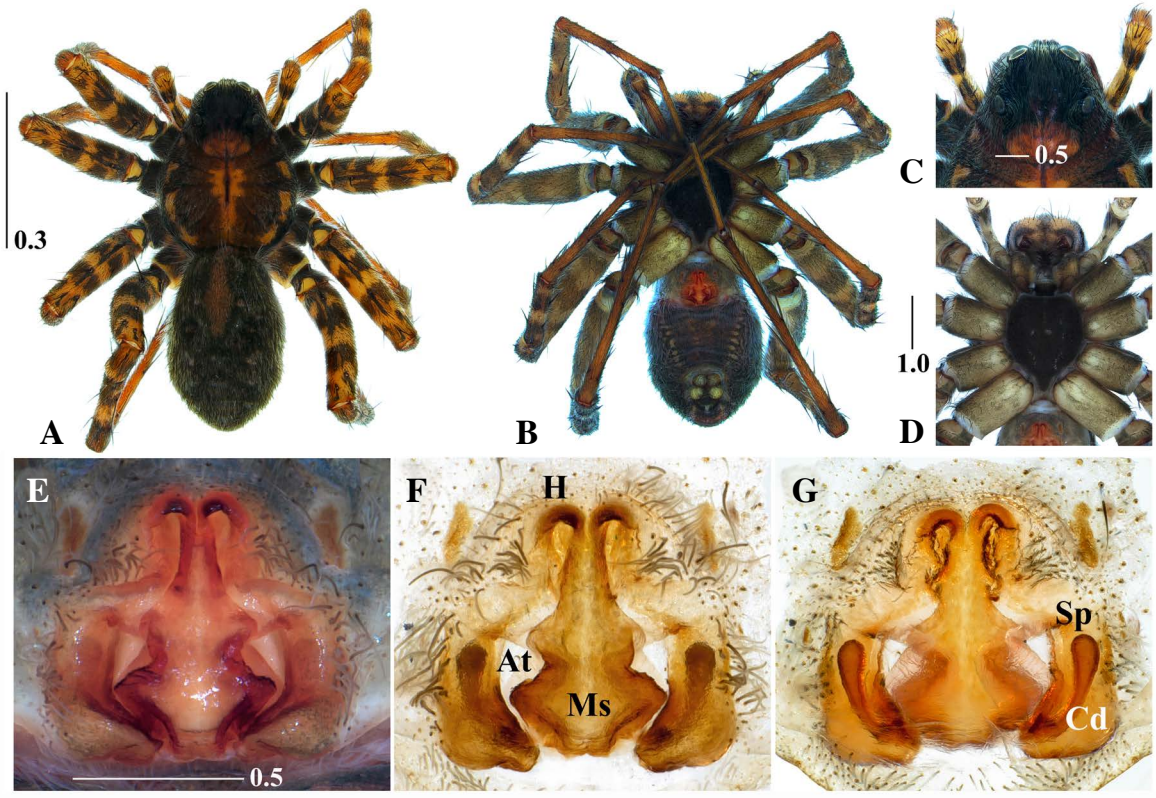

Fig. 2. *Pardosa altitudis* Tikader & Malhotra, 1980, female. A. Habitus in dorsal view; B. Habitus in ventral view; C. Eye area from above; D. Sternum; E. Epigynum; F. Vulva in ventral view; G. Vulva in dorsal view (At, atrium; Cd, copulatory duct; H, hood; Ms, median septum; Sp, spermatheca). Scale bars in mm.

with black and white hairs (Fig. 2A). Epigynum: one pair of small hoods located anteromedially; median septum tree-shaped, anterior part narrow and posterior part broad, anterior end connected to the hoods; spermathecal head round; copulatory duct tubular (Fig. 2E–G).

Habitat. The species was collected by hand in mixed forest leaf litter in mountainous terrain.

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

***Pardosa laevitarsis* Tanaka & Suwa, 1986**

산늑대거미 (신칭) (Fig. 3)

Pardosa laevitarsis Tanaka & Suwa, 1986: 56, f. 9–12; Tanaka, 1993: 283, f. 25–28; Tanaka, 2009: 241, f. 107–108.

Materials examined. 1♂, Mt. Odaesan National Park, Dongsan-ri, Jinbu-myeon, Pyeongchang-gun, Gangwon-do (37.73N, 128.59E, alt. 638 m), 13 September

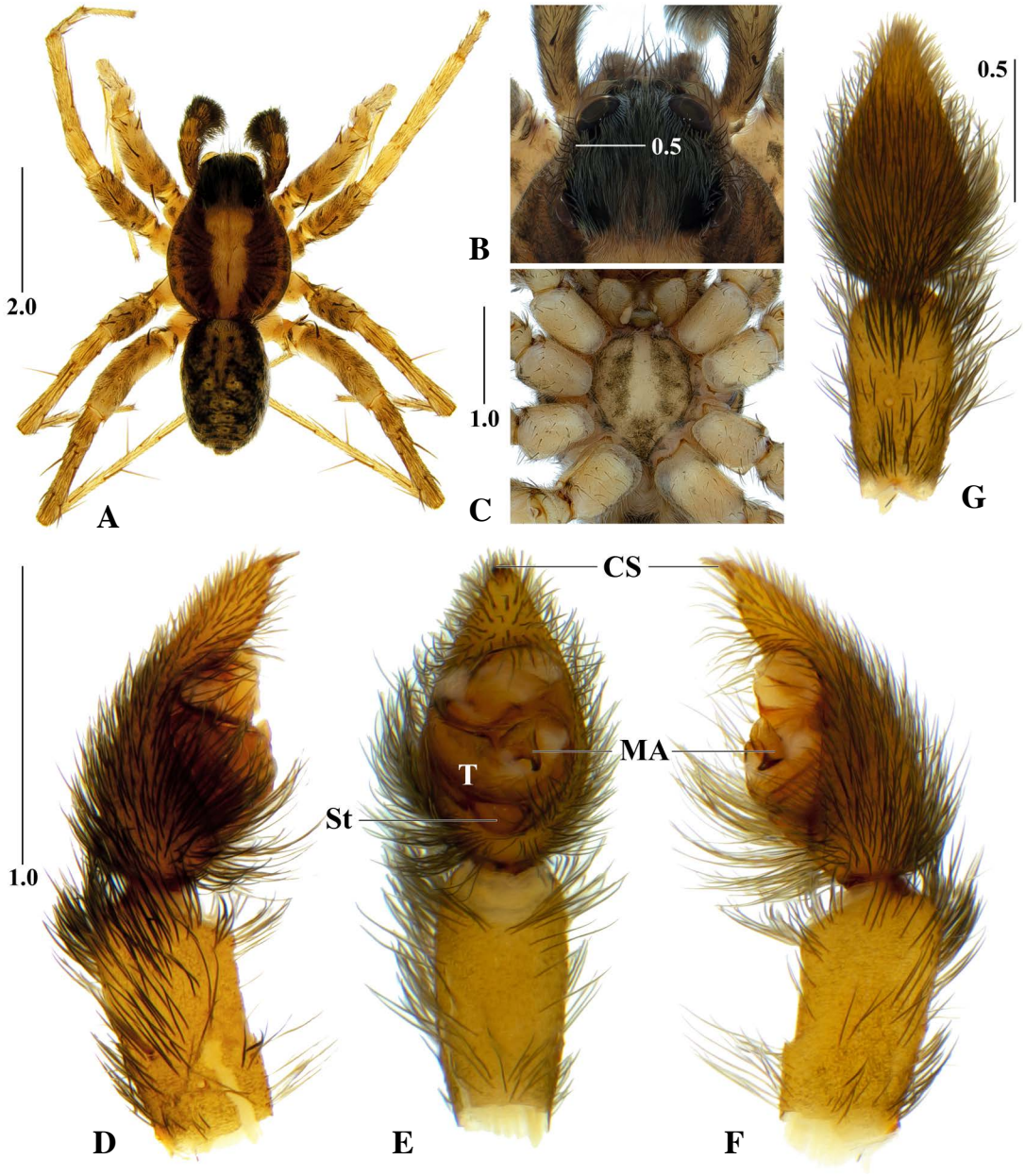

Fig. 3. *Pardosa laevitarsis* Tanaka & Suwa, 1986, male. A. Habitus in dorsal view; B. Eye area from above; C. Sternum; D. Palp in prolateral view; E. Palp in ventral view; F. Palp in retrolateral view; G. Palp in dorsal view (CS, cymbial setae; MA, median apophysis; St, subtegulum; T, tegulum). Scale bars in mm.

2019, S.T. Kim & S.Y. Lee leg., 1♂, Mt. Sobaeksan, Cheondong-ri, Danyang-eup, Dangyang-eup, Chungcheongbuk-do (35.95N, 128.43E), 10 April 2018, S.T. Kim & S.Y. Lee leg.

Description. Male. Total length 4.83. Carapace: 2.70 long / 1.96 wide. Eyes: AER 0.55, PER 1.13. Chelicera: 0.99 long / 0.35 wide. Endite: 0.54 long / 0.33 wide. Labium: 0.27 long / 0.25 wide. Sternum: 1.23 long / 1.00 wide. Legs: I 7.98 (2.10, 2.55, 2.05, 1.28) / II 7.74 (2.10, 2.39, 2.00, 1.25) / III 7.91 (1.92, 2.40, 2.35, 1.24) / IV 11.41 (3.10, 3.40, 3.65, 1.26). Abdomen: 2.22 long / 1.45 wide. Palp: 3.33 (1.10, 1.23, - , 1.00).

Habitus as in Fig. 3A. Carapace ovoid, blackish brown, longer than wide, yellowish brown median band stretched from posterior part of head region to end of thoracic region, one pair of yellowish brown bands along the margin, cervical and radial furrows indistinct, longitudinal fovea needle-shaped (Fig. 3A). Eight eyes, eye region black, covered densely with white and blackish brown pubescence, posterior eye row longer than anterior eye row (Fig. 3B). Chelicera strongly developed with two promarginal teeth and two retromarginal teeth (proximal large and distal small). Sternum heart-shaped, pale and turbid yellowish brown, margin, paramedian part and posterior part mottled with black except medial part, posterior end pointed unprotruding between coxae of leg IV (Fig. 3C). Legs strongly developed, yellowish brown, femora, patellae, and tibiae blackish brown, leg formula IV-I-III-II (Fig. 3A). Palp: almost black, covered densely with long black pubescence; cymbium with 2 thick apical setae; median apophysis large with a pointed tip directing downward, posterior margin curved ventrally (Fig. 3D–G).

Habitat. The species was collected by hand in mixed forest leaf litter in mountainous terrain.

Distribution. Korea (new record), Japan.

Acknowledgements

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