

Redescription of a poorly known spider, *Pholcus kwangkyosanensis* Kim & Park, 2009 (Araneae: Pholcidae) from Korea

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Contribution to Environmental Biology

- Spiders are crucial arthropods that contribute to biodiversity in terrestrial ecosystems.
- The redescription of this species provides important information for comprehending the spider fauna in Korea.

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Abstract: A poorly known spider, *Pholcus kwangkyosanensis* Kim & Park, 2009 is redescribed with diagnosis, detailed descriptions, and taxonomic photographs of diagnostic characters. *P. kwangkyosanensis* is similar in appearance to *P. kwanaksanensis* Namkung & Kim, 1990, in terms of the shape of the genital organ and body, but it can be easily distinguished from the latter by the shape of the cheliceral apophysis, uncus, and procurus in males, as well as the shape of the epigynum and pore plates in females. The specimens of this spider were collected at the type locality (Mt. Gwanggyosan, Suwon), specifically under the bridge on a local stream in an agricultural landscape surrounded by rice fields, upland fields, or horticultural greenhouses.

Keywords: diagnosis, morphology, *phungiformes* species group, taxonomy, Korea

1. INTRODUCTION

Pholcus kwangkyosanensis in the family Pholcidae C. L. Koch, 1850 was erected by Kim & Park (2009) and Kim & Kim (2016) redescribed this species. Despite of their works, *P. kwangkyosanensis* has not been accepted from the Bibliographic checklist of Korean spiders (Yoo *et al.* 2015) and the National Species List of Korea (Kim 2019) due to insufficient scientific evidence without comprehensible diagnosis, description, and taxonomic illustrations with high photos resolution thus cannot identify important taxonomic characters. So, the authors investigated at type locality in agricultural landscape (Mt. Gwanggyosan, Suwon) of this spider and collected sufficient male and female spiders in order to verify this

species' taxonomic identity. The present study redescribes *P. kwangkyosanensis* with diagnosis, detailed description, and taxonomic photographs of diagnostic characters.

2. MATERIALS AND METHODS

All specimens were collected by hands and preserved in 98% ethyl alcohol and external morphology was examined under a Leica S8APO (Singapore) stereo-microscope. 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). Measure-

ments of body parts were made with an ocular micrometer and are recorded in millimeters. Internal genitalia of female was removed and treated in 10% KOH for 2 hours before illustration. Leg measurements are shown as: Total length (femur, patella, tibia, metatarsus, tarsus). Morphological terminology follows Huber (2011). The following abbreviations are used in the descriptions: **ALE**= anterior lateral eye, **AME**= anterior median eye, **PLE**= posterior lateral eye; **PME**= posterior median eye, **ALE-AME**= distance between **ALE-AME**, **ALE-PLE**= distance between **ALE-PLE**, **AME-AME**= distance between **AMEs**, **AME-PME**= distance between **AME-PME**, **PLE-PME**= distance between **PLE-PME**, **PME-PME**= distance between **PMEs** in the eye region; **L/d**= length/diameter in the leg measurement.

3. TAXONOMY

Family Pholcidae C. L. Koch, 1850
Subfamily Pholcinae C.L. Koch, 1850

Genus *Pholcus* Walckenaer, 1805

Diagnosis and detail description. See Huber (2011).
Type species. *Aranea phalangoides* Fuesslin, 1775.

Pholcus phungiformes species-group

Diagnosis and description. See Huber (2011) and Yao *et al.* (2021).

Pholcus kwangkyosanensis Kim & Park, 2009

(Fig. 1)

Pholcus kwangkyosanensis Kim & Park, 2009: 99; Yoo *et al.*, 2015: 5 (“uncertain species”); Kim & Kim, 2016: 23.

Examined materials. 7 ♀♀ 11 ♂♂, Sanggwang-gyo-dong, Jangan-gu, Suwon-si, Gyeonggi-do, Korea (37.329880N, 127.014511E, Alt. 160 m), 21 September 2023, leg. Jang C.M. & S.T. Kim.

Diagnosis. *Pholcus kwangkyosanensis* Kim & Park, 2009 is similar to *P. kwanaksanensis* Namkung & Kim, 1990 (Namkung & Kim, 1990: 132, f. 1–10) in the shape of the genital organ and body appearance, but can be easily distinguished from the latter by the combination of the following characters: Male - chelicera with conspicuously large distal apophysis (Fig. 1D vs. small),

uncus quadrangle with protruding thumb-like process and slightly depressed ridge (Fig. 1H vs. quadrangle with protruding beak-like process and strongly rising ridge), procurus with four apophysis (numbered 1–4 in Fig. 1H–J vs. three apophysis). Female - epigynum longer than wide with one pair of small and bulged latero-distal processes (Fig. 1E vs. wider than long with one pair of large and bulged latero-distal processes), pore plates small and far apart from each other (Fig. 1G vs. large and close to each other).

Description. Male. Habitus as in Figure 1A. Total length 6.32. Carapace: 1.88 long/1.86 wide. Eyes: AER 0.72, PER 0.77, ALE 0.18, AME 0.13, PLE 0.18, PME 0.16, ALE-AME 0.05, ALE-PLE contiguous, AME-AME 0.10, AME-PME 0.07, PLE-PME 0.03, PME-PME 0.28. Chelicera: 1.07 long/0.33 wide. Endite: 0.49 long/0.39 wide. Labium: 0.27 long/0.39 wide. Sternum: 0.92 long/1.18 wide. Legs: I 53.44 (13.61, 0.80, 13.71, 22.88, 2.44), II 35.51 (9.75, 0.75, 9.03, 14.34, 1.60), III 23.60 (6.64, 0.66, 5.89, 9.24, 1.17), IV 31.29 (8.65, 0.68, 8.06, 12.50, 1.40), tibia I L/d 71. Palp: 3.57 (0.72, 0.39, 1.12, –, 1.34). Abdomen: 4.14 long/2.23 wide.

Carapace pale yellowish brown, cephalic region with a pale blackish brown median band, thoracic region with pale blackish brown radial and marginal bands (Fig. 1A). Chelicera with three apophyses; blunt proximo-lateral apophysis slightly protrudent diagonally upward out of chelicera, small and blunt frontal apophysis protruding forward, and large pointed distal apophysis slightly protrudent diagonally downward (Fig. 1C, D). Legs yellowish brown, retrolateral trichobothrium on tibia I at 5% proximally, tarsus I with about 30 pseudo-segments, femora, tibiae, and metatarsi with one or two pale blackish brown proximal and distal annuli, leg formula I-II-IV-III. Abdomen elliptical, pale grayish brown with a long cardiac pattern and many blackish brown irregular spots (Fig. 1A). Palp (Fig. 1H–K): trochanter conspicuously long with strongly curved tip, slightly longer than femur; palpal tibia with a finger-shaped prolatero-ventral modification (Fig. 1H); bulb pale yellowish brown, pocket-shaped; uncus dark blackish brown and quadrangle with protruding thumb-like process and slightly depressed ridge, edge rather smooth, pseudoappendix absent; embolus weakly sclerotized with thick base and some semitransparent fringed distal processes, thick and long, curved (Fig. 1H, K); procurus large and long, brown with blackish brown margin, large ventral knee roundly swollen and strongly curved,

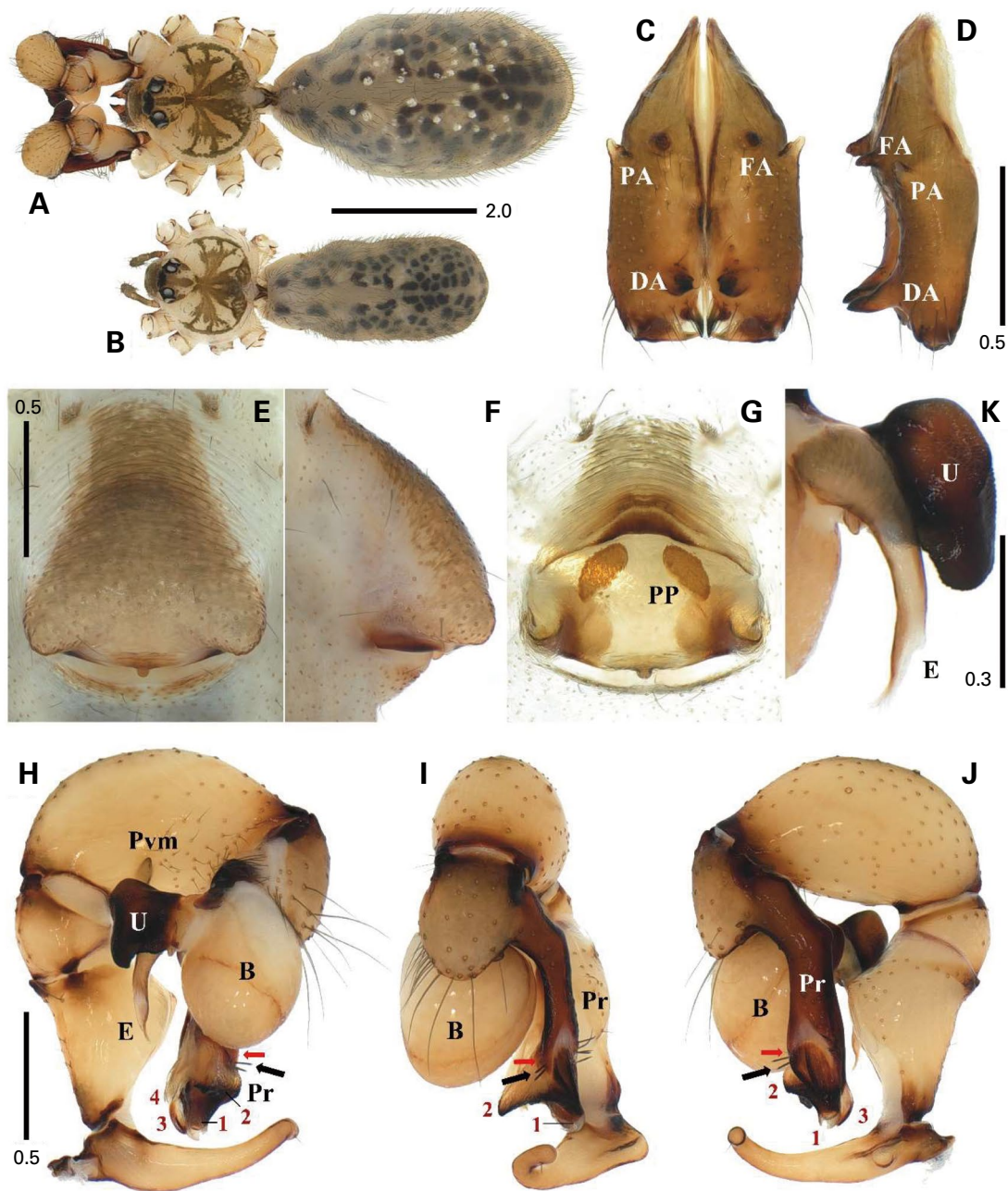


Fig. 1. *Pholcus kwangkysanensis* Kim & Park, 2009: A. Male (Habitus); B. Female (Habitus); C. Male chelicerae, frontal view; D. *Ditto*, lateral view; E. Female epigynum, ventral view; F. *Ditto*, lateral view; G. female internal genitalia, dorsal view; H. Male palp, prolateral view; I. *Ditto*, frontal view; J. *Ditto*, retrolateral view; K. Embolic division (1 = retrolatero-distal apophysis, 2 = dorso-distal apophysis, 3 = ventro-distal apophysis, 4 = ventral apophysis, black and red arrows point at dorsal spines) (B = bulb, DA = distal apophysis, E = embolus, FA = frontal apophysis, PA = proximo-lateral apophysis, PP = pore plate, Pr = procurus, Pvm = prolatero-ventral modification, U = uncus). Scale bars in mm.

four distal apophyses present, one blunt retrolatero-distal apophysis with membranous, pincer-shaped tip (numbered 1 in Fig. 1H-J), one dorso-distal apophysis (numbered 2 in Fig. 1H-J), one ventro-distal apophysis

(numbered 3 in Fig. 1H, J), and one membranous ventral apophysis with a fringed tip (numbered 4 in Fig. 1H), three dorsal spine present (one thin and short marked with a red arrow, and two thick and long

marked with a black arrow in Fig. 1H–J).

Female. General appearance similar to male, habitus as in Figure 1B. Total length 4.82. Carapace: 1.61 long/1.68 wide. Eyes: AER 0.60, PER 0.65, ALE 0.17, AME 0.09, PLE 0.15, PME 0.15, ALE–AME 0.05, ALE–PLE contiguous, AME–AME 0.05, AME–PME 0.08, PLE–PME 0.03, PME–PME 0.24. Chelicera: 0.83 long/0.28 wide. Endite: 0.50 long/0.31 wide. Labium: 0.27 long/0.33 wide. Sternum: 0.80 long/1.01 wide. Legs: I 34.96 (8.44, 0.65, 8.79, 14.88, 2.20), II 23.41 (6.40, 0.61, 5.61, 9.41, 1.38), III 16.92 (4.78, 0.59, 4.11, 6.37, 1.07), IV 22.79 (6.48, 0.61, 5.69, 8.84, 1.17), tibia I L/d 51. Palp: 1.21 (0.39, 0.18, 0.21, –, 0.43). Abdomen: 3.10 long/1.44 wide. Epigynum: 1.18 long/0.93 wide.

Legs yellowish brown, femora, tibiae, and metatarsi with one or two pale blackish brown proximal and distal annuli, leg formula I–II–IV–III. Epigynum (Fig. 1E, F): longer than wide, sclerotized with one pair of bulged processes latero-distally, anterior epigynal plate strongly protrudent, anterior epigynal plate and posterior epigynal plate far apart, small and short knob with a blunt tip. Internal genitalia (Fig. 1G): anterior arch with median portion slightly curved, pore plates elliptical, diagonal, and far apart from each other.

Variation. Tibia I in five males: 12.64 ± 0.64 (12.57, 12.62, 12.26, 12.06, 13.71). Tibia I in five females: 8.86 ± 0.09 (8.79, 9.01, 8.82, 8.88, 8.78).

Habitat. Found under the bridge on a local stream in an agricultural landscape surrounded by rice fields, upland fields, or horticultural greenhouses.

Distribution. Korea.

CRedit authorship contribution statement

CM Jang: Conceptualization, Methodology, Investigation, Collection, Writing-Original draft. **ST Kim:** Conceptualization, Methodology, Investigation, Collection, Identification, Writing-Original draft, review and editing, Project administration, Funding acquisition.

Declaration of Competing Interest

No potential conflict of interest relevant to this article was reported.

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