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Phrynarachne birudis sp. nov., a new crab spider (Araneae, Thomisidae) from South Korea

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Abstract

Background

The crab spiders of the genus *Phrynarachne* Thorell, 1869 comprising 32 species has been widely known to distribute worldwide to date. Only one species, *Phrynarachne katoi* Chikuni, 1955, is known in Korea so far.

New information

A new crab spider, *Phrynarachne birudis* sp. nov. is described, based on a male collected from Gumi-si, Gyeongsangbuk-do, South Korea. The geographic record is provided as well as photos of habitus and illustrations of the male copulatory organ. The type specimens of this study are deposited in the collection of the Nakdonggang National Institute of Biological Resources (NNIBR) and Konkuk University (KKU), South Korea.

Keywords

Thomisidae, *Phrynarachne*, new species, description, South Korea

Introduction

The genus *Phrynarachne* Thorell, 1869 was erected with *Phrynarachne rugosa* (Walckenaer, 1805) as the type species. The genus currently consists of 32 species worldwide ([World Spider Catalog 2021](#)). Only one species, *Phrynarachne katoi* Chikuni, 1955, is known in Korea, and although rare, it is widely distributed throughout Korea (Fig. 1A) (Kim et al. 2016, Kim 2019, [World Spider Catalog 2021](#)). Two males of *Phrynarachne birudis* sp. nov. were collected from Gumi-si, Gyeongsangbuk-do (South-central inland

area in South Korea) during an intensive seasonal investigation of the spider fauna in hilly province nationwide in 2019-2020 (Fig. 1B). The male of *Phrynarachne birudis* sp. nov. is described with measurements, a key to the males of Korean *Phrynarachne* species, morphological illustrations, and a distribution map.

Materials and methods

External morphology was examined and illustrated using a stereoscopic dissecting microscope (LEICA, S8APO, Singapore). Habitus photographs were taken with a CANON 650D with 60 mm macro-lens. 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, total length (femur, patella, tibia, metatarsus, tarsus). Abbreviations used are as follows: ALE = anterior lateral eye, AME = anterior median eye, PLE = posterior lateral eye, PME = posterior median eye, AER = anterior eye row, PER = posterior eye row; RTA = retrolateral tibial apophysis, VTA ventral tibial apophysis.

Taxon treatment

Phrynarachne birudis, sp. n.

- ZooBank [urn:lsid:zoobank.org:pub:49334E7D-1BBF-4B65-BF89-19F94CF168A9](https://zoobank.org/pub:49334E7D-1BBF-4B65-BF89-19F94CF168A9)

Materials

Holotype:

- phylum: Arthropoda; class: Arachnida; order: Araneae; family: Thomisidae; continent: Asia; country: South Korea; countryCode: KR; stateProvince: Gyeongsangbuk-do; municipality: Gumi-si; locality: Gupo-dong; decimalLatitude: 36.128139; decimalLongitude: 128.396056; samplingProtocol: sweep net; eventDate: Jun-25-2020; habitat: Mixed forest; individualCount: 1; sex: male; lifeStage: adult; recordedBy: Jae Seong Im and Seung Tae Kim; identifiedBy: Seung Tae Kim; institutionID: Nakdonggang National institute of Biological Resources (NNIBR)

Paratype:

- phylum: Arthropoda; class: Arachnida; order: Araneae; family: Thomisidae; continent: Asia; country: South Korea; countryCode: KR; stateProvince: Gyeongsangbuk-do; municipality: Gumi-si; locality: Gupo-dong; decimalLatitude: 36.128139; decimalLongitude: 128.396056; samplingProtocol: sweep net; eventDate: May-14-2020; habitat: Mixed forest; individualCount: 1; sex: male; lifeStage: adult; recordedBy: Sue Yeon Lee and Seung Tae Kim; identifiedBy: Seung Tae Kim; institutionID: Konkuk University (KKU)

Description

Holotype male. Total length 4.20 (habitus) (Fig. 1). Carapace: 2.15 long/2.20 wide, dark reddish brown, round, slightly wider than long, clothed sparsely with serrated setae, head region flat with a pair of light stripes along the median line, numerous warts

present, cervical and radial furrows distinct, dark longitudinal fovea slightly depressed (Fig. 2A, C-E). Eyes: ALE 0.10, AME 0.06, PLE 0.14, PME 0.06, ALE-AME 0.17, AME-AME 0.30, PLE-PME 0.37, PME-PME 0.31, ALE-PLE 0.30, AME-PME 0.37, AER 0.58, PER 0.59, all eyes on the eye tubercle, eight eyes in two rows, AER almost straight and PER recurved from above, AER strongly procurved and PER slightly procurved from front, PER longer than AER (Fig. 2E, F). Chelicera; 0.62 long/0.35 wide, dark reddish brown, light stripe and cross-shaped pattern on dorsal surface (Fig. 2C). Endite: 0.45 long/0.18 wide, dark reddish brown. Labium: 0.28 long/ 0.25 wide, dark reddish brown. Sternum: 1.00 long/0.98 wide, mottled with dark and light reddish brown, subcordate, clothed sparsely with long blackish brown setae, pointed anteromedial margin protrudent, posterior end round and not protrudent between the coxae of leg IV (Fig. 2B). Legs: I 7.67 (2.40, 0.80, 1.67, 1.90, 0.90), II 6.84 (2.07, 0.80, 1.50, 1.65, 0.82), III 3.92 (0.87, 0.60, 0.85, 0.93, 0.67), IV 4.40 (1.00, 0.52, 0.90, 1.18, 0.80), ivory, stout and strongly developed, I and II mottled severely with dark reddish brown, III and IV mottled weakly with dark reddish brown (Fig. 2A, D), femur with ventral stripe (Fig. 2B), femur I with two small rod-like proximal protuberances on prolatral surface (Fig. 2G), leg formula I-II-IV-III. Abdomen: 2.10 long/2.03 wide, ivory, mottled with blackish brown, yellowish brown and reddish brown, trapezoidal, longer than wide, a pair of dark reddish brown triangular markings paramedianly, numerous rounds or irregular pits on dorsal surface, clothed densely with semi-transparent clavate and serrated setae (Fig. 2A, C, D, Fig. 3E, F). Palp: 2.57 (0.46, 0.41, 0.20, -, 0.70), bulb round and simple, embolus thick with a pointed tip rotating largely clockwise, finger-like VTA large with a bent tip, thumb-like blunt RTA large (Fig. 3A–D).

Female. Unknown.

Diagnosis

The males of the new species can be easily distinguished from congeners of this genus by the large finger-like VTA with a bent tip and a thumb-like blunt RTA (Fig. 3A–C); *versus* very short VTA with a very long and pointed RTA in *P. brevis* (Tang and Li 2010: 49, figs 35B–D), thumb-like VTA with a slightly bent tip and a very long and pointed RTA in *P. ceylonica* (Ono 1988: 25, figs 16, 17), thumb-like VTA without a bent tip and a very long and blunt RTA in *P. jobiensis* (Lehtinen 2016: 152, fig. 2g), thumb-like VTA without a bent tip and a very long and pointed RTA in *P. katoi* (Ono 1988: 28, figs 25, 26), thumb-like VTA with a slightly bent tip and a wide spear-like RTA in *P. lancea*, (Tang and Li 2010: 53, figs 37B–D), no VTA and a very long RTA with a slightly curved tip in *P. melloleitaoi* (Lessert 1933: 121, fig. 44), thumb-like VTA without a bent tip and a bifurcated RTA in *P. rugosa* (Ledoux 2004: 176, figs 19A–C).

Etymology

The species name is a combination of Latin prefix ‘*bi-*’ (means two) and noun ‘*rudis*’ (means small stick) referring to two small rod-like proximal protuberances on prolatral surface of the femur I.

Distribution

South Korea: Gumi-si, Gyeongsangbuk-do (Fig. 1A).

Taxon discussion

A total of 32 species of the genus *Phrynarachne* Thorell, 1869 have been described around the world, of which only 10 species of males are known to date (World Spider Catalog 2021). The genus *Phrynarachne* is a species-rich one that has not been taxonomically revised comprehensively in recent times. The males of the genus *Phrynarache* are generally similar in the shape of the tegulum and embolus. However, the known males can be easily distinguished from each other within this genus by the shape and size of a ventral tibial apophysis (VTA) and a retrolateral tibial apophysis (RTA) in the palpal organ.

Remarks: The species was collected with a sweep net between shrubs in a mixed forest of hilly terrain near the tributary of the Nakdonggang River. The new species appear to be endemic to South Korea. Until now, females have not been collected and are unknown, and have no ecological information other than their habitat. Twenty-one species, known only to females and one species based on juvenile are known to be distributed in South Pacific Ocean Island, Indian Ocean Island, Pacific Ocean Island, Asia, and Africa as follows: *P. cheesmanae* from Vanuatu in South Pacific Ocean; *P. clavigera*, *P. pusiola*, from Madagascar in Indian Ocean; *P. tuberculata* from New Guinea in Pacific Ocean; *P. coerulescens*, *P. dissimilis*, and *P. kannegieteri* from Indonesia, *P. cucullata* from Cambodia, Vietnam, and Moluccas, *P. papulata* and *P. papulata aspera* from Myanmar in Southeast Asia; *P. rothschildi* and *P. fatalis* (based on juvenile) from Sri Lanka, and *P. peeliana* and *P. tuberosa* from India in South Asia; *P. gracilipes* from Ethiopia in Africa; *P. marmorata* and *P. olivacea* from Ivory Coast, *P. rubroperlata* and *P. rugosa spongicolorata* from Guinea in West Africa; *P. huangshanensis* (Anhui, East China region), *P. mammillata* China (Guizhou, Southwest China region), and *P. sinensis* (no detailed collecting data) from China in East Asia (World Spider Catalog 2021). However, South Korea belongs to Far East Asia, and all three Chinese species adjacent to Korea have been reported in the southeastern region of China, which has a lower latitude than Korea. Thus, although females of the new species have not been collected, given the geographical distribution of 21 congeners of the genus *Phrynarachne* known only to females, males of the new species are not considered to match them in current status.

Identification keys

Key to the males of Korean *Phrynarachne* species

1	Embolus separated from the embolic base, finger-like ventral tibial apophysis (VTA) small, beak-like retrolateral tibial apophysis (RTA) long and pointed	<i>P. katoi</i> Chikuni
–	Embolus conjugated with an embolic base, finger-like ventral tibial apophysis (VTA) large, thumb-like retrolateral tibial apophysis (RTA) large and blunt	<i>P. birudis</i> sp. nov.

Acknowledgements

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References

- Kim ST, Lee SY, Im MS, Yoo JS (2016) Distribution of Korean Spiders. National Institute of Biological Resources, Incheon, 1624 pp. [ISBN 978-89-6811-234-8]
- Kim ST (2019) Class Arachnida, Order Araneae. In: National Institute of Biological Resources (Ed.) National Species List of Korea II, Vertebrates, Invertebrates, Protozoans. Incheon, 412–443 pp. [ISBN 978-89-6811-382-6].
- Ledoux JC (2004) Araignées de l'île de La Réunion: I. Hahniidae, Ctenidae, Thomisidae et Clubionidae (Araneae). *Revue Arachnologique* 14: 159-191.
- Lehtinen PT (2016) Significance of oriental taxa in phylogeny of crab spiders (Thomisidae s. lat. and Stiphropodidae). *Indian Journal of Arachnology* 5: 143-171.
- Lessert R (1933) Araignées d'Angola. (Resultats de la Mission scientifique suisse en Angola 1928-1929). *Revue Suisse de Zoologie* 40 (4): 85-159.
- Ono H (1988) A revisional study of the spider family Thomisidae (Arachnida, Araneae) of Japan. National Science Museum, Tokyo, 252 pp.
- Tang G, Li SQ (2010) Crab spiders from Xishuangbanna, Yunnan Province, China (Araneae, Thomisidae). *Zootaxa* 2703: 1-105. <https://doi.org/10.11646/zootaxa.2703.1.1>.
- World Spider Catalog (2021) World Spider Catalog. Version 22.0. Natural History Museum Bern. <http://wsc.nmbe.ch>. Accessed on: 2021-4-10.



Figure 1.

Distribution of *Phrynarachne* species in South Korea (A), the environment around the collection site (B), and the collection site of *Phrynarachne birudis* sp. nov. (C).

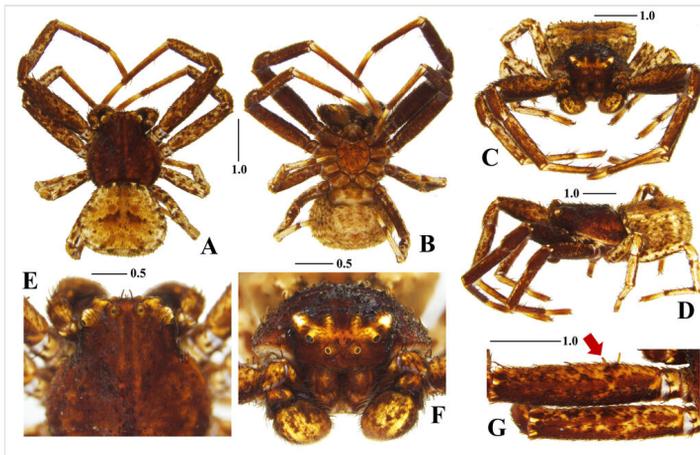


Figure 2.

Phrynarachne birudis sp. nov., holotype male. **A** Habitus in dorsal view; **B** Ditto in ventral view; **C** Ditto in frontal view; **D** Ditto in lateral view; **E** Eye area from above; **F** Ditto from front; **G** Femur I in prolateral view (Arrow indicates two proximal protuberances). Scale bars in mm.

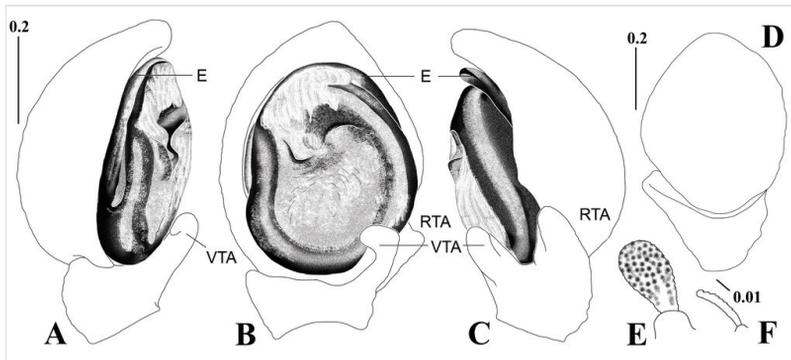


Figure 3.

Phrynarachne birudis sp. nov., holotype male. **A** Palp in prolateral view; **B** Ditto in ventral view; **C** Ditto in retrolateral view; **D** Ditto in dorsal view; **E** Clavate seta; **F** Serrated seta (E, embolus; RTA, retrolateral tibial apophysis; VTA, ventral tibial apophysis). Scale bars in mm.