



A new species of *Afraflacilla* Berland & Millot, 1941 (Araneae, Salticidae) from India

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ABSTRACT. A new species of jumping spiders (Araneae, Salticidae), *Afraflacilla goensis* Gawas & Tripathi **sp. nov.**, is described, diagnosed and illustrated based on a single male specimen collected from a mangrove in Goa, India. Considering this finding, the genus *Afraflacilla* previously known from the Indian states of Tamil Nadu, Kerala, Gujarat, and Rajasthan, is now documented for the first time in Goa. Finally, the Indian records of the genus *Afraflacilla* are mapped.

Key words: Asia, distribution map, Goa, jumping spider, mangroves, taxonomy

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INTRODUCTION

The genus *Afraflacilla* was established by Berland & Millot (1941) with *A. bamakoi* as the type species. Clark (1974) synonymized it with *Pseudicius* Simon, 1885 without any justifications, and despite this, it was considered as such in several publications (e.g., Andreeva et al., 1984; Wanless, 1984; Maddison, 1987; Prószyński, 1987, 1989, 1990; Platnick, 1989). However, Żabka (1993), through a comparison of the types of both *Afraflacilla* and *Pseudicius*, provided evidence supporting their distinctiveness. Consequently, the genus was reinstated in the same publication and reported from Australia for the first time. In 2021, the genus was newly documented in India (Prajapati et al., 2021), and currently five species of *Afraflacilla* are known from this country. *Afraflacilla* currently comprises 47 nominal species, spanning the Middle East, Africa, southern Asia, and the middle and western Pacific region, encompassing Africa and New Guinea (Żabka, 1993; World Spider Catalog, 2024).

Members of *Afraflacilla* can be identified by the presence of a stridulatory apparatus, the arrangement of hard setae in a row on the first leg's femur, and a rugose carapace margin. Despite sharing some characteristics with *Pseudicius*, *Afraflacilla* can be distinguished from it by long insemination ducts, distinctive epigynal pockets, a long embolus, and in some species, a laterally twisted cymbium in some species as in *A. vestjensi* Żabka, 1993 and *A. huntorum* Żabka, 1993 (Sudhin et

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al., 2022; Žabka, 1993). Species of *Afraflacilla* are mostly found in open landscapes, including savannahs and deserts, where they reside on vegetation, tree trunks, or under bark. Further studies by J. Prószyński (unpublished data) revealed that some Pacific species exhibit a preference for human habitats or mangroves (Žabka, 1993). This paper contributes to this knowledge by describing a new species from the mangrove ecosystem in Goa, India.

MATERIAL AND METHODS

Specimen was hand collected from a branch of *Rhizophora mucronata* Lam. located within a mangrove ecosystem. Subsequently, it was preserved in 70% ethanol. All measurements are in millimeters (mm) and were made with LAS software equipped to a Stereozoom microscope. Lengths of palp and leg segments are given as follows: total [femur, patella, tibia, metatarsus (absent on palp), tarsus]. The taxonomic terminology follows Sudhin et al. (2022). The microphotographs were made with a Leica DMC4500 digital camera attached to a Leica M205A stereomicroscope, with the software package Leica Application Suite (LAS, version 3.8) used for stacking images taken at different focal planes. The examined specimen is deposited in the research collections of the National Centre for Biological Sciences, Bengaluru, Karnataka, India (NRC).

Abbreviations used in the text are as follows: ALE – anterior lateral eye; AME – anterior median eye; do – dorsal; pl – prolateral; pld – prolateral dorsal; PLE – posterior lateral eye; plv – prolateral ventral; PME – posterior median eye; rl – retrolateral; rld – retrolateral dorsal; rlv – retrolateral ventral; RTA – retrolateral tibial apophysis.

RESULTS

Taxonomic hierarchy

Class Arachnida Lamarck, 1801

Order Araneae Clerck, 1757

Family Salticidae Blackwall, 1841

Genus *Afraflacilla* Berland & Millot, 1941

Type species: *Afraflacilla bamakoi* Berland & Millot, 1941

Afraflacilla goaensis Gawas & Tripathi **sp. nov.** (Figs 1–2)

<https://zoobank.org/urn:lsid:zoobank.org:act:7EDA069-4B84-465C-B87F-A78334087105>

Material examined. Holotype ♂ (NRC-AA-8611), INDIA: Goa, North Goa, Tiswadi, Choroa Island (15.515662° N, 73.869248° E; 3 m a.s.l), 23 July 2022, V. Gawas leg., from branch, by hand.

Etymology. The specific epithet is an adjective, referring to the type locality of the new species.

Diagnosis. The male of *Afraflacilla goaensis* **sp. nov.** is most similar to that of *Afraflacilla ballarini* Cao & Li, 2016 as both have an oval bulb and embolus arising at a 9 o'clock position, but can be distinguished from it by RTA short and broad (*vs.* long and thin in *A. ballarini*; cf. Figs 2F–G with Cao et al., 2016: figs 1B–D).

Description — *Male holotype* (Figs 1–2). Measurements. Body length 4.15. Carapace length 1.67, width 1.16. Opisthosoma length 2.48, width 1.14. Eye diameters: AME 0.27, ALE 0.16, PME 0.06, PLE 0.15. Eye interdistances: PME–PME 0.18, ALE–ALE 0.65, PME–PLE 0.17, PLE–PLE 0.78, ALE–PME 0.24. Length of chelicerae 0.55. Measurements of palp and legs: Palp 1.18 [0.47, 0.14, 0.11, 0.46], legs: I 3.98 [1.11, 0.62, 1.24, 0.71, 0.30], II 2.12 [0.69, 0.31, 0.48, 0.37, 0.27], III 2.18 [0.72, 0.29, 0.42, 0.51, 0.24], IV 3.14 [1.04, 0.43, 0.76, 0.65, 0.26]. Leg formula: 1432. Spination. Palp: femur do 1, patella spineless, tibia spineless, tarsus plv 1. Legs: femur I spineless, II pld 1 do 3, III and IV pld 1 do 3 rld 1; patellae I–IV spineless; tibiae I and IV plv 1, II spineless, III rlv 1; metatarsus I plv 1 rlv 1, II–IV pl 1 plv 1 rlv 1; tarsi I–IV spineless. Colour in alcohol: Carapace, clypeus, chelicerae, labium, endites, sternum, leg I and palp burnt orange; spinnerets light brown; eye field nearly black; carapace covered with scattered fine black hairs (Fig. 2A–C).

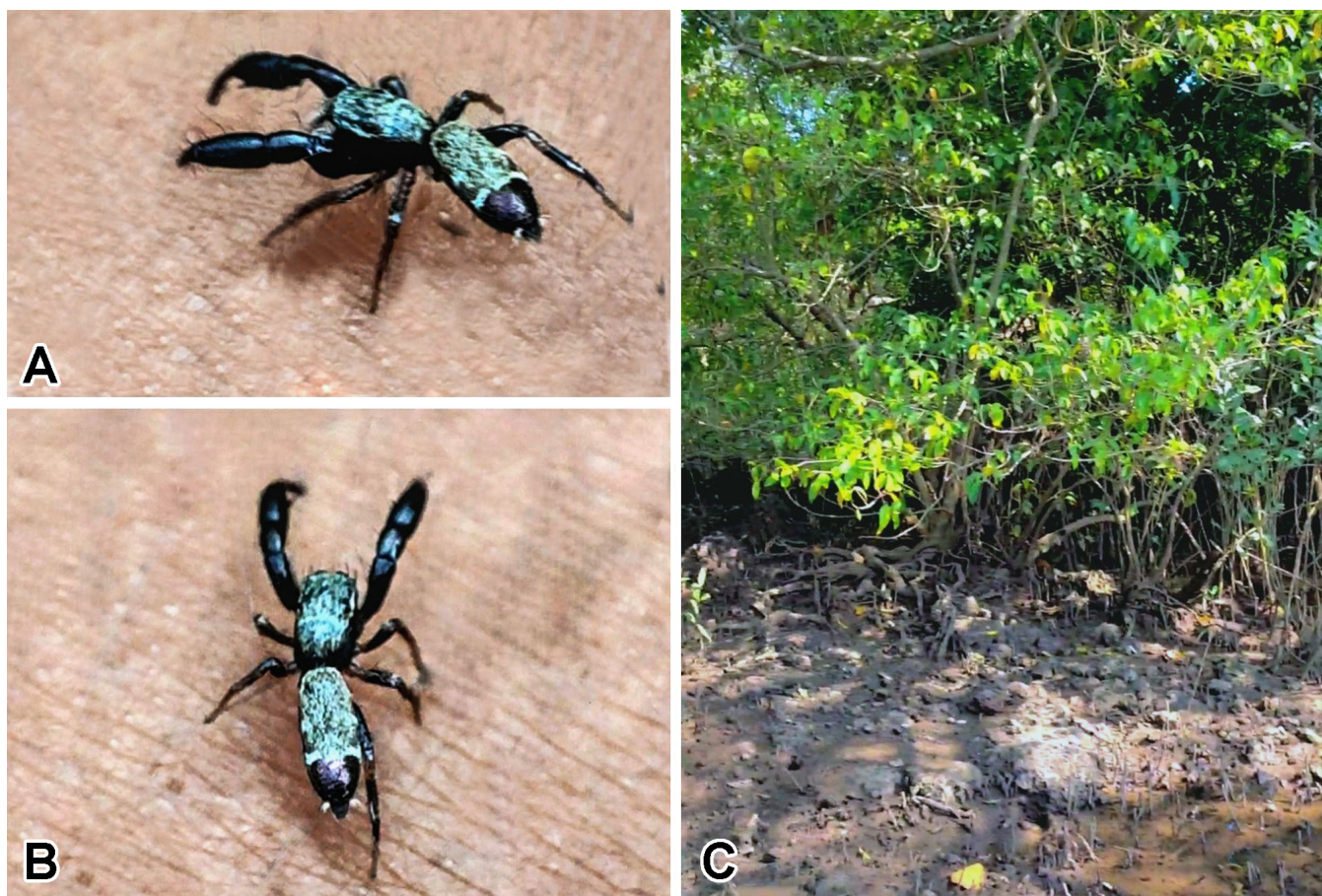


Figure 1. Live specimen (A–B) and collection site (C) of *Afraflacilla goaensis* Gawas & Tripathi **sp. nov.**: **A.** Holotype male, lateral view; **B.** Same, dorsal view; **C.** The Mangrove ecosystem, Chorao Island, North Goa, India.

Ocular region longer than wide, covered with brown long hairs. Lateral sides of carapace with a row of twelve long black curved bristles below eyes (Fig. 2C). AME and ALE nearly contiguous (Fig. 2D). Chelicerae dorsolaterally flat and without much hair; promargin with 2 closely arranged teeth, retromargin with 1 tooth. Fovea short, longitudinal, straight, reddish-brown (Fig. 2A). Opisthosoma oval, hirsute; dorsum coffee brown with creamy dots and a narrow light yellowish brown transverse stripe posteriorly (Fig. 2A). Leg I robust, nearly as long as body (Fig. 2E). Palp (Fig. 2F–G): segments orangish-brown; RTA flat, broad, wharcliffe knife-shaped in retrolateral view (Fig. 2G); bulb oval, with a small medioretrolaterally blunt growth (Fig. 2F); embolus arising at a 9 o'clock position and coiled once around bulb (Fig. 2F).

Female. Unknown

Distribution. Known only from the type locality (Fig. 3).

Habitat. Chorao is an estuarine island nestled within the Mandovi River's backwaters. It marks the starting point of the Mandovi estuary's mangrove ecosystem, which stretches for 34 km upstream. Chorao Island hosts thriving mangrove swamps, creating a rich estuarine wetland environment. Among the various mangrove species found on Chorao, *Avicennia officinalis* L., *A. alba* Blume, *Bruguiera cylindrica* (L.), *Kandelia candel* (L.), *Rhizophora mucronata*, and *R. apiculata* Blume are the most common. A portion of the island, specifically 178 hectares, is situated within the boundaries of the Dr. Salim Ali Bird Sanctuary (Figs 1, 3) and is protected.

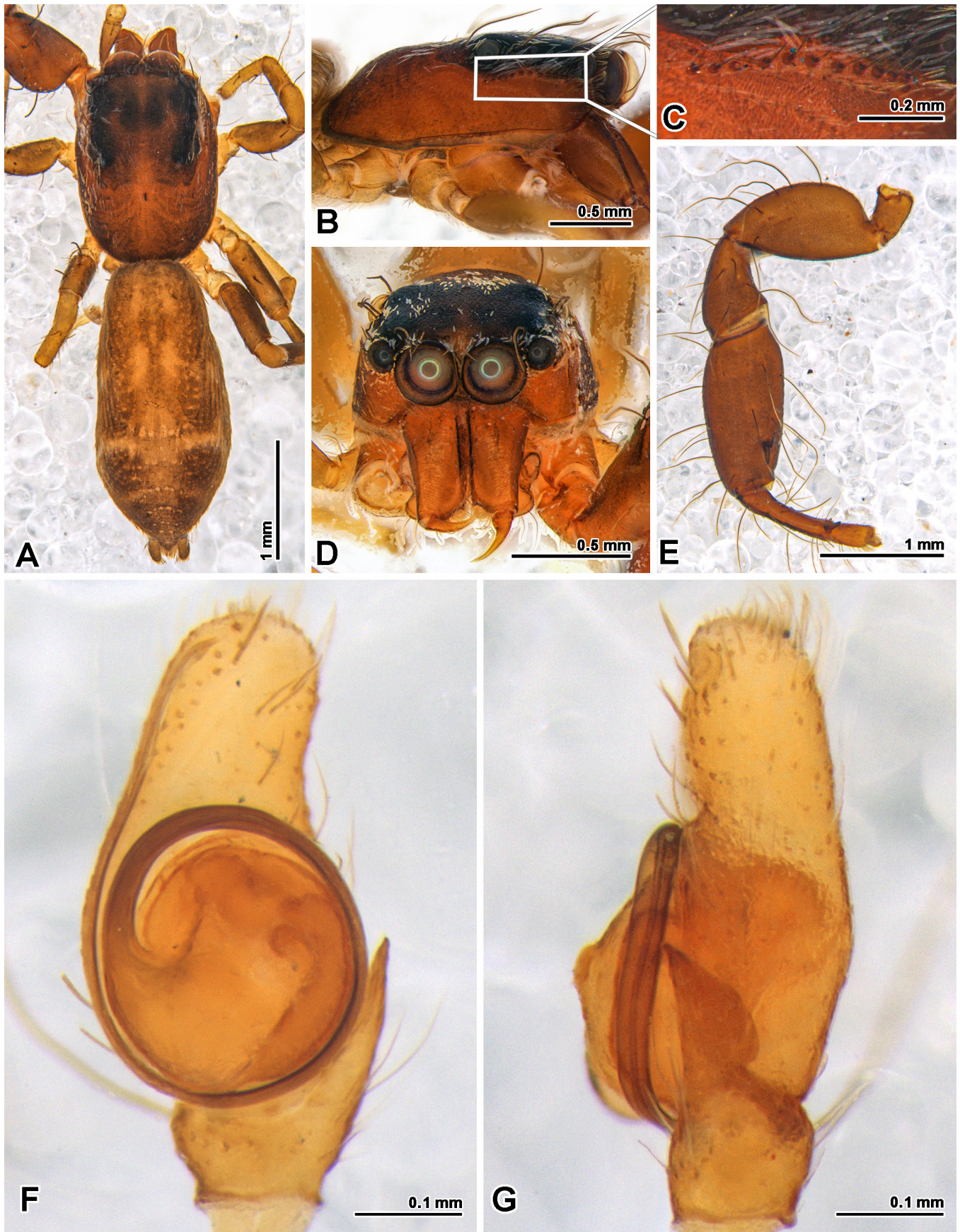


Figure 2. *Afraflacilla goaensis* Gawas & Tripathi **sp. nov.**, holotype male (NRC-AA-8611): **A.** Habitus, dorsal; **B.** Prosoma, lateral; **C.** Stridulatory tubercles, close up; Prosoma, frontal; **E.** Leg I, proateral; **F.** Palp, ventral; **G.** Same, retrolateral.

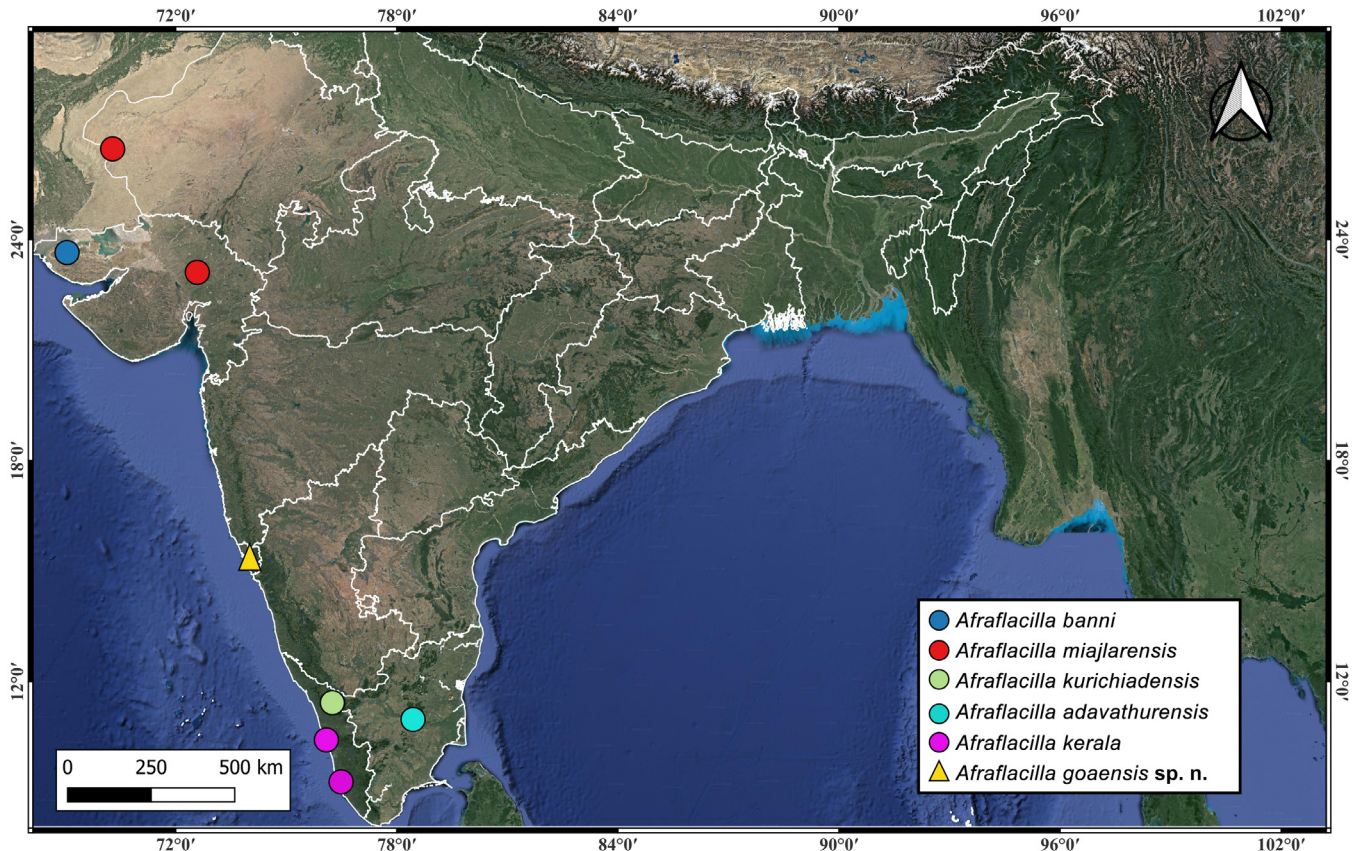


Figure 3. Collecting localities of species of *Afraflacilla* Berland & Millot, 1941 in India.

DISCUSSION

The genus *Afraflacilla*, considering the results of this research, comprises a total of 48 species. Recent studies in India have enlarged the known range of the genus to states of Kerala, Gujarat, Rajasthan, Tamil Nadu, and, herein for the first time, Goa. The regional geographical distribution of the genus (Fig. 3) highlights that the six described species are predominantly found in the Western region of India. However, there are iNaturalist records from the Eastern state of West Bengal, indicating a greater range and emphasising the need for further research and compilation to elucidate the biogeography of the genus. Babu et al. (2023) provided valuable insights by comparing Indian *Afraflacilla* species to those found in Asia/Near East and Oriental/Austro-Asian regions. The findings show affinities between the Indian species and representatives of the genus across a vast geographic region. The present paper describes a new species closely related to *A. ballarini* Cao & Li, 2016, known only from its type locality in China. To gain better understanding of the diversity and biogeographic patterns of this genus, integrative studies involving multiple lines of evidence (e.g., molecular markers) are helpful.

AUTHOR'S CONTRIBUTION

The authors confirm their contribution in the paper as follows: V.U.G.: Collection of specimens, preparation of the map and writing; R.T.: Conceptualization, writing, microscopic imaging & measurement, review and editing; A.V.S.: Networking and supervision; N.S.S.: Networking, supervision, paper oversight, and review; The authors read and approved the final version of the manuscript.

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AVAILABILITY OF DATA AND MATERIAL

The specimen examined in this study is deposited in the research collections of the National Centre for Biological Sciences, Bengaluru, Karnataka, India (NRC) and is available from the curator, upon request.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this paper.

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REFERENCES

- Andreeva, E.M., Hęciak, S. & Prószyński, J. (1984) Remarks on *Icius* and *Pseudicius* (Araneae, Salticidae) mainly from central Asia. *Annales Zoologici, Warszawa*, 37, 349–375.
- Berland, L. & Millot, J. (1941) Les araignées de l'Afrique Occidentale Française I.-Les salticides. *Mémoires du Muséum National d'Histoire Naturelle de Paris* (N.S.), 12, 297–423.
- Babu, N., Tripathi, R., Sampathkumar, M., Caleb, J.T.D., Prasad, G., Mohanasundaram, M., Mahendiran, G. & Sudhikumar, A.V. (2023) Two new species of *Afraflacilla* Berland et Millot, 1941 (Araneae: Salticidae: Chrysillini) from India. *Arthropoda Selecta*, 32 (4), 459–465. <https://doi.org/10.15298/arthscl.32.4.10>
- Cao, Q., Li, S.Q. & Žabka, M. (2016) The jumping spiders from Xishuangbanna, Yunnan, China (Araneae, Salticidae). *ZooKeys*, 630, 43–104. <https://doi.org/10.3897/zookeys.630.8466>
- Clark, D.J. (1974) Notes on Simon's types of African Salticidae. *Bulletin of the British Arachnological Society*, 3 (1), 11–27. <https://doi.org/10.1080/13530197408705095>
- Maddison, W. (1987) *Marchena* and other jumping spiders with an apparent leg-carapace stridulatory mechanism (Araneae: Salticidae: Heliophaninae and Thiodininae). *Bulletin of the British Arachnological Society*, 7, 101–106
- Platnick, N.I. (1989) *Advances in Spider Taxonomy 1981–87*. Manchester University Press, British Arachnological Society, Manchester, New York. 673 p.
- Prajapati, D.A., Tatu, K. & Kamboj, R.D. (2021) First record of *Afraflacilla* Berland & Millot, 1941 from India, with description of a new species (Araneae: Salticidae). *Arachnology*, 18 (9), 990–992. <https://doi.org/10.13156/ arac.2021.18.9.990>
- Prószyński, J. (1987) *Atlas Rysunków Diagnostycznych Mniej Znanych Salticidae 2*. Zeszyty Naukowe Wyższej Szkoły Rolniczo-Pedagogicznej, Siedlce. 172 p.
- Prószyński, J. (1989) Salticidae (Araneae) of Saudi Arabia. *Fauna Saudi Arabia*, 10, 31–64.
- Prószyński, J. (1990) *Catalogue of Salticidae (Araneae): Synthesis of Quotations in the World Literature since 1940, with Basic Taxonomic Data since 1758*. Wyższa Szkoła Rolniczo-Pedagogiczna, Siedlce. 366 p.
- Sudhin, P.P., Nafin, K.S., Tripathi, R., Jangid, A.K., Prajapati, D.A., Siliwal, M. & Sudhikumar, A.V. (2022) Description of two new species of the genus *Afraflacilla* Berland et Millot, 1941 (Araneae: Salticidae) from India. *Arthropoda Selecta*, 31 (3), 326–334. <https://doi.org/10.15298/arthscl.31.3.09>
- Wanless, F.R. (1984) Araneae-Salticidae. Contributions à l'étude de la faune terrestre des îles granitiques de l'archipel des Séchelles (Mission P.L.G. Benoit - J.J. Van Mol). *Annales, Musée Royal de l'Afrique Centrale, Sciences Zoologiques*, 241, 1–84.

- World Spider Catalog (2023) World Spider Catalog. Version 24.5. Natural History Museum Bern, online at <http://wsc.nmbe.ch> [Accessed on 05 January 2024]
- Žabka, M. (1993) Salticidae (Arachnida: Araneae) of the Oriental, Australian and Pacific regions. IX. Genera *Afraflacilla* Berland & Millot 1941 and *Evarcha* Simon 1902. *Invertebrate Taxonomy*, 7 (2), 279–295.
<https://doi.org/10.1071/IT9930279>

گونه جدید از جنس *Afraflacilla* Berland & Millot, 1941 (Araneae, Salticidae) از هند

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چکیده: یک گونه جدید از عنکبوت‌های جهنده (Araneae, Salticidae) به نام *Afraflacilla goaensis* Gawas & Tripathi sp. nov. براساس یک نمونه نر جمع‌آوری شده از یک جنگل مانگرو در گوآ - هند توصیف، و تصویربرداری شد و خصوصیات افتراقی آن تشریح گردید. با توجه به این یافته جدید، جنس *Afraflacilla* که قبلاً از ایالت‌های تامیل نادو، کرالا، گجرات و راجستان هند شناخته شده بود، برای اولین بار در منطقه گوآ نیز ثبت شد. نقشه انتشار گونه‌های این جنس *Afraflacilla* نیز ارائه شد.

واژگان کلیدی: آسیا، نقشه انتشار، گوآ، عنکبوت جهنده، مانگرو، تاکسونومی