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# *Gratianna* gen. nov., a new jumping spider genus (Araneae: Salticidae: Plexippini) from tropical and subtropical evergreen forests of southern China and Northeast India

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**Abstract.** This study focuses on a group of morphologically similar jumping spiders from South and East Asia, including *Carrhotus assam* from India and Nepal, and species previously placed in *Carrhotus* and *Orientattus* from China. A new genus *Gratianna* gen. nov. is proposed to resolve their classification, resulting in three new combinations: *Gratianna assam* (Caleb, 2020) comb. nov., *G. bowu* (Lin, Wang & Ruan, 2024) comb. nov. and *G. yunnanensis* (Song, 1991) comb. nov. These taxa share distinct male palps and female genitalia—embolus accompanied with a membrane; long RTA; epigynal pockets and slit-like copulatory openings—not consistent with either *Carrhotus* or *Orientattus*. The female *G. assam* (ex. *Carrhotus*) is described here for the first time. The ♂ "*Evarcha flavocincta*" described by Ono et al. (2009) is tentatively identified as *Orientattus chushu* Liu 2025.

**Keywords.** biodiversity hotspot, *Carrhotus*, *Evarcha flavocincta*, Nepal, *Orientattus*, taxonomy

## Introduction

The genus *Carrhotus* Thorell, 1891, in its current composition, requires critical taxonomic reassessment. Several species remain known from only one sex, and a few others appear to be morphologically inconsistent with the type species, raising questions about their placement within the genus (Caleb et al. 2020; Satkunanathan & Benjamin 2022; Caleb & Sampathkumar 2024).

A notable example is *Carrhotus kevinlii* Cao & Li, 2016, originally described from both sexes in Yunnan, China. Caleb et al. (2020) later synonymized *C. kevinlii* with *Ptocasius yunnanensis* Song, 1991, as *Carrhotus yunnanensis*. In the same study, a morphologically similar species, *Carrhotus assam* Caleb, 2020, was described from Assam, India. *C. assam* was later recorded from Nepal (Logunov 2021).

However, a closer examination reveals that *C. yunnanensis* exhibits significant morphological differences from *Carrhotus* sensu stricto. These include the presence of a filiform embolus accompanied by a membrane in male and epigynal pockets in female—features not found in the type species of *Carrhotus*, *C. viduus* (C. L. Koch, 1846). Such traits are instead characteristic of genera belonging to the tribe Plexippini, and are generally absent in members of Salticini, to which *Carrhotus* belongs. This suggests that the placement of *C. yunnanensis* was erroneous, and a reassignment is warranted.

Further supporting this reassessment is the discovery of the previously unknown female of *C. assam* from Assam, which displays a comparable genital morphology. Additionally, a recently described species,

*Orientattus bowu* Lin, Wang & Ruan, 2024, shares similar female genital features but was placed in the genus *Orientattus* Caleb, 2020 (Lin et al. 2024).

These converging lines of evidence highlight the need for a comprehensive re-evaluation of the generic placement of these taxa. The present study addresses this issue and proposes the establishment of a new genus to accommodate these morphologically distinct yet closely related species.

## Material and Methods

Specimens preserved in 70% ethanol were examined under a Leica EZ4 HD stereomicroscope. Images were processed with the aid of LAS core software (LAS EZ 3.0). Epigyne was dissected and cleared in 10% KOH, mounted on a temporary slide and imaged with a Leica EC3 camera attached to a Leica DM1000 compound microscope. All measurements are in millimeters. Leg measurements are given as: total length (femur, patella, tibia, metatarsus, tarsus). The studied specimens are deposited in the National Zoological Collection, Zoological Survey of India, Kolkata (NZC-ZSI).

Abbreviations used: AEW = anterior eye row width, ALE = anterior lateral eye, AME = anterior median eye, EFL = eye field length, PEW = posterior eye row width, PLE = posterior lateral eye, PME = posterior median eye, RTA = retrolateral tibial apophysis.

## Taxonomy

Family Salticidae Blackwall, 1841
Subfamily Salticinae Blackwall, 1841
Tribe Plexippini Simon, 1901

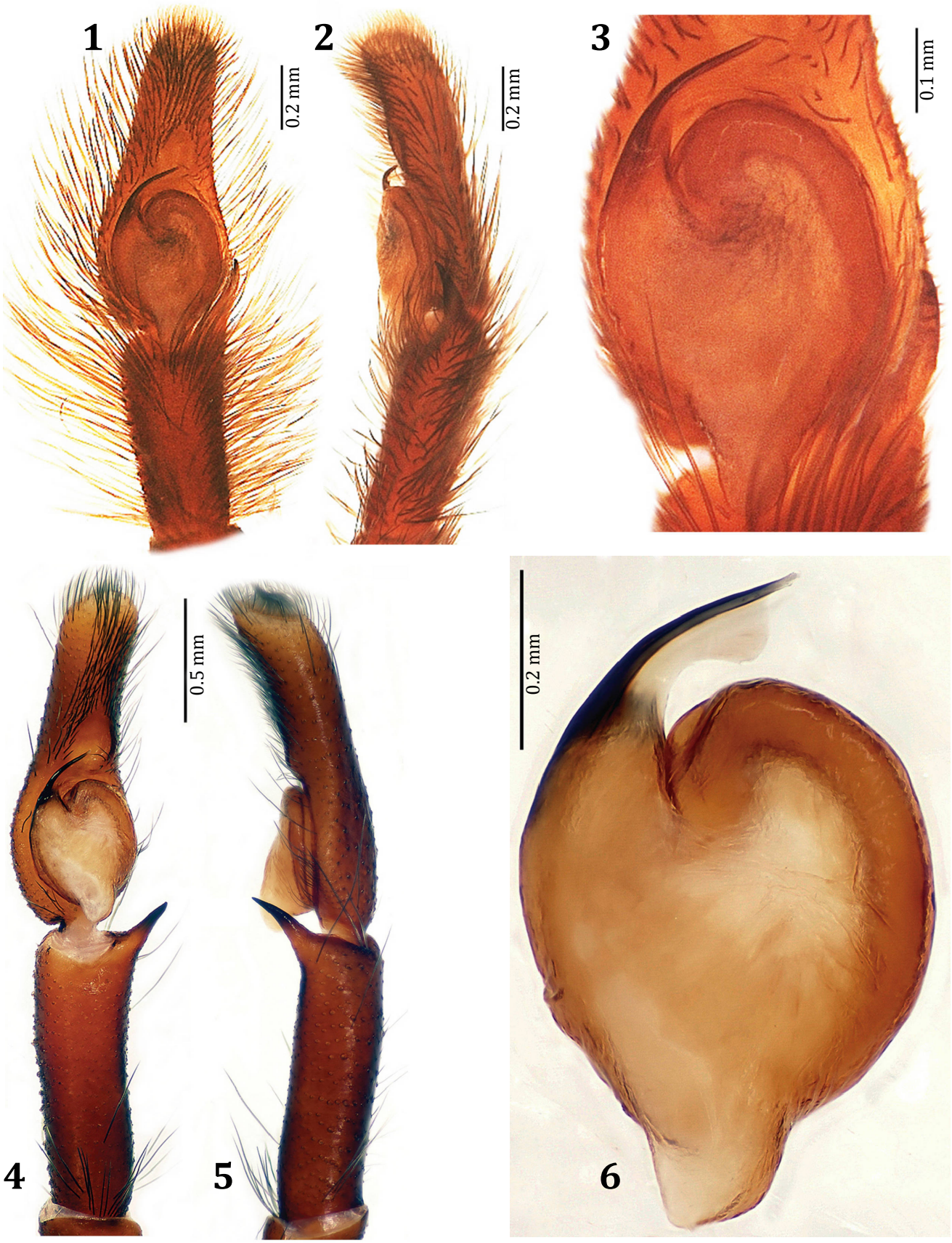
### Genus *Gratianna* gen. nov.

Type species: *Carrhotus assam* Caleb, 2020

*Etymology*: The genus name *Gratianna* is derived from the Latin *gratia*, meaning “grace,” and is named after the author's second daughter, Joanna Gratia. The name is treated as feminine in gender.

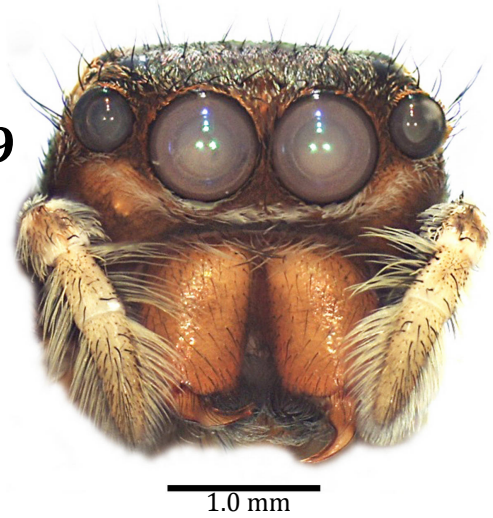
*Taxonomic remarks*: *Gratianna* gen. nov. is assigned to the tribe Plexippini based on the following key morphological features commonly found among plexippines but generally absent in Salticini: (1) the presence of epigynal pockets in females, (2) a globular palpal bulb in males often with a posterior lobe, and (3) simple, fixed embolus (Maddison 2015). These traits are consistently present across species of *Gratianna* and align well with the diagnostic characters of plexippines (e.g., *Evarcha*, *Orientattus*, *Pancorius*), supporting its tribal placement.

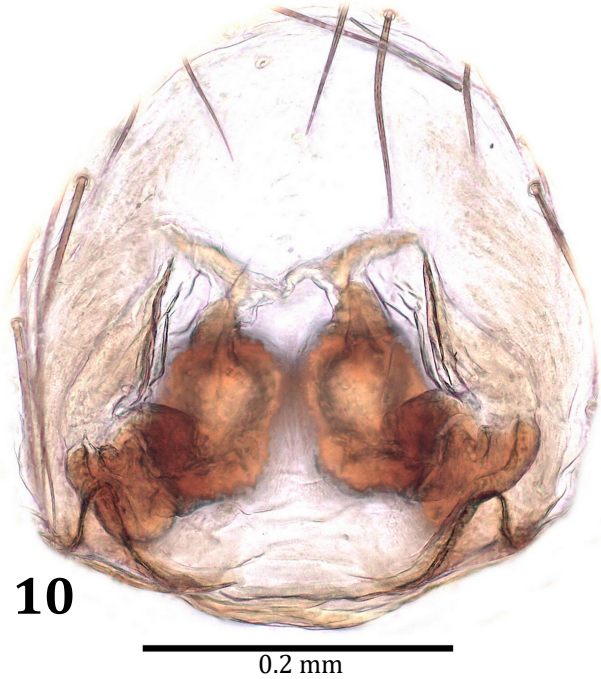
*Diagnosis*: Members of *Gratianna* gen. nov. can be distinguished from other plexippines by a unique combination of characters. Males possess a needle-like embolus accompanied by a membrane, a rounded bulbus with a small posterior lobe, and a single, narrow, thorn-like RTA (Figures 1–6; see also Lin et al. 2024: figs. 3A–C). Females possess straight, slit-like copulatory openings, very short, simple copulatory ducts, and globular spermathecae, as well as a pair of postero-lateral pockets along the margin of the epigyne (Figures 10, 11; also see Lin et al. 2024: figs. 3A–C).

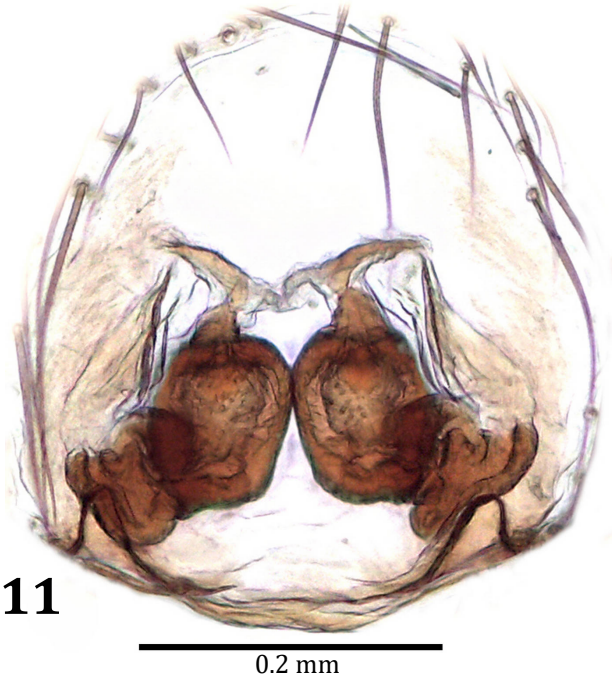



**Figures 1-6. 1-3,** *Gratianna assam* (Caleb, 2020) comb. nov., ♂ holotype, ventral (1, 3) and retrolateral (2) views of left palp (adapted from Caleb et al. 2020). **4-6,** *G. yunnanensis* (Song, 1991), ventral (4) and retrolateral (5) views of left palp, and ventral view of bulb (6) (adapted from Cao et al. 2016, used under a CC BY 4.0 license).






**Figures 7-11.** ♀ *Gratianna assam* (Caleb, 2020) comb. nov. **7,** Habitus, dorsal view. **8,** Chelicerae, maxillae and labium, ventral view. **9,** Front view. **10,** Cleared epigyne, ventral view. **11,** Vulva, dorsal view.

These are medium-sized spiders (5–7 mm body length) with compact bodies, generally brownish, and lacking iridescent or shiny body scales unlike *Colopsus* Simon, 1902 whose males have metallic colours and with elongated abdomen. The general morphology is superficially similar to *Tenkana* Marathe, Maddison & Caleb, 2024 in having an embolus with a membrane and absence of shiny body scales (Marathe et al. 2024). However, *Gratianna* differs in lacking the hair tufts behind the ALEs found in members of *Tenkana*, *Evarcha* Simon, 1902 and *Hyllus* C. L. Koch, 1846. Additionally, the cymbium in *Gratianna* lacks a retrolateral bulge, unlike *Tenkana*, where it is prominently developed. The embolus is short and arises around the 10 o'clock position, whereas in *Tenkana* it is relatively longer and originates between the 5–6 o'clock position. In females, *Gratianna* is further distinguished by its straight, slit-like copulatory openings, short copulatory ducts, and globular spermathecae, as opposed to the crescent-shaped openings, longer and twisted ducts, and pear-shaped spermathecae of *Tenkana*. While members of the genera *Evarcha*, *Colopsus*, and *Pancorius* Simon have an epigyne with membraneous windows, and either tubular, elongated spermathecae (*Evarcha*) or multi-chambered spermathecae (*Colopsus*, *Orientattus* Caleb, 2020 and *Pancorius* Simon, 1902) (Kanesharatnam & Benjamin 2021; Caleb 2020).

Ecologically, *Gratianna* is confined to humid tropical and subtropical evergreen forests; in contrast *Tenkana* inhabits drier, open grassland and rocky habitats.

*Description of type species (G. assam)*: See Caleb et al. (2020: 54) for male and see below for female.

*Distribution*: India, Nepal, China (Figure 12).


**Figure 12.** Map showing the distribution of species covered in this study. For squares, red color indicates type locality, white indicates other records, and blue indicates a record from the present study.

*Natural history*: *Gratianna* appears to be an exclusively forest-dwelling genus. It is found in a variety of evergreen forest types ranging from tropical wet evergreen forests in Northeast India to subtropical broad-leaved and seasonal rainforests in southern China. The constituent species have been collected in humid habitats with dense canopy cover, most often in protected reserves or natural forest patches.

*Composition*: Three species: *Gratianna assam* (Caleb, 2020) comb. nov., *Gratianna bowu* (Lin, Wang & Ruan, 2024) comb. nov. and *Gratianna yunnanensis* (Song, 1991) comb. nov.

***Gratianna assam* (Caleb, 2020) comb. nov.**
Figures 1–3, 7–11

> *Carrhotus assam* Caleb, in Caleb et al. 2020: 54, figs. 11-17, 20-21 (♂).
> *Carrhotus assam* Logunov, 2021: 353, figs. 1-2 (♂).
> *Carrhotus assam* Sherwood et al. 2025 (♂)

*Material examined*: 1♀ (NZC-ZSI-CDT-AA663) & 1 subadult ♀ (NZC-ZSI-CDT-AA662) near Bherjan-Borjan-Padumoni Wildlife Sanctuary (27.536897°N, 95.304442°E), 119 m, Assam, 03 April 2017, leg. Shantanu Kundu & Imon Abedin.

*Diagnosis*: For male see Caleb et al. (2020: 54). The female is similar to *Gratianna yunnanensis* (Song, 1991) but can be distinguished by the copulatory ducts which bulge before entering the spermathecae (without any modification in *G. yunnanensis*), copulatory ducts that enter spermathecae postero-laterally (laterally in *G. yunnanensis*), and pear-shaped spermathecae, placed inferior to the copulatory openings (spherical in *G. yunnanensis*, placed below the copulatory openings) (compare Figures 10, 11 with figs. 10A, B in Cao et al. 2016).

*Description of female*: Total length: 6.55, carapace: 3.31 long, 2.60 wide; abdomen: 3.24 long, 2.20 wide. Carapace brownish, covered with pale hairs; long, rod-like black hairs present in the cephalic region; a pair of lighter yellow-brown longitudinal stripes present on the posterior part of cephalothorax (Figure 7). Anterior eyes surrounded by orange orbital setae with some white setae lining the anterior margins. Clypeal region brownish, with a transverse white stripe (Figure 9). Eye diameter: AME 0.72, ALE 0.40, PME 0.15, PLE 0.36. Eye field: AEW 2.50, PEW 2.45, EFL 1.52. Clypeus height: 0.18. Sternum yellowish. Chelicerae brownish, dorsally covered with black hairs; unidentate with 2 promarginal and 1 large retromarginal teeth. Labium and maxillae brown with paler margins (Figure 8). Legs brownish; femora with blackish distal region; dark brown annulations present at the junction of all segments; all tarsi yellow (Figure 7). Leg measurements: I 5.99 (1.85, 1.27, 1.29, 0.89, 0.69); II 5.65 (1.82, 1.17, 1.17, 0.86, 0.63); III 6.57 (2.21, 1.18, 1.19, 1.28, 0.71); IV 6.44 (2.02, 1.02, 1.24, 1.46, 0.70). Leg formula: 3412. Abdomen oval; blackish brown, covered with pale hairs; chevron shaped markings present in the median region; anterior margin whitish; dorsum with two pairs of white spots, anterior spots are smaller, lighter and less conspicuous (Figure 7). Spinnerets brownish. Epigyne with a pair of blind pockets placed along the posterior margin; copulatory openings slit-like (Figure 10); copulatory ducts broad; spermathecae pear-shaped and contiguous (Figure 11).

*Remarks*: Although the females were not collected along with the holotype male of *C. assam*, the females described here are considered conspecific since these were collected close to the type locality of *C. assam* (Figure 12).

*Distribution*: India and Nepal (Caleb et al. 2020; Logunov 2021) (Figure 12).

*DNA Barcode*: Cytochrome c oxidase subunit I (COI) sequence data are available in GenBank under accession numbers MK393111 (NZC-ZSI-CDT-AA662) and MK393112 (NZC-ZSI-CDT-AA663). In Tyagi et al. (2019), these specimens were identified as *Carrhotus* sp.

***Gratianna bowu* (Lin, Wang & Ruan, 2024) comb. nov.**

*Orientattus bowu* Lin, Wang & Ruan, 2024 ♂♀ (see Lin et al. 2024)

***Gratianna yunnanensis* (Song, 1991) comb. nov.**

*Ptocasius yunnanensis* Song, 1991 ♀
*Ptocasius yunnanensis* Song et al., 1999 ♀
*Carrhotus kevinlii* Cao & Li, 2016 (see Cao et al. 2016) ♂♀
*Carrhotus yunnanensis* Caleb, Bera & Acharya, 2020 ♂ (see Caleb et al. 2020)
*Ptocasius yunnanensis* Peng, 2020 ♀

**Genus *Orientattus* Caleb, 2020**

***Orientattus chushu* K. Liu, 2025**

*Orientattus chushu* K. Liu, in Liu et al. 2025: 196, figs. 6A-F, 7A-D, 12B-C (D♂♀).
*Evarcha flavocincta* Ono, Ikeda & Kono, 2009: 576, figs. 183–184 (♂ mismatched).

*Comments*: Caleb & Joseph (2025) noted that the male specimen of *Evarcha flavocincta* illustrated by Ono et al. (2009) was mismatched with the female. The male is apparently a member of *Orientattus* as it shares similarities with the generotype. Based on shared morphological features, particularly the short RTA with three distinct apices, the Japanese male specimen is tentatively assigned to *O. chushu*. However, there are minor morphological differences between the holotype of *O. chushu* and the Japanese specimen. The embolus is slightly more elongated in *O. chushu*, and tibia is as long as wide in *O. chushu* but longer than wide in the Japanese specimen (cf. figs. 183–184 in Ono et al. 2009 with figs. 6D, E & 12B, C in Liu et al. 2025).

*Distribution*: China and Japan.

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