

First records of the jumping spider genus *Irura* Peckham & Peckham 1901 (Araneae: Salticidae: Simaethina) from India

Gautam Kadam¹, Rishikesh Tripathi^{2,5}, Ashish Kumar Jangid³,
Ambalaparambil Vasu Sudhikumar² and David E. Hill⁴

¹ Sálím Ali Centre for Ornithology and Natural History Anaikatty (Post), Coimbatore - 641108, Tamil Nadu, India, e mail gautamkadam7wild@gmail.com

² Centre for Animal Taxonomy and Ecology, Department of Zoology, Christ College, Irinjalakuda - 680125, Kerala, India

³ Wildlife Institute of India, Dehradun - 248001, Uttarakhand, India

⁴ 213 Wild Horse Creek Drive, Simpsonville SC 29680, USA, email platycryptus@yahoo.com

⁵ email (corresponding author): rishikeshtripathi14@gmail.com; ORCID: <https://orcid.org/0000-0002-9192-4609>

Abstract. The jumping spider *Irura mandarina* Simon 1903 is reported for the first time from India (Maharashtra). The south and southeast Asian distribution of the 16 described species assigned to the genus *Irura* Peckham & Peckham 1901, is also reviewed.

Keywords. Astioida, *Irura mandarina*, Western Ghats, distribution, Maharashtra

Introduction

The salticid genus *Irura* Peckham & Peckham 1901 includes 16 described species, all known only from south and southeast Asia (Figure 1; WSC 2021). The placement of this genus was unresolved in earlier studies that revealed the presence of a large Australasian clade of salticine spiders, the Astioida, with many representatives with ancestors that apparently migrated over the Wallacean transition zone to southeast Asia (Maddison, Bodner & Needham 2008; Hill 2010). However, *Irura*, and the closely related genus *Ligurra* Simon 1903a, are now identified as astioids, members of the tribe Vicirini, subtribe Simaethina (Maddison 2015). *Ligurra* includes four poorly-known species distributed to the south of *Irura* species, from Malaysia to Indonesia and the Caroline Islands. A future revision of *Irura* should include a study of the relationship of these two simaethine genera.

Little is known of the *Irura* species, most of which have been described recently. Only one sex has been described for 5 of the 16 species in this genus. Most, 11 of the 16, are known from a single locality (identified by white circles in Figure 1). The type species, *I. pulchra* Peckham & Peckham 1901, is known from a single specimen from Ceylon with only a brief and doubtful description. In general, the published descriptions of spiders in this genus are inadequate for their identification in the field. In recent years only one remarkably ornamented species (Figures 1-2: *Irura* sp. A), has gained the attention of wildlife photographers, mostly in Hong Kong but also near North Lakhimpur in Assam (Chetia 2020; Figure 1: record 32: 27.2340°N, 94.1142°E). Although the recently posted identity of this spider is *I. bidenticulata* Guo, Zhang & Zu 2011 (also called *I. bidentatiformis* in the same paper), there is nothing in the description of that species to resolve this identity from photographs of living spiders. For example, the carapace of the male is described as yellow, but in the living male this is deep black. We also include (Figure 1:20; Figure 3) photographs of a different male *Irura* from Hong Kong, *Irura* cf. *trigonapophysis* (Peng & Yin 1991). This male agrees with the published dorsal view of *I. trigonapophysis*, but again the description did not include photographs of living spiders so our identification of this species is tentative.

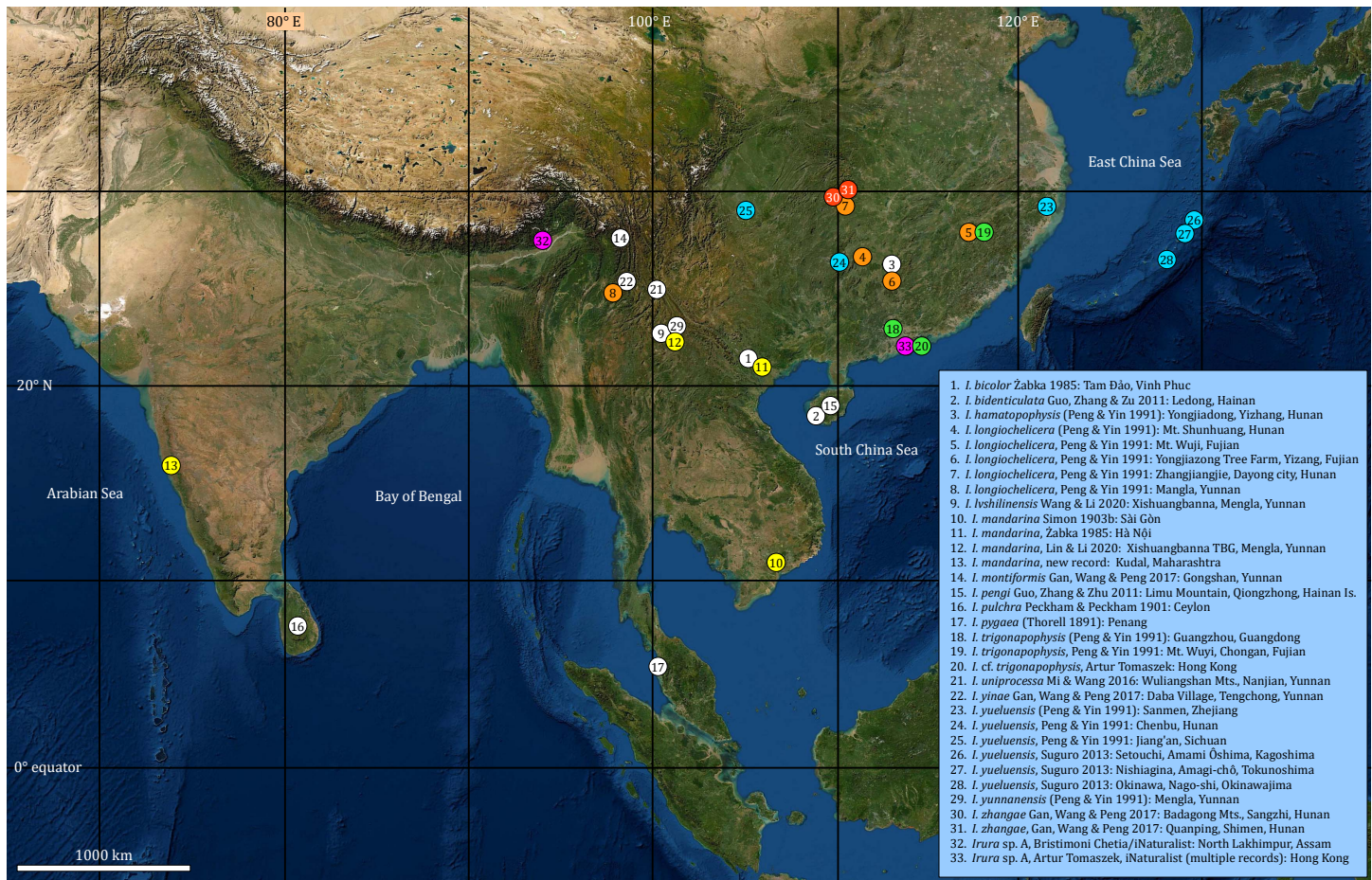


Figure 1. Landsat-based map of south and southeast Asia, with records of all species of *Irura* that have been described to date. White circles represent species known from a single locality. Records (20), (32) and (33) represent spiders identified from photographs published on iNaturalist and FLICKR.

We encountered three *Irura mandarina* Simon, 1903 during our routine arachnological survey at Sindhudurg district in the state of Maharashtra (India). This area is a part of the Sahyadri hills in the Western Ghats, a recognized *global biodiversity hotspot*. Here we redescribe *I. mandarina* from these Indian specimens, representing the first published report of the genus *Irura* from India. Previously this species was known only from two sites in Vietnam, and one site in southern China (Figure 1). With the posted record of a second species (identification not confirmed) from Assam (Chetia 2020: *Irura* sp. A; Figures 1-2), India can now claim at least two members of the genus.

Materials and methods

Live individuals were photographed at the encounter sites using Canon a EOS 80D camera, and then preserved in 70% ethyl alcohol following standard preservation guidelines. Multifocal photographs of specimens were processed and stacked with the help of hardware, viz., Leica DMC4500 digital camera & Leica M205 C stereomicroscope, and software, viz., Leica Application Suite (LAS) version 4.3.0, respectively. Measurements (all in mm) were completed with LAS version 4.3.0 software. Parenthesized measurements represent the leg segments listed from the proximal to distal positions, i.e., [femur, patella, tibia, metatarsus, tarsus]. Taxonomic terminology follows Bossellaers & Jocque (2000) and Ali et al. (2018) for leg spination.



Figure 2. Three adult male (1-3, 4, 5) and one adult female (6-7) *Irura* sp. A from Hong Kong, where this remarkable species has been frequently seen and photographed in recent years. Although often identified as *I. bidenticulata* Guo, Zhang & Zu 2011, this identity cannot be confirmed from the published description of that species, based on specimens collected on Hainan. Certain features in the description, including colour and the presence of a large pair of black spots between the PME, may be due to the fact that only preserved specimens of *I. bidenticulata* were described. This colourful species has also been found in Assam (Chetia 2020). Photographs copyright © Artur Tomaszek, used with permission.



Figure 3. Two adult male (1-5, 6) *Irura* cf. *trigonapophysis* from Hong Kong. Photographs copyright © Artur Tomaszek, used with permission.

Taxonomy

Salticidae: Salticinae: Salticoida: Astioida: Vicirini: Simaethina (after Maddison 2015)

Irura mandarina Simon 1903 (Simon 1903b)

Figures 1 (map), 4-9 (description), 10 (habitat)

Material examined. INDIA: Maharashtra: Sindhudurg District: Kudal Town, 1♂ (NRC-AA-2355), 16.0473306°N, 73.7127417°E, 11m asl, coll. G. Kadam, 18 June 2021. 2♀ (NRC-AA-2356, NRC-AA-2357), same as male, 20 June 2021. The three specimens are deposited in the research collection (NRC) at the museum in National Centre for Biological Studies (NCBS), Bangalore, Karnataka, India.

Description of male (accession number NRC-AA-2355; Figures 4-6). Carapace flat and broad, reddish-brown colour, anteriorly darker, covered with black setae with a pair of dark black patches between the PME. Eyes surrounded by dark rings. Clypeus light reddish-brown colour, very low, covered with black setae longer than the rest on carapace. Chelicerae light yellowish-brown, covered with few setae on minute elevations. Endites yellowish-red, outer margins with dark brown lines. Labium coloured as endites, tip covered with dense and dark setae. Sternum oval, light reddish-yellow coloured with truncated anterior end, covered with grey setae. Abdomen oval, yellowish-orange coloured, narrowing posteriorly, covered with a few black setae, with three pairs of light brown sigillae, widely separated. Spinnerets grey, densely covered with brown and black setae. Legs brown to red-brown. Legs I stronger and with more of setae than the other legs. Leg I femur prolaterally covered with white setae. Pedipalp: bulbus oval and slightly translucent, sperm duct originates at 9 o'clock position, embolus thin and long (slightly thick in anterior part), originates at 8 o'clock position; cymbium with long protrusion reaching the patella.

Body length 2.88. Carapace 1.36 long, 1.37 wide. Abdomen 1.51 long, 1.20 wide. Ocular area 0.78 long, 1.12 wide. Eye diameters: AME 0.29, ALE 0.17, PME 0.03, PLE 0.14. Intraocular distances: AME-AME 0.03, AME-ALE 0.09, PME-PME 0.99, ALE-ALE 0.75, PME-PLP 0.30, PLE-PLP 1.14, ALE-PME 0.14. Chelicera 0.46 long; 0.35 wide. Clypeus 0. Sternum 0.57 long, 0.45 wide. Labium 0.30 long, 0.27 wide. Endite 0.34 long, 0.25 wide. Pedipalp [0.43, 0.24, 0.35, 0.52], leg I [1.20, 0.86, 0.87, 0.50, 0.35], leg II [0.72, 0.33, 0.42, 0.30, 0.25], leg III [0.60, 0.28, 0.29, 0.30, 0.25], leg IV [0.97, 0.37, 0.42, 0.35, 0.27]. Leg formula (leg spines): femur & patellae I-IV spineless; tibia I plv 2 rlv 2, II plv 1 rlv 1, III-IV spineless; metatarsi I-II plv 2 rlv 2, III spineless, IV plv 1 rlv 1 v 2; tarsi I-IV spineless.



Figure 4. Adult male *Irura mandarina* from Kudal Town. 1, Dorsal view of dried specimen. 2-3, Two views of the living spider. Note the covering of bright white setae on the front of each femur I (2).



Figure 5. Adult male *Irura mandarina* from Kudal Town, in alcohol.



Figure 6. Adult male *Irura mandarina* from Kudal Town, in alcohol. **1-3**, Ventral (1), retrolateral (2) and dorsal (3) views of left pedipalp. **4**, Prolateral (anterior) view of left leg I.

Description of female (accession numbers NRC-AA-2356, NRC-AA-2357; Figures 7-9). Habitus similar to male except for the slightly darker ocular area, covered with shiny white setae, and a lateral row of short white setae on posterior half of the carapace. Abdomen pale coloured. Epigynum slightly wider than long, flat and delicate, copulatory opening almost round, situated latero-medially, copulatory ducts long and S-shaped, fertilization ducts slender and situated medially.

Body length 2.96. Carapace 1.22 long, 1.27 wide. Abdomen 1.48 long, 1.17 wide. Ocular area 0.74 long, 1.23 wide. Eye diameters: AME 0.27, ALE 0.16, PME 0.02, PLE 0.11. Intraocular distances: AME-AME 0, AME-ALE 0.06, PME-PME 0.96, ALE-ALE 0.66, PME-PL 0.17, PLE-PL 1.11, ALE-PME 0.35. Chelicera 0.38 long, 0.34 wide. Clypeus 0. Sternum 0.52 long, 0.41 wide. Labium 0.22 long, 0.23 wide. Endite 0.28 long, 0.17 wide. Pedipalp [0.40, 0.17, 0.20, 0.38], Leg I [0.78, 0.52, 0.58, 0.31, 0.26], leg II [0.58, 0.32, 0.34, 0.27, 0.19], leg III [0.55, 0.23, 0.25, 0.26, 0.18], leg IV [0.67, 0.28, 0.39, 0.33, 0.20]. Leg formula (leg spines): femur & patellae I-IV spineless; tibia I plv 3 rlv 3, II plv 2 rlv 2, III-IV spineless; metatarsi I-II plv 2 rlv 2, III-IV spineless; tarsi I-IV spineless.



Figure 7. Adult female *Irura mandarina* from Kudal Town. **1**, Dorsal view of dried specimen. **2-4**, Three views of the living spider.

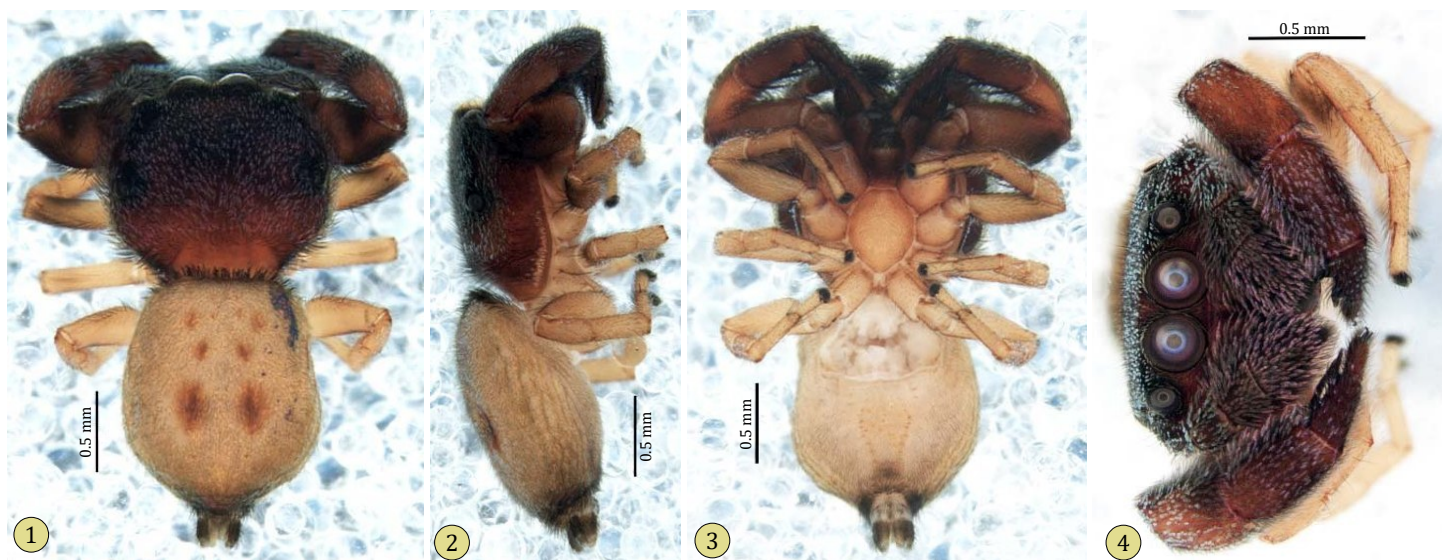


Figure 8. Adult female *Irura mandarina* from Kudal Town, in alcohol.

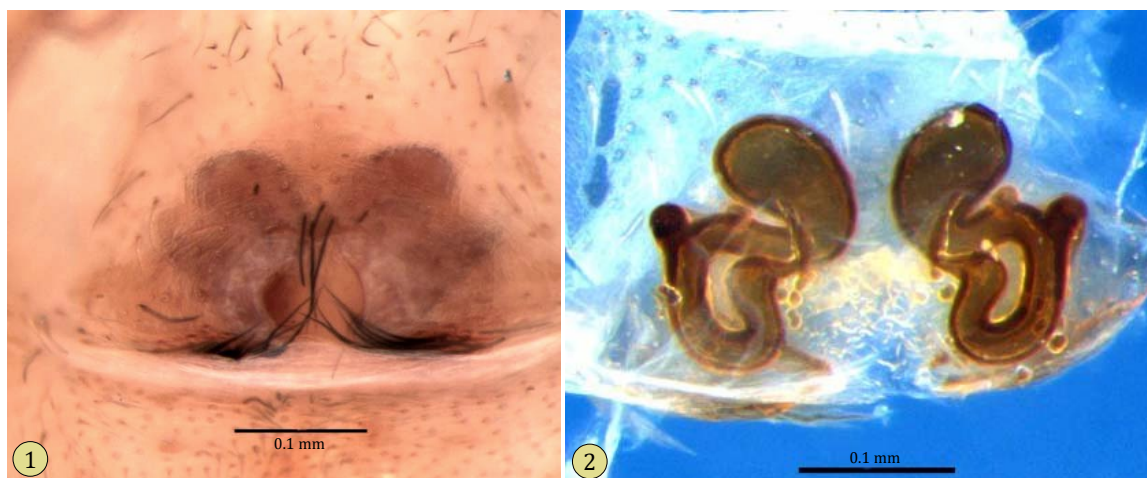


Figure 9. Epigynum of adult female *Irura mandarina* from Kudal Town, in alcohol. **1**, Ventral (exterior) view. **2**, Dorsal view of dissected and cleared epigynum.

Note. The abdomen of both sexes has a shining golden colour. The female pedipalp is silver in colour in freshly preserved and living individuals. This is not evident after preservation in an ethanol solution.

Habitat (Figure 10). Male and female *Irura mandarina* were observed on the internodes of the native bamboo grass, *Dendrocalamus* sp. (family Poaceae) in a riverine area. A few individuals were seen on a similar bamboo grass in the human-dominated areas as well. Females were seen to be active during daylight hours, while males were found both day and night.



Figure 10. Collection sites for *Irura mandarina* in Kudal Town, Sindhudurg, Maharashtra, India.

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References

- Ali, P. A., W. P. Maddison, M. Zahid and A. Butt. 2018. New chrysilline and aelurilline jumping spiders from Pakistan (Araneae, Salticidae). ZooKeys 783: 1–15. <http://dx.doi.org/10.3897/zookeys.783.21985>.
- Bosselaers, J. and J. Jocqué. 2000. Studies in Corinnidae: transfer of four genera and description of the female of *Lessertina mutica* Lawrence 1942. Tropical Zoology 13: 305–325.
- Chetia, B. 2020. *Irura bidenticulata*. iNaturalist, online at <https://www.inaturalist.org/photos/94122233>
- Gan, J. H., C. Wang, and X. J. Peng. 2017. Three new spider species of *Irura* Peckham & Peckham, 1901 from China (Araneae: Salticidae). Zootaxa 4226(2): 273–282.
- Guo, J. Y., F. Zhang and M. S. Zhu. 2011. Two new species of the genus *Irura* Peckham & Peckham, 1901 (Araneae: Salticidae) from Hainan Island, China. Acta Arachnologica 60(2): 89–91.
- Hill, D. E. 2010. Sunda to Sahul: Trans-Wallacean distribution of recent salticid genera (Araneae: Salticidae). Peckhamia 80.1: 1–60.
- Lin, Y. J. and S. Q. Li. 2020. Two new genera and eight new species of jumping spiders (Araneae, Salticidae) from Xishuangbanna, Yunnan, China. ZooKeys 952: 95–128. doi:10.3897/zookeys.952.51849
- Maddison, W. P. 2015. A phylogenetic classification of jumping spiders (Araneae: Salticidae). Journal of Arachnology 43: 231–292.

- Maddison, W. P., M. R. Bodner and K. M. Needham. 2008.** Salticid spider phylogeny revisited, with the discovery of a large Australasian clade (Araneae: Salticidae). *Zootaxa* 1893:49–64.
- Mi, X. Q. and C. Wang. 2016.** A new species of *Irura* Peckham & Peckham, 1901 (Araneae: Salticidae) from Yunnan Province, China. *Sichuan Journal of Zoology* 35 (3): 400-403.
- Peckham, G. W. and E. G. Peckham. 1901.** *Pellenes* and some other genera of the family Attidae. *Bulletin of the Wisconsin Natural History Society (N.S.)* 1: 195-233.
- Peng, X. J. and C. M. Yin. 1991.** Five new species of the genus *Kinhia* from China (Araneae: Salticidae). *Acta Zootaxonomica Sinica* 16: 35-47.
- Simon, E. 1903a.** Histoire naturelle des araignées. Deuxième édition, tome second. Roret, Paris. 669-1080.
- Simon, E. 1903b.** Etudes arachnologiques. 33e Mémoire. LIII. Arachnides recueillis à Phuc-Son (Annam) par M. H. Fruhstorfer (Nov-Dec. 1899). *Annales de la Société Entomologique de France* 71: 725-736.
- Suguro, T. 2019.** *Irura yueluensis* (Peng & Yin 1991) and *Synageles hilarulus* (C. L. Koch 1846) (Araneae: Salticidae), new to Japanese fauna. *Acta Arachnologica* 68 (1): 25-30.
- Thorell, T. 1891.** Spindlar från Nikobarerna och andra delar af södra Asien. *Kongliga Svenska Vetenskaps-Akademiens Handlingar* 24 (2): 1-149.
- Wang, C. and S. Q. Li. 2020.** On eight species of jumping spiders from Xishuangbanna, Yunnan, China (Araneae, Salticidae). *ZooKeys* 909: 25-57. doi:10.3897/zookeys.909.47137
- WSC. 2021.** World Spider Catalog. Version 22.5. Natural History Museum Bern, *online at* <http://wsc.nmbe.ch>, accessed on 26 JUL 2021. doi: 10.24436/2
- Żabka, M. 1985.** Systematic and zoogeographic study on the family Salticidae (Araneae) from Viet-Nam. *Annales Zoologici, Warszawa* 39: 197-485.