

First record of *Brettus cingulatus* from India, with a review of *Brettus* in South and Southeast Asia (Araneae: Salticidae: Spartaeinae)

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Abstract: *Brettus cingulatus* Thorell 1895, previously known only from a single male specimen collected in Myanmar, has been found in Maharashtra, India. The female of this species, previously known as *B. albolimbatus* Simon 1900, is synonymized with *B. cingulatus*. Published and unpublished records that document this relationship and the wider distribution of *B. cingulatus* and other *Brettus* species in South and Southeast Asia are reviewed.

Key words: araneophagy, *Brettus albolimbatus*, Maharashtra, new synonymy

Introduction

The genus *Brettus* Thorell 1895 has included seven (now six) species of small to medium-sized web-invading araneophagic spartaeine jumping spiders (Cerveira et al. 2003, Maddison et al. 2014, WSC 2017). All except one, *B. madagascarensis* (Peckham & Peckham 1903), are found in South and Southeast Asia. The type species for *Brettus*, *B. cingulatus* Thorell 1895, is known from a single male specimen (the holotype) collected at "Tharrawaddy" (Thayarwady, Myanmar). The female *B. cingulatus* has not been previously described. Two species of *Brettus*, *B. albolimbatus* Simon 1900 and *B. anchorum* Wanless 1979 were originally reported from India.

Although the male *B. albolimbatus* has not been formally described, a male that agrees with the original description of *B. cingulatus* has been figured a number of times in association with a female *B. albolimbatus* (e.g., Jackson & Hallas 1986, Sebastian & Peter 2009, Padayatty 2011, Shah 2016). In his unpublished thesis, Padayatty described a *Brettus* ("*B. serratopalpus* sp. nov.") from Kerala, India that he distinguished from *B. cingulatus* by serration along the retrolateral edge of the male cymbium. However, Wanless (1979: Figure 1A) also included these serrations in his drawing of the pedipalp of the male holotype for *B. cingulatus*, and we consider this "new species" to represent another new record for *B. cingulatus* in southern India. With this male, Padayatty figured a female that in all respects, including the structure of the epigynum, agrees with published descriptions (Simon 1900, Wanless 1979) of the female *B. albolimbatus*. Thus we recognize *B. cingulatus* and *B. albolimbatus* as the male and female, respectively, of a single species (*B. cingulatus*, new synonymy). In the following review of five *Brettus* species from South and Southeast Asia we include a new record for a male *B. cingulatus* from Maharashtra, India. The pedipalp of this male (Figure 2) agrees in all details with the descriptions of *B. cingulatus*, including a "pointed spur on the ectal margin of the cymbium" (Wanless 1979).

Species accounts

With respect to the tendency to assign each sex within the genus *Myrmarachne* to a different species, Edwards (2014) suggested that *intersexual shared autapomorphies or unique sets of characters must place them together as a single species until proven otherwise with new data*. This is particularly true if a male and female are known to occur in the same locality. Here, in our review of the Asian *Brettus* species, we will identify a number of the automorphies shared by male and female *B. cingulatus*. Based on published descriptions, males and females of other *Brettus* species also appear to have these automorphies. For each entry in this section, numbers in brackets refer to localities in the relief map (Figure 1). Except for *B. cingulatus*, descriptions given here for reference are based entirely on published accounts. Several of the *Brettus* species are known from only a few specimens, some poorly preserved, and the range of variability within each species remains to be documented in a future revision of the genus. Since only photographs are available to document most of the records listed here, these may be regarded as provisional.



Figure 1. Localities associated with the five *Brettus* species known from South and Southeast Asia. These are based on both published records and posted photographs or videos (see text). Only two of these species (*B. anchorum* and *B. cingulatus*) are widely distributed. A sixth species, *B. madagascarensis* (Peckham & Peckham 1903) has been described from a single female collected in Madagascar. The background relief map is in the public domain (CC0), courtesy of maps-for-free (<https://maps-for-free.com>).

Brettus adonis Simon 1900

- ♀ [1] *Brettus adonis* Simon 1900 (Ins. Taprobane: Galle!)
Portia adonis Simon 1901
Brettus adonis Wanless 1979 (Sri Lanka, Galle)
- ♂ [1] *Brettus adonis* Wanless 1979 (Sri Lanka, Galle; found in container with ♀ type specimen)
- ♂♀ *Brettus adonis* Jackson & Hallas 1986 (Sri Lanka)
- ♀ [2] *Brettus adonis* Jackson 2000 (Peradeniya, Sri Lanka)
- ♂♀ [2] *Brettus adonis* Cerveira, Jackson & Guseinov 2003 (Peradeniya, Sri Lanka)

B. adonis is known only from Sri Lanka and can be identified by the bifurcated RTA of the male pedipalp and extension of the curved posterior margin of the female epigynum toward the rear of the epigastric groove. Males and females are similar in colouration. *The male* has a light orange carapace with a yellow-orange eye region. The clypeus is fringed with short white setae, and the chelicerae are yellow with a proximal band of white setae. The opisthosoma is lightly mottled. Legs I are orange with some black, with and orange-brown fringe on the venter and dorsum of the tibia, the venter of the patella, and the distal venter of the femur. Legs II-III are pale yellow. *The female* has an orange ("reddish-yellow") carapace with a cover of yellow hairs and scarlet hairs (may be faded) in the anterior eye region. Low setae may comprise a wide marginal band around the carapace. The clypeus bears thin white hairs, or reddish hairs near the midline. The opisthosoma is pale yellow and grey toward the rear (or pale clay with yellowish setae according to Simon). Legs I have ventral fringes running from the patella to the tibia, comprised of long white setae, but no dorsal fringes (may be faded; according to Simon fringes are dark chestnut brown under the tibia I and brown under the femur I). The pedipalps are yellow-white.

This species has been reared in captivity, and there are three published research papers dealing with its behaviour (Jackson & Hallas 1986; Jackson 2000; Cerveira et al. 2003), including one b/w photograph of a female (Jackson & Hallas 1986, Figure 2). The appearance of living animals needs to be documented.

Brettus anchorum Wanless 1979

- ♀ [3] *Brettus anchorum* Wanless 1979 (India, Madras, Nilghiri Hills)
Brettus anchorum Wanless 1984 (India, Madras)
- ♂ [4] *Brettus anchorum* Wanless 1984 (India, Madras, Ootacamund)
- ♂♀ [5] *Brettus anchorum* Jastrzębski 1997 (Nepal, Gorkha Distr., Arughat - Suteo)
- ♂♀ [6] *Brettus anchorum* Sen, Dhali, Saha & Raychaudhuri 2015 (Khunia, Gorumara National Park, West Bengal)
Brettus anchorum Dhali, Saha & Raychaudhuri 2017 (Khunia, Gorumara National Park, West Bengal)

B. anchorum can be expected to occur across India, but is presently only documented from several localities ranging from Madras in the south north to West Bengal and Nepal. The male pedipalp has a series of small medial apophyses and a small hook-like distal apophysis of the tegulum. There is a single spermatheca on either side of the midline near the epigastric groove of the female (extended laterally), giving the epigynum a distinctive "anchor" shape. *The male* carapace is amber in colour with broad white marginal bands, each with a brown dorsal edge. The clypeus is white, and the chelicerae are amber with a basal band of white setae. There are longer black fringes under femur and tibia I, and short black fringes under femur and tibia II. Legs I are orange-brown, and the other legs are yellow-brown. *The female* has a pale orange carapace with a yellow eye region and broad marginal bands comprised of low white setae or scales. There are thin white setae on the clypeus. The opisthosoma is yellow-white. There is a fringe of long orange-brown setae beneath the distal femur to tibia of legs I. The pedipalp is light yellow. As with *B. adonis*, the appearance of living animals needs to be documented in detail.

***Brettus celebensis* (Merian 1911)**

- ♀ [7] *Macopaeus celebensis* Merian 1911 (Wald bei Duluduo, Celebes)
Brettus celebensis Wanless 1980 (Celebes)

B. celebensis is known from only a single female specimen in poor condition. Wanless (1980) thought that this was closely related to *B. anchorum*, perhaps with the spermathecae in a more anterior position on either side of a wider pair of medial ducts. His drawing of the epigynum showed only a simple external view. The carapace is dark orange-brown, and the chelicerae are orange-brown. The clypeus bears some "whitish" setae, as do the legs which are brown to yellow-brown. Leg I has a dense dorsal fringe on the tibia, and dense grey-black ventral fringes. According to Merian the carapace was brown, the opisthosoma darker than this. More work is necessary to establish the identity of this species, and to document the field marks of both males and females. This represents the extreme eastern distribution of *Brettus*.

***Brettus cingulatus* Thorell 1895**

- ♂ [8] *Brettus cingulatus* Thorell 1895 ("Tharrawaddy" or Thayarwady, Myanmar)
Brettus cingulatus Wanless 1979 (Burma)
- ♀ [9] *Brettus albolimbatus* Simon 1900 ("India merid. Trichinopoly" or Tiruchirappalli), **new synonymy**
Brettus albolimbatus Wanless 1979 (India, Madras, Trichinopoly)
- ♀ [9] *Brettus semifimbriatus* Simon 1900 (India merid. Trichinopoly)
- ♀ [10] *Portia semifimbriata* Strand 1912 (Travancore in Indien)
- ♀ [11] *Portia cingulata* Reimoser 1925 (Fort de Kock, Sumatra)
- ♂♀ [12] *Brettus cingulatus* Jackson & Hallas 1986 (Sri Lanka)
- ♀ [13] *Brettus albolimbatus* Peng & Kim 1998 (Yunnan Province, China)
- ♀ [12] *Brettus albolimbatus* Jackson 2000 (Habarana, Sri Lanka)
- ♂♀ [12] *Brettus albolimbatus* Cerveira, Jackson & Guseinov 2003 (Habarana, Sri Lanka)
- ♂♀ *Brettus albolimbatus* Sebastian & Peter 2009 (location not specified)
- ♂ [14] *Brettus serratopalpis* (unpub.) Padayatty 2011 (Kanjoor, Ernaculam District, Kerala)
- ♀ [14] *Brettus serratopalpis* (unpub.) Padayatty 2011 (Kakkanadu, Ernaculam District, Kerala)
- ♀ [15] *Brettus* sp. (penultimate female) Bay 2012 (Fraser's Hill, Raub District, Pahang, Malaysia)
- ♀? [16] *Brettus albolimbatus* Chetia & Kalita 2012 (Gibbon Wildlife Sanctuary, Assam, India)
- ♀ [17] *Brettus* sp. Popumon 2013 (video record at Pangseeda National Park, Thailand)
- ♀ [18] *Brettus albolimbatus* Sekar 2013 (Kabini River Lodge, Karnataka)
- ♂ [19] *Brettus* sp. photograph by Vipin Baliga 2013 (Western Ghats)
- ♀ [13] *Brettus* sp. Horstman 2014 (Pu'er, Yunnan, China)
- ♂♀ [20] *Brettus* sp. Ismavel 2014 (Makunda Christian Hospital, Karimganj District, Assam)
- ♀ [21] *Brettus albolimbatus* Sen, Dhali, Saha & Raychaudhuri 2015 (Sevok, Mahananda Wildlife Sanctuary, West Bengal)
- ♂♀ [22] *Brettus* sp. Shah 2016 (Sanjay Gandhi National Park, Mumbai)
- ♀ [23] *Brettus albolimbatus* Roy, Saha & Raychaudhuri 2016 (Nagrakata Tea Estate, Dooars, West Bengal)
- ♀ [24] *Brettus albolimbatus* Dahli, Saha & Raychaudhuri 2017 (Jalpaiguri, West Bengal)
- ♂♀ [25] *Brettus* sp. photographs by Sumukha JN 2017 (Shivamogga, Karnataka)
- ♀ [25] *Brettus* sp. photographs by Sumukha JN 2017 (KANS, Hosanagara taluk, Shivamogga, Karnataka)
- ♂ [26] *Brettus cingulatus* photographs by Raiyan Ahmed (Bangladesh)
- ♂ [27] *Brettus cingulatus* photograph by Rakesh Kumar B. (Mangalore, Karnataka)
- ♂ [14] *Brettus cingulatus* photographs by Sunny Joseph (Kerala)
- ♂ [28] *Brettus cingulatus* Ahmed, Khalap, Hill, Sumukha & Mohan 2017, **new record** (Nagaon, Alibaug, Maharashtra)

Brettus cingulatus (Figures 2-9) is a widely distributed species that has been frequently photographed and also reared in captivity for behavioural studies (Jackson & Hallas 1986; Jackson 2000; Cerveira et al. 2003). Previously only a single male collected in Myanmar prior to 1895 was known (Thorell 1895; Wanless 1979). Jackson & Hallas (1986), Sebastian & Peter (2009), Padayatty (2011), Shah (2016) and Ismavel (2014) described or photographed what appear to be typical male *B. cingulatus* in association with female *B. albolimbatus* (here synonymized). The two sexes are similar with respect to their relatively dark colouration, iridescent bronze-green scales of the dorsal opisthosoma, and bronze-green

to coppery-violet iridescence of the carapace and legs. Both sexes have alternating white and black stripes running along the length of legs IV that are readily visible from above, prominent fringes beneath legs I and II, and a variable number of isolated, larger white scales on the glossy black anterior femora of legs I. *The male* pedipalp (Figure 2) has a large, pointed prolateral tibial apophysis, and a large, distally directed and blunt (rectangular at the end) retrolateral tibial apophysis. The proximal retrolateral margin of the cymbium also has a distinctive spur that appears as a serrated edge in most views. Viewed from the front, the pedipalp is black with black setae, and like the legs may be coppery-violet iridescent when viewed from above. The carapace is black or dark brown with some bronze-green or coppery-violet iridescence above, and there may be brown to red-brown setae toward the front of the eye region. There is a wide white clypeal band that is continuous with even wider marginal bands that circle around to meet at the rear of the carapace. The chelicerae are dark brown to black, mostly glabrous but may have a cover of some sparse black setae. The opisthosoma is uniform in colouration, densely covered with bronze-green setae. Legs I are much thicker and longer than legs II. Legs I are black with a long black fringe beneath the paterall and tibia. The front of legs I is black with a loose cover of large, separate white scales. Legs II are also black with a shorter black fringe beneath the patella and tibia. As in the female, legs III are banded. Femur III is black, and the patella to tarsus may be light brown, distinctly lighter in colour than the other legs. All of the thin tarsi are light brown or off-white.

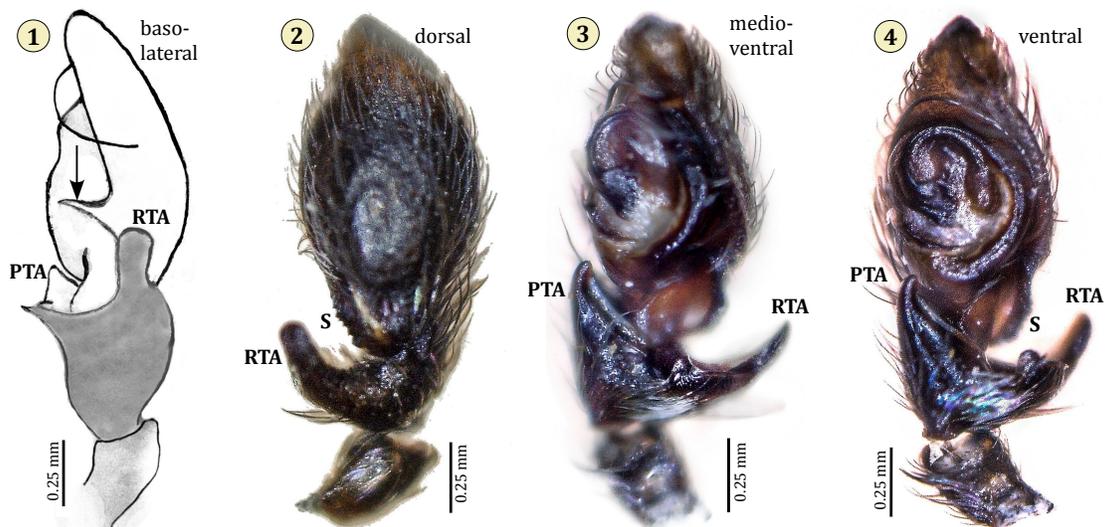


Figure 2. Left pedipalp of male *B. cingulatus* from Nagaon, Alibaug District, Maharashtra (new record for India, locality [28]). The blunt, distally oriented RTA and the serrated lateral margin (S) and spur (1, arrow) of the cymbium are characteristics of this species. There is also a large prolateral tibial apophysis (PTA), separated from the RTA by a notch (3, 4).

The female epigynum has a pair of S-shaped ducts, one on either side of a pair of medial ducts, extending toward the front to meet the pair of spermathecae. The femur of the pedipalp is light brown, the distal segments thin and white. The carapace is dark or black and may have some bronze-green iridescence, and may have reddish setae toward the front of the eye region. Wide white to light yellow marginal bands, separate at the front, extend around the sides of the carapace to join at the rear. The clypeus and chelicerae may be covered with longer grey-brown setae. The dorsal opisthosoma is bronze-green (or the green-tinted rose, *viridi roseoque tinctum*, colour given by Simon) to brown and shiny or iridescent, with distinctive light yellow or white figures that may be surrounded by black. These include an anterior marginal band, behind this a pair of large spots or maculae, and a transverse band toward the rear. Between the maculae other median figures may also be present, and their appearance also varies with the extent of expansion of the opisthosoma. Legs I and II are thicker, and legs II are noticeably thicker than in the male. The femur of leg I is black with scattered large white scales, and there is also one or two regular

lines of white scales along the bottom, visible from the front. The patella of leg I may be off-white to light purple or dark. Below the tibia of leg I there is a fringe of long, dark orange setae and behind this a longer fringe of black setae. The thin metatarsus and tarsus of leg I are off-white. Legs II are similar to legs I but the fringes under the tibiae are less prominent, and the proximal tibiae may be light brown. As in the male, legs III are banded, with the proximal femur light brown, the distal femur brown, and the patella light brown or off-white. The thin tarsus and metatarsus of all legs are also off-white. As in the male leg IV (from femur to tibia) bears alternating white and black stripes that are more-or-less continuous. There is a distal black fringe of longer setae (longer distally) beneath tibia IV.

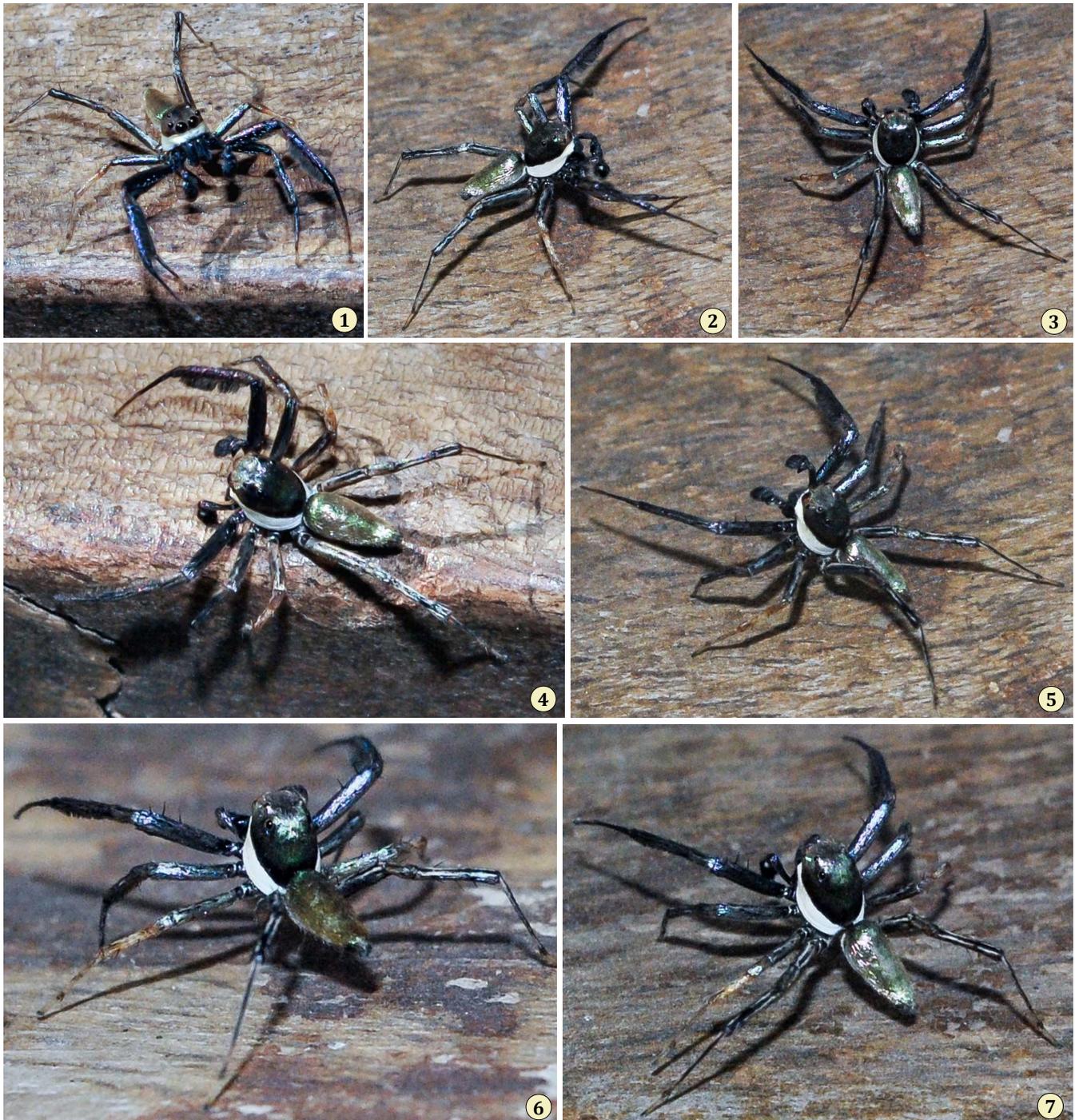


Figure 3. Views of an adult male *B. cingulatus* from Nagaon, Alibaug District, Maharashtra (new record for India, locality [28]). See Figure 2 for a detailed view of the pedipalp.



Figure 4. Adult male *B. cingulatus* from: **1-2**, Makunda Christian Hospital, Karimganj, District Assam (Vijay Anand Ismavel, by permission, [20]). **3-4**, Kerala (Sunny Joseph, by permission [14]). **5-6**, Bangladesh (Raiyan Ahmed, by permission, [26]). **7**, Mangalore, Karnataka, feeding on spider (Rakesh Kumar B., by permission, [27]). **8**, Western Ghats, feeding on spider (Vipin Baliga, permission by CC-BY-2.0 license, [19]).



Figure 5. Two adult female *B. cingulatus* (1-7, 8-11) from Makunda Christian Hospital, Karimganj District, Assam (Vijay Anand Ismavel, by permission, locality [20]).

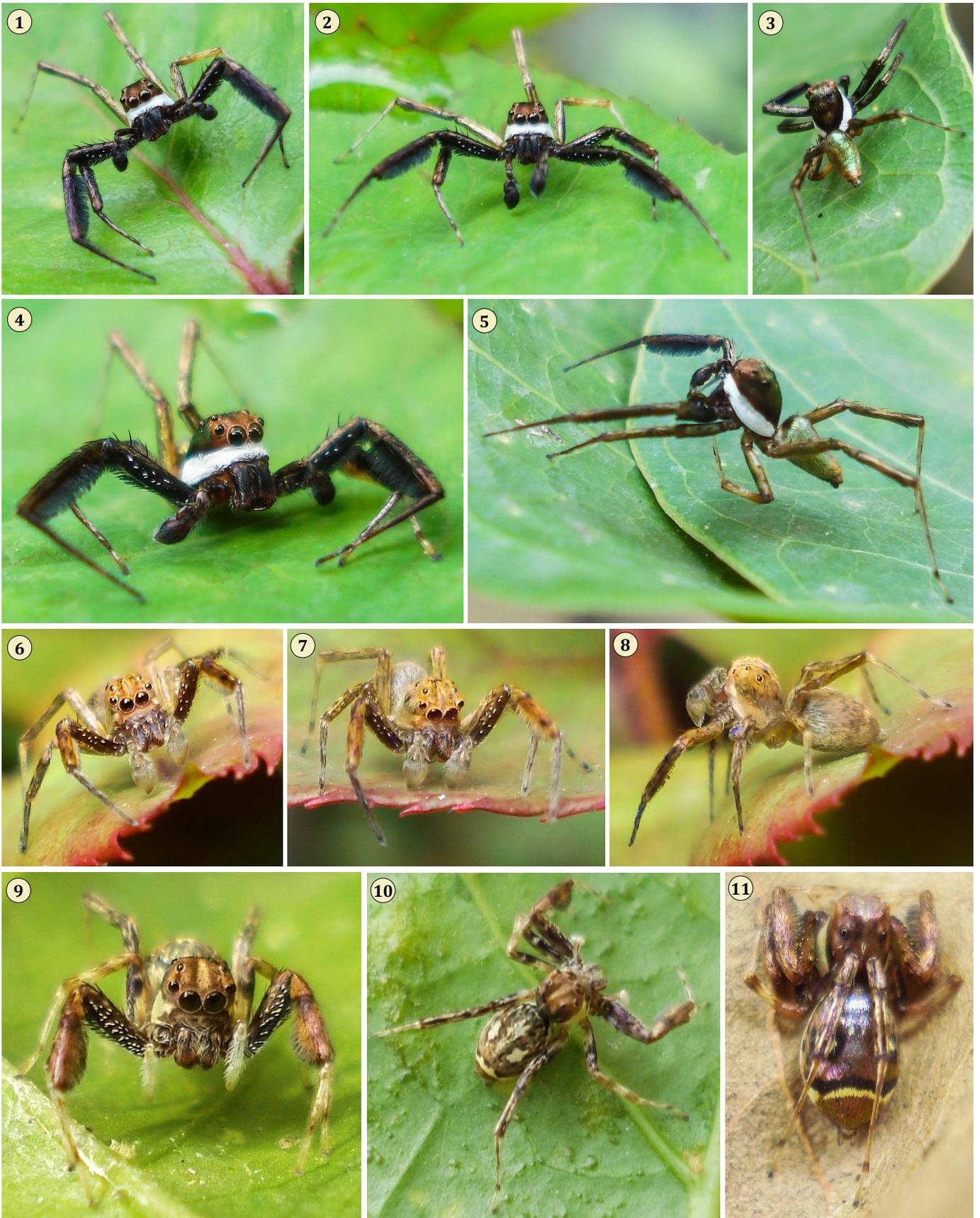


Figure 6. *B. cingulatus* from Shivamogga, Karnataka (1-10, locality [25]) and KANS, Hosanagara taluk, Shivamogga, Karnataka (11, locality [25]) (Sumukha J. N.). **1-5**, Adult male with many red-brown setae in the anterior eye region. **6-8**, Penultimate male. **9-10**, Penultimate female. **11**, Adult female with a high degree of iridescence.



Figure 7. Penultimate female *Brettus*, perhaps a *B. cingulatus*, from Fraser's Hill, Raub District, Pahang, Malaysia (Nicky Bay, by permission, locality [15]).

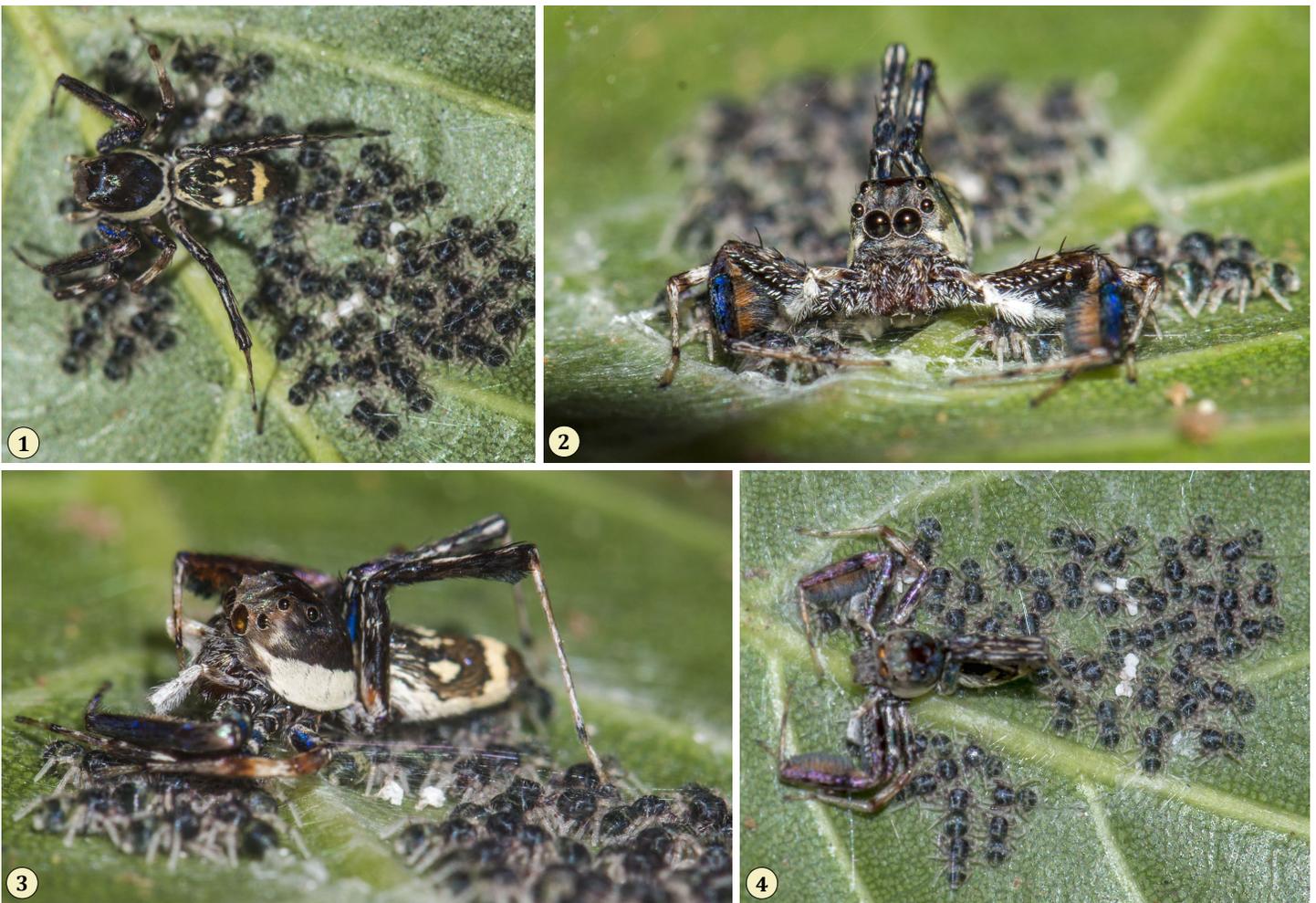


Figure 8. Female *B. cingulatus* with brood from from Makunda Christian Hospital, Karimganj District, Assam (Vijay Anand Ismavel, by permission, locality [20]). 2-4, Legs IV are often held in this elevated position by a brooding female.



Figure 9. Immature *Brettus* sp. from Bangladesh (Raiyan Ahmed, by permission, locality [26]). These may represent an earlier instar of *B. cingulatus*.

The male *Brettus cingulatus* depicted in Figures 2-3, from Nagaon, Alibaug District, Maharashtra (locality [29]), represents a new record of the male of this species from India. This spider was first encountered as it was resting on the underside of a teak tree leaf, well past midnight, in the garden of the beach front holiday home of one of the authors (R. Khalap). This spider was then collected and subsequently photographed and euthanized. All material examined will be deposited in the repository of The Forest Training Institute, Chikhaldara, Amravati. An excellent video depicting the brooding female of this species may be viewed online (Popumon 2013).

***Brettus storki* Logunov & Azarkina 2007**

♂♀ [29] *Brettus storki* Logunov & Azarkina 2007 (Brunei, Bukit Sulang, Ladan Hills Forest Reserve)

This relatively new species was collected at a single locality in Brunei. The pedipalp of the male resembles that of *B. cingulatus* but the blunt RTA may be wider and it is directed laterally and not distally. *The male* carapace is light brown and the eye region is grey. The clypeus bears silver-white setae, but there are no distinctive markings on the carapace and opisthosoma. All of the legs are yellow-grey. Femur I has a ventral fringe of long brown setae distally, and tibia I is covered sparingly with long, yellow-brown setae. The femur and patella of the pedipalp are yellow, the tibia brown, and the cymbium yellow-brown. *The female* epigynum resembles that of *B. anchorum* but the medial ducts are quite short. The carapace of the female is yellow-brown and the eye region is yellow-grey. As in the male there are silver-white setae on the clypeus. The opisthosoma is yellow-gray and, also as in the male, there is no distinct pattern on either the carapace or the opisthosoma. All legs are yellow. Tibia I has a fringe of scattered yellow-brown setae above, and a fringe of long brown setae below. The pedipalp is pale yellow with white setae. Documentation of the appearance of living animals is needed. In general, it can be said that the *Brettus* of the East Indies are poorly known.

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