

First report of the African jumping spider *Thyene coccineovittata* (Araneae: Salticidae: Plexippina) in Brazil

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Summary. *Thyene coccineovittata* (Simon 1886) is reported from a number of localities in the state of Rio de Janeiro, Brazil where it has been introduced and appears to be thriving. Males, females and immatures are described. Previously this species has been found only in Eurafasia, ranging from South Africa to Senegal and Southern France. *Thyene pulchra* Peckham & Peckham 1903, new synonym, is recognized as the female of *T. coccineovittata*.

Keywords. Eurafasia, international trade, introduced species, Rio de Janeiro, scarlet stripes, *Thyene pulchra*, *Triplaris*

In the previous version of this paper (Mariante & Hill 2018) we reported the discovery of a single female *Thyene* in Rio de Janeiro, identified as *T. cf. pulchra*. Now, based on our examination of many males and females of this species from Brazil, described here, as well as our recent review of the syntypes of *T. crudelis*, *T. ogdeni* and *T. pulchra* in the Peckham Collection (Hill & Mariante 2019), we can report that the female that we described previously was in fact *T. pulchra* Peckham & Peckham 1903. Since we can also identify the males in this population as *T. coccineovittata* (Simon 1886), we synonymize *T. pulchra* with that species.

Excluding *T. pulchra* and *Gangus longulus* Simon 1902 from Queensland, the latter listed as a *species inquirenda* by Richardson (2016), *Thyene* Simon 1885 is an endemic eurafrican genus with 46 known species, mostly tropical (WSC 2019). We can now add the state of Rio de Janeiro, Brazil to the range of *T. coccineovittata*, previously reported from Eurafasia (South Africa to France; Figures 1-2). Just how this species was introduced to Brazil is unknown, but almost certainly this was the result of human activity. One possibility is the international trade in goods (Kobelt & Nentwig 2007; Nedvěd et al. 2011). Increasing trade between Brazil and Africa (White 2010) may lead to many more spider introductions in the future.

Thyene coccineovittata (Simon 1886)

Hyllus coccineovittatus Simon 1886 ♂♀

Thyene crudelis Peckham & Peckham 1903 ♂, synonymy by Berland & Millot 1941

Thyene pulchra Peckham & Peckham 1903 ♀, **new synonymy** : Wesołowska & Haddad 2009 ♀ : Hill & Mariante 2019 ♀

Thyene coccineovittata Berland & Millot 1941 ♂♀ (but not ♀ *T. ogdeni*) : Wesołowska & Haddad 2009 ♂ (only) :

Dawidowicz & Wesołowska 2016 ♂ : Oger & Van Keer 2017 ♂ : Hill & Mariante 2019 ♂ (*T. crudelis*)

Thyene cf. pulchra Mariante & Hill 2018 ♀

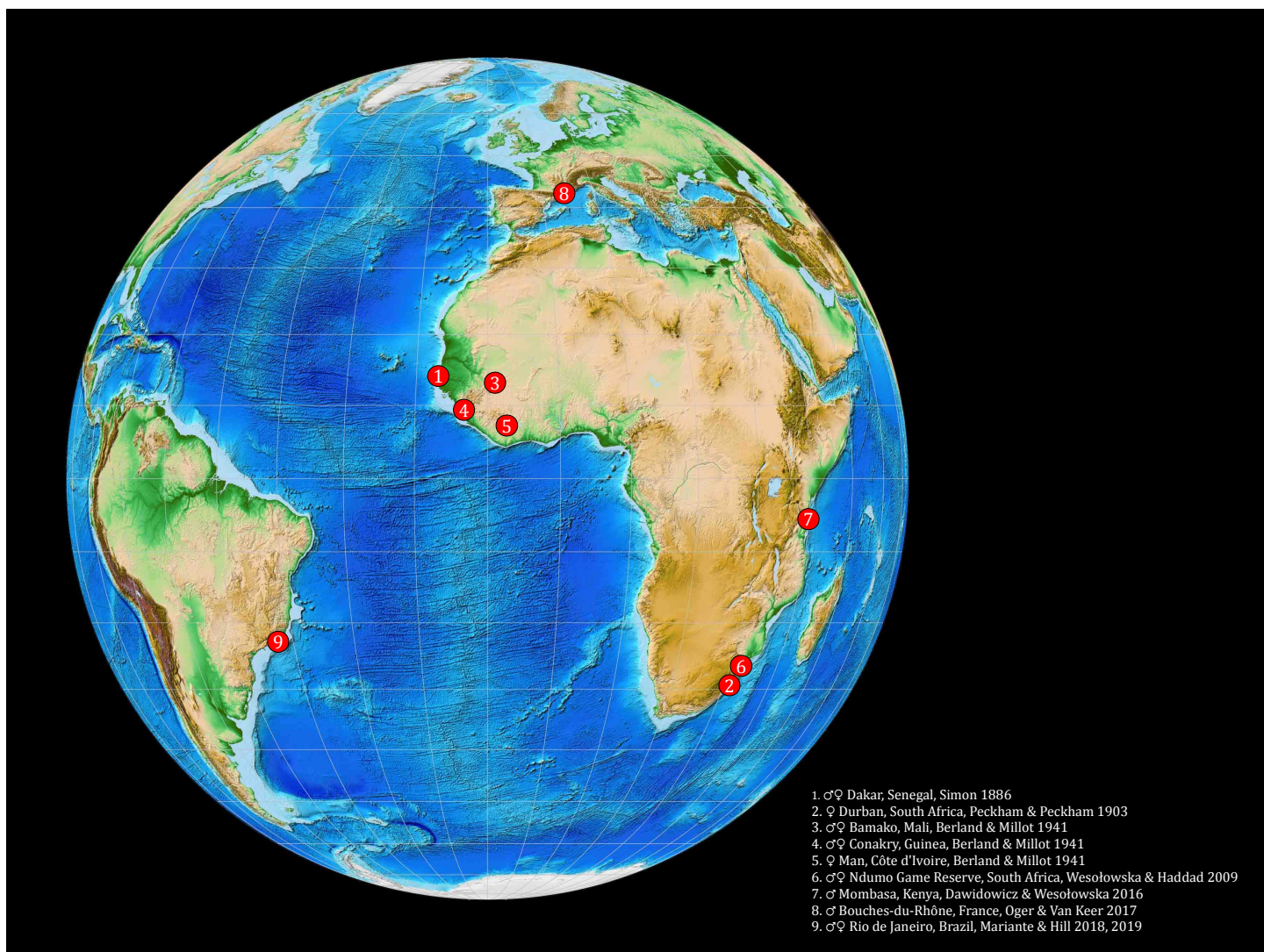


Figure 1. Transatlantic distribution of *Thyene coccineovittata* with references (map data by NASA).



Figure 2. Known distribution of *Thyene coccineovittata* in Brazil based on our study sites (1-2) and other sites (3-8) where this species has been observed (map imaging by USGS Landsat).

Diagnosis. Each pedipalp of the male *Thyene coccineovittata* has a very short retrolateral tibial apophysis (RTA), often difficult to observe behind the many coils of the embolus. The epigynum of the female is very lightly sclerotized, generally with only a small anteromedial *parens* visible through the cuticle. The male is dark brown to black, the female light yellow-brown and translucent. Both sexes have a middorsal opisthosomal band comprised of broad, flat white-yellow scales, and many of these scales are present on the carapace and/or the chelicerae. On either side this band is flanked by dark stripes, interrupted with paired spots toward the rear, and highlighted with bright, scarlet scales. The species group name (*bearing scarlet stripes*) is almost certainly based on the appearance of these flanking stripes, but their coloration varies and in some males they are black without any scarlet scales. In females the flanking stripes are usually broken into large, black spots. Other characters, such as the femoral stripes of females, are shared with other species of *Thyene* and are thus of limited use for purposes of identification. Here (Figures 3-22) we present photographs of male, female and immature *T. coccineovittata* with reference to the sites (Figure 2) where they have been observed in the state of Rio de Janeiro.



Figure 3. Penultimate male *Thyene coccineovittata* (Figure 2: site 1). Immatures of both sexes closely resemble adult females. See Figures 4-5 for images of this spider as an adult.



Figure 4. Male *Thyene coccineovittata* shown in Figure 3 after a final molt to the adult stage. Note the prominent fringes under the black femora I and II.

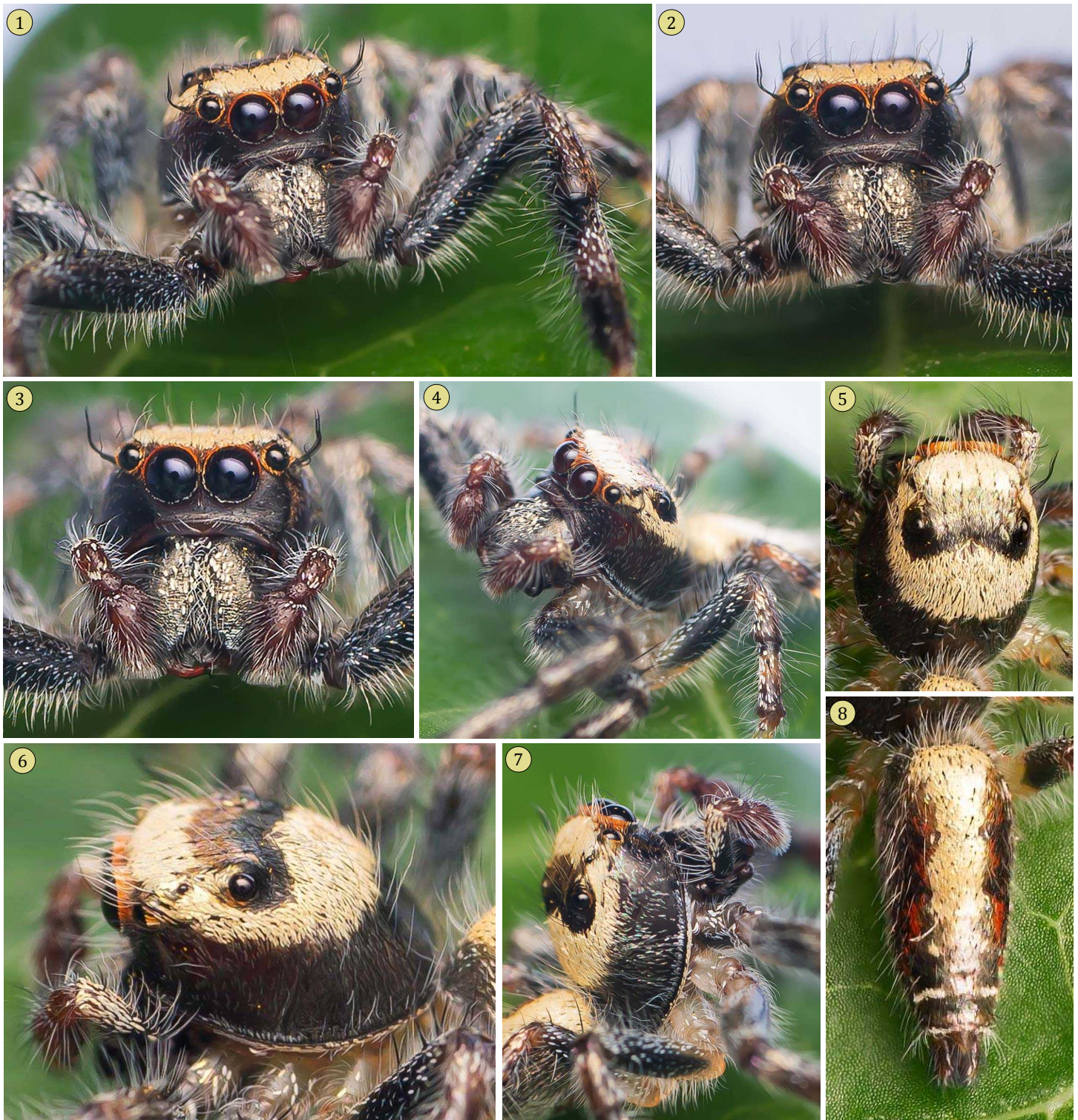


Figure 5. Detailed views of the adult male *Thyene coccineovittata* shown in Figure 4. Orange scales surround the ALE and the top half of each AME. The top of the carapace is mostly covered with flat yellow-white scales, as is the broad middorsal band of the opisthosoma. **1-3**, Each anterior paturon of the male is reflective, with a variable cover of flat yellow-white scales, and bears many prominent transverse grooves. **8**, The middorsal opisthosomal band is flanked by dark stripes, interrupted by light spots or transverse lines toward the rear. In this individual these dark stripes include many scarlet scales.



Figure 6. Adult male *Thyene coccineovittata* in nature (Figure 2: sites 1-2).



Figure 7. Adult male *Thyene coccineovittata* (Figure 2: sites 1-2).



Figure 8. Ventral view of adult male (1-3) and adult female (4-6) *Thyene coccineovittata* (Figure 2: sites 1-2). 6, Detail of (5), showing only slight sclerotization of the epigynum when viewed from below.

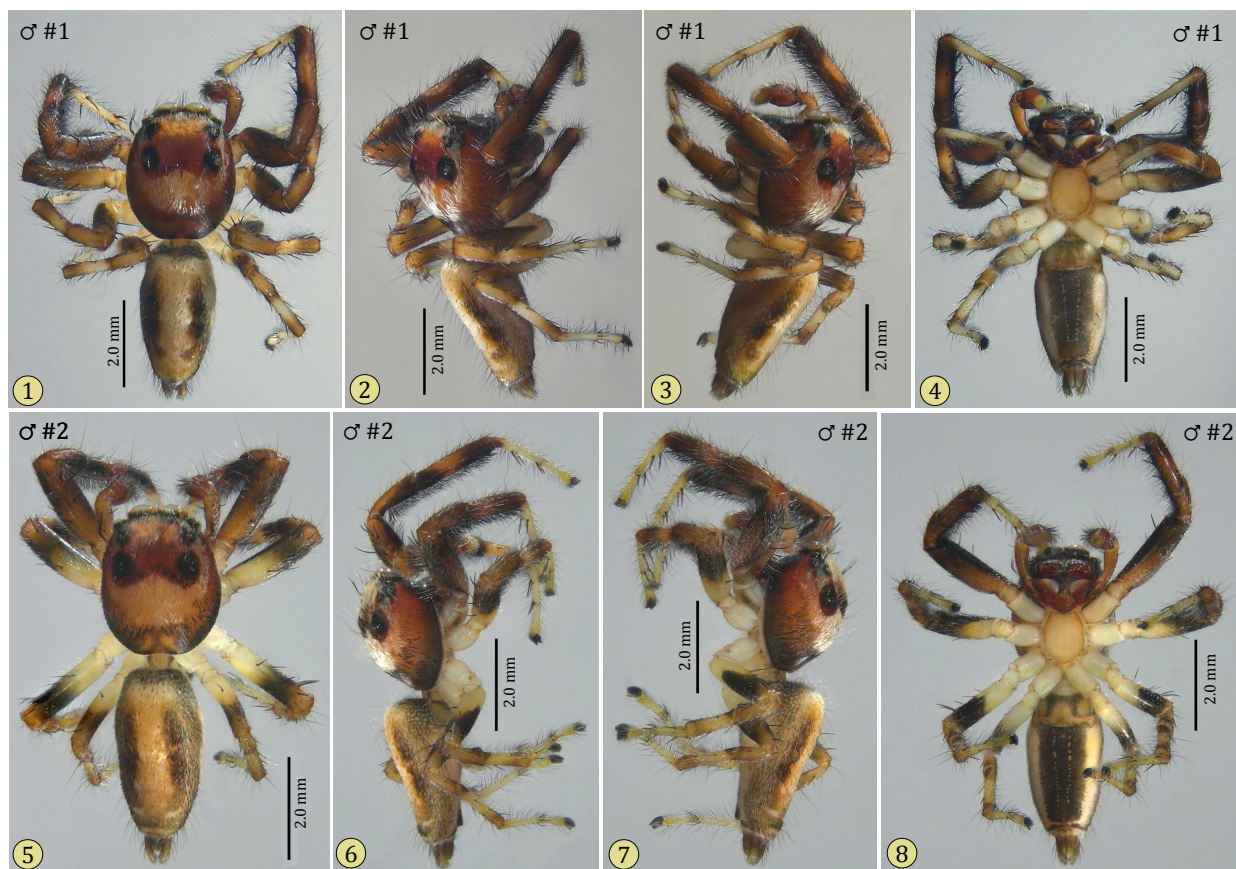


Figure 9. Two adult male *Thyene coccineovittata* (Figure 2: sites 1-2) in 70% ethanol.

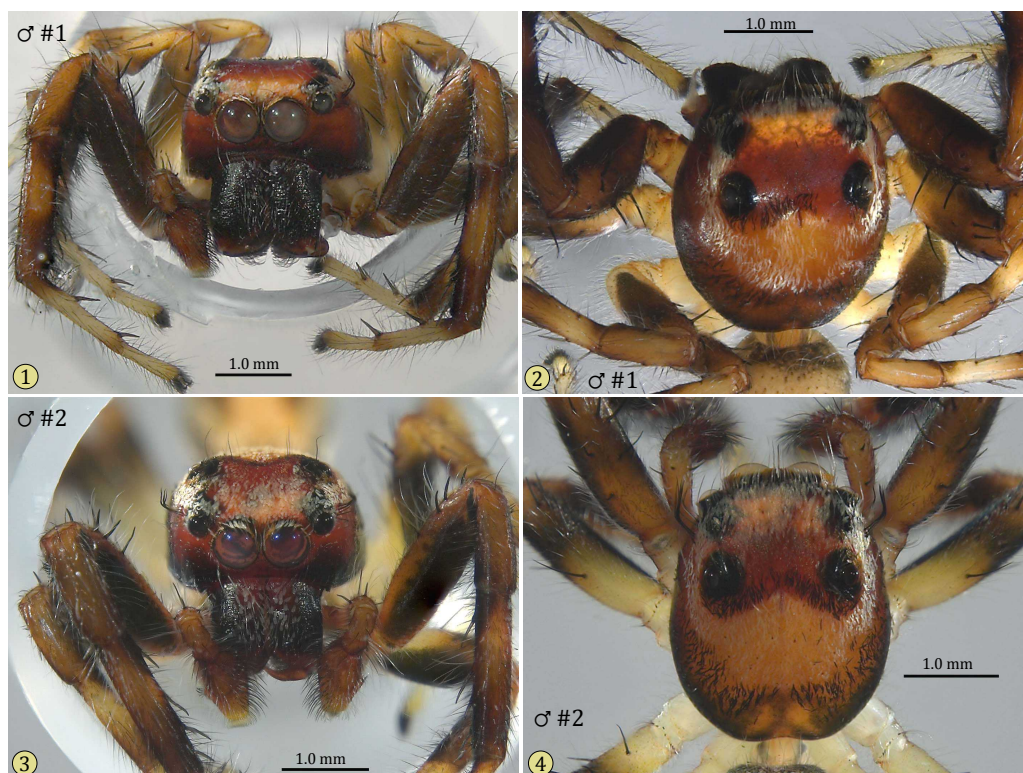


Figure 10. Two adult male *Thyene coccineovittata* (Figure 2: sites 1-2) in 70% ethanol.

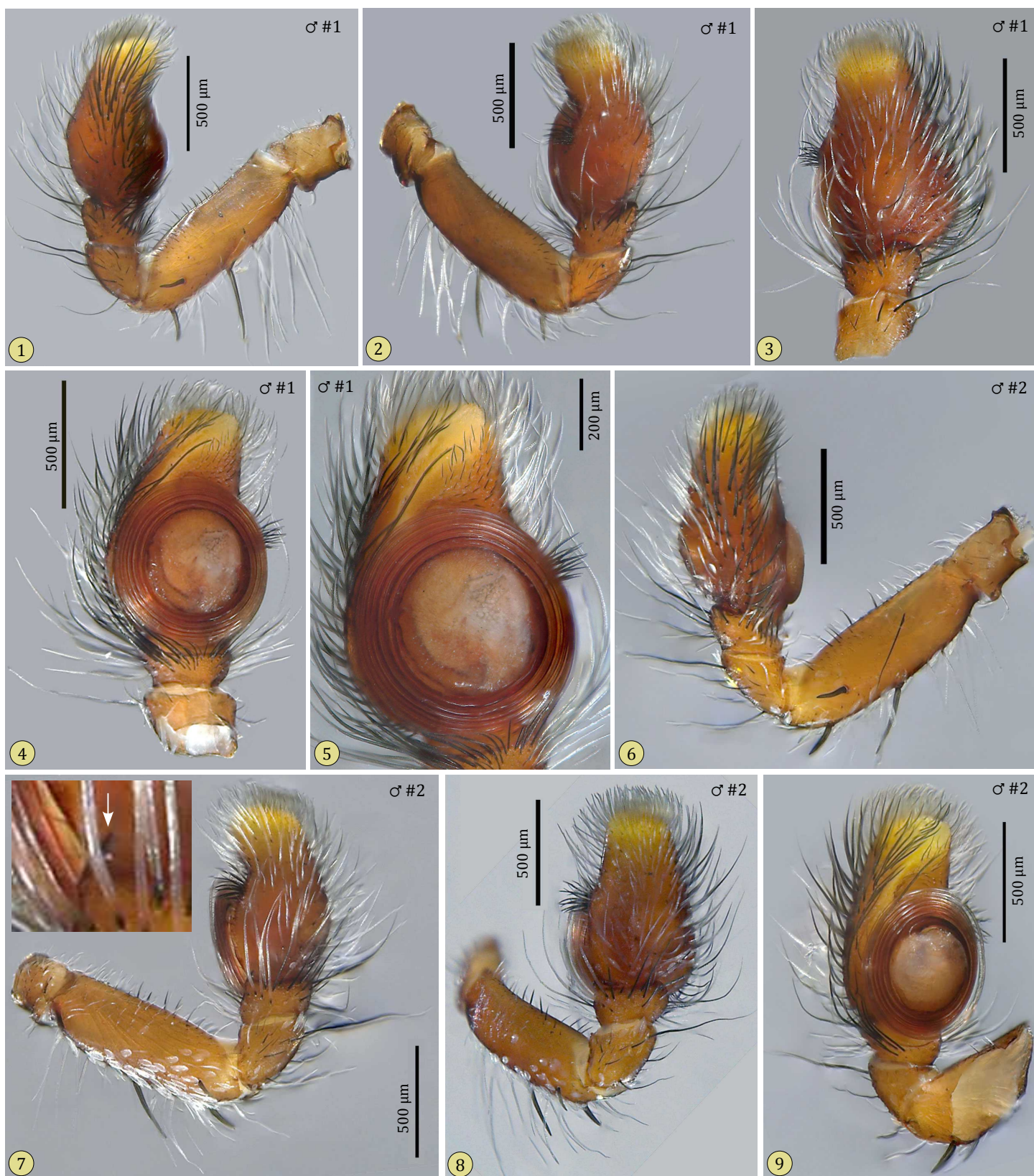


Figure 11. Right pedipalp of two adult male *Thyene coccineovittata* (Figure 2: sites 1-2) in 70% ethanol. These images were flipped horizontally (mirrored) to facilitate direct comparison according to our *left pedipalp convention*. Thus they represent the appearance of the left pedipalp. **7**, This detailed view (inset: arrow) shows the position of the small RTA, just above the many coils of the embolus. This can be difficult to observe.



Figure 12. Adult female *Thyene coccineovittata* (Figure 2: site 2). This was the first *Thyene* found by one of the authors (9 OCT 2018, RMM; Mariante & Hill 2018), standing on a leaf of *Triplaris* sp. A long setal tuft flanks each ALE and there are several lines of white scales beneath the front eye row. Dark transverse lines or striae are most prominent on the front of each femur I.



Figure 13. Adult female *Thyene coccineovittata* in nature (Figure 2: sites 1-2).

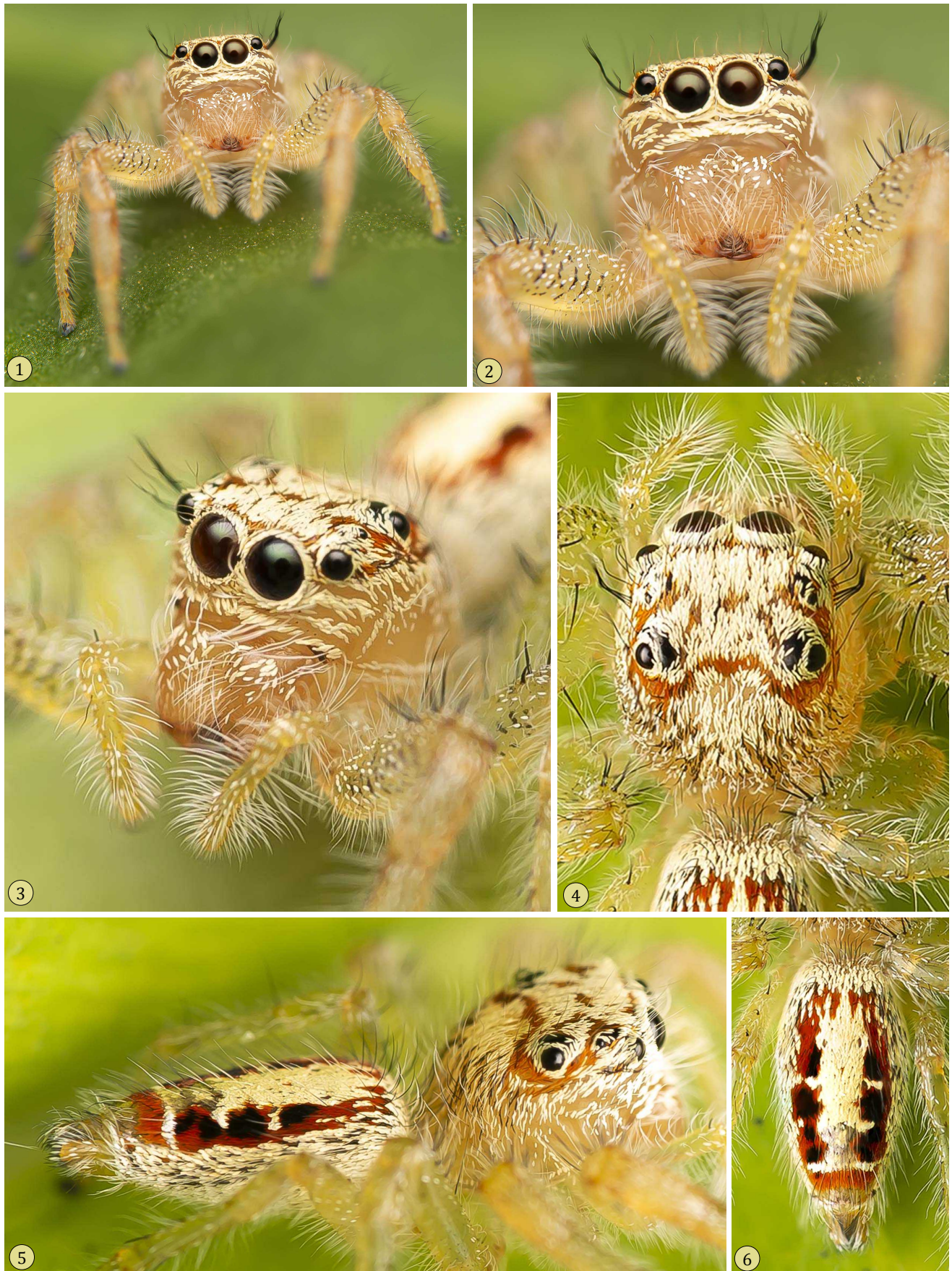


Figure 14. Detailed views of adult female *Thyene coccineovittata* in nature (Figure 2: sites 1-2).



Figure 15. Adult female *Thyene coccineovittata* (Figure 2: sites 1-2).

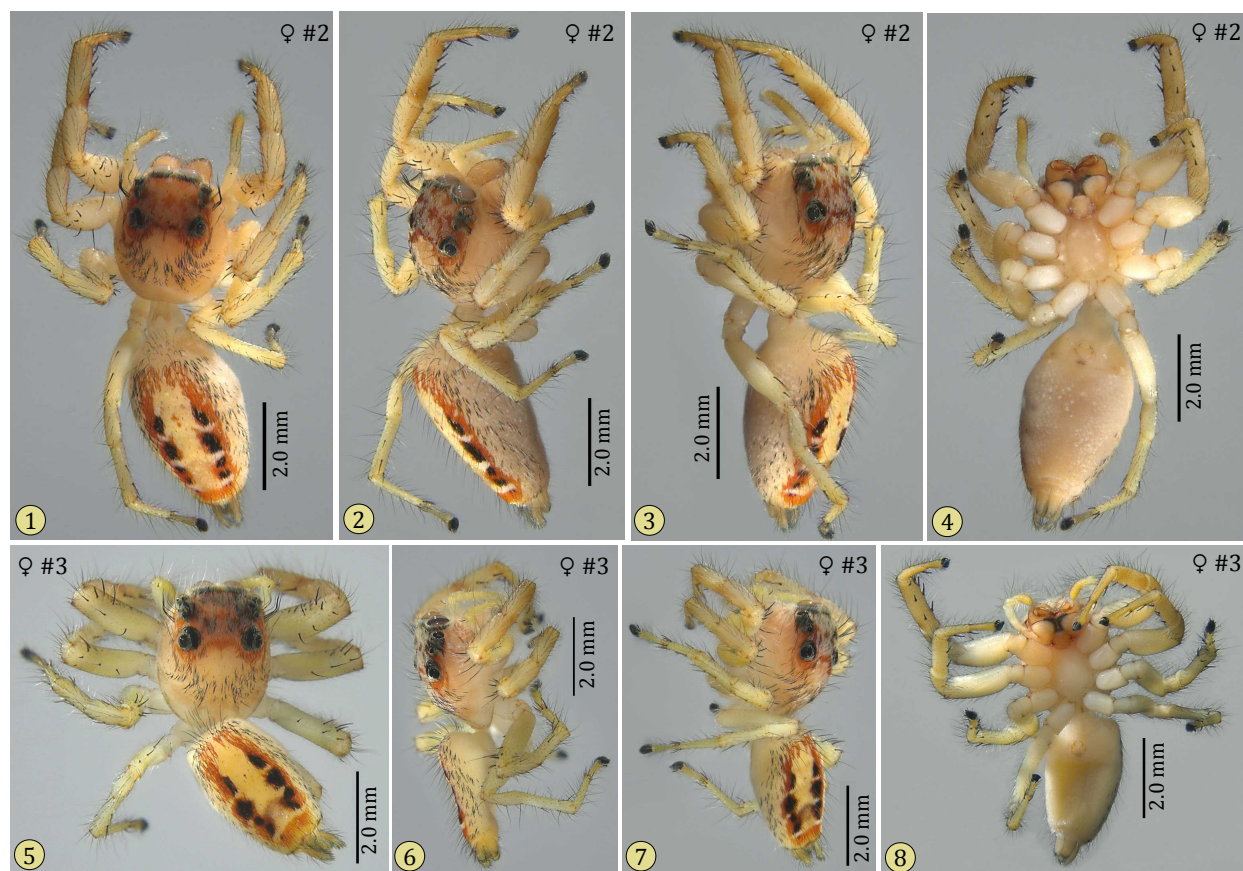


Figure 16. Two adult female *Thyene coccineovittata* (Figure 2: sites 1-2) in 70% ethanol.

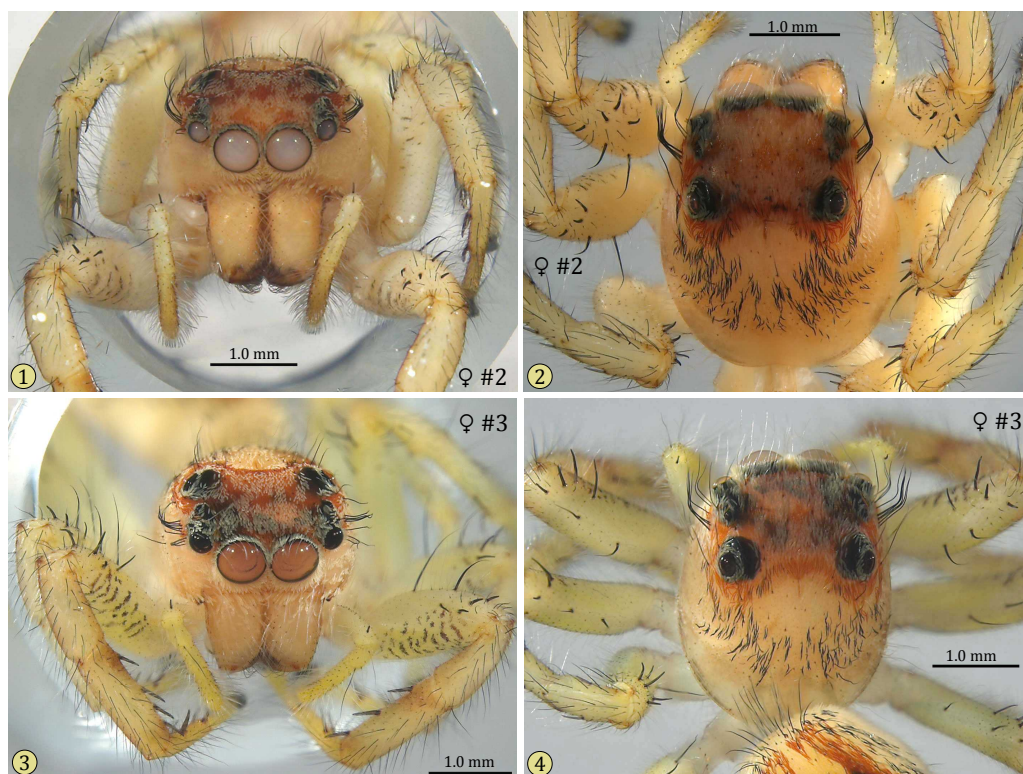


Figure 17. Two adult female *Thyene coccineovittata* (Figure 2: sites 1-2) in 70% ethanol.

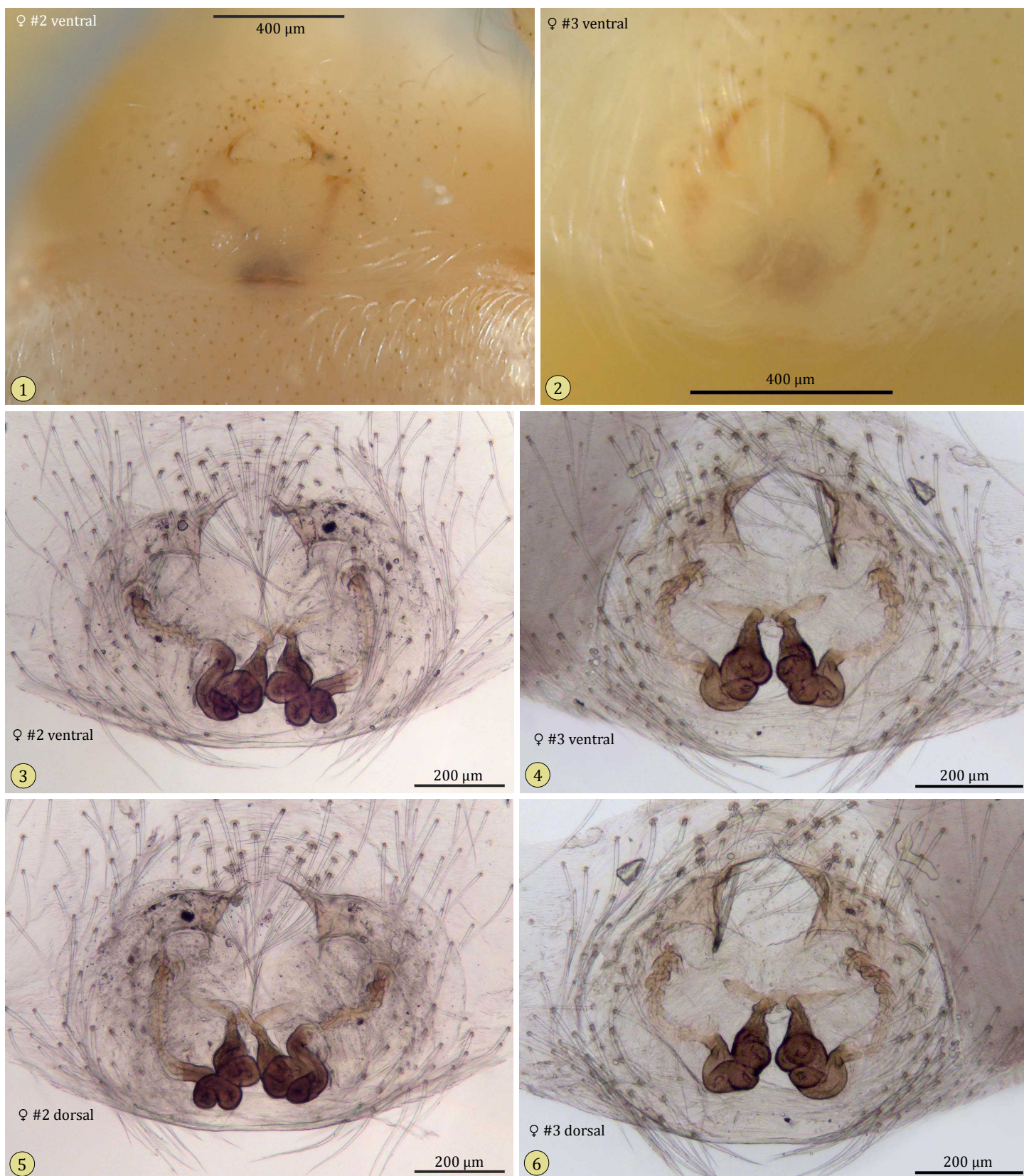


Figure 18. Epigynum of two adult female *Thyene coccineovittata* (Figure 2: sites 1-2) in 70% ethanol. **1-2**, Ventral view (anterior toward top of page) of epigynum prior to clearing. **3-4**, Ventral view of cleared epigynum. **5-6**, Dorsal view of cleared epigynum.



Figure 19. Earlier immature *Thyene coccineovittata* (Figure 2: site 1). At this stage the basic scale pattern of the adult female is already visible.



Figure 20. Later immature (not penultimate) *Thyene coccineovittata* (Figure 2: site 1), showing the basic scale pattern of an adult female.



Figure 21. Two sequences (1-4, 5-10) showing interactions between a male and female *Thyene coccineovittata* (Figure 2: sites 1-2). Although a complete courtship sequence was not observed, lateral extension of legs II-III (3-4) with waving of elevated legs I (5-7) appear to represent important features of the male display.



Figure 22. Additional records of *Thyene coccineovittata* in the state of Rio de Janeiro. Respective locations corresponding to the numbered sites shown in Figure 2 are bracketed above the name of the contributing photographer. All photographs used with permission.

Habitat (Figure 23). Our two study sites (Figure 2: sites 1-2) are both in Rio de Janeiro, although other observers have found *Thyene coccineovittata* near Cabo Frio on the eastern side of the state of Rio de Janeiro (Figure 22). At both of these sites *T. coccineovittata* was found on vegetation in inhabited areas. One of the authors (RMM, 9 OCT 2018; Mariante & Hill 2018) first found this species standing on a leaf of *Triplaris* sp. (Polygonaceae, *Ant Tree*), a common native tree in Brazil, at the Oswaldo Cruz Institute (site 2), a campus of Fiocruz, a scientific institution for research and development in the biological sciences. This campus has many native trees separated by the stairs, sidewalks and paths that give access to the buildings. Many Neotropical salticids (e.g., *Bryantella*, *Chira*, *Colonus*, *Corythalia*, *Frigga*, *Lyssomanes*, *Maeota*, *Phiale*, *Sarinda*, *Sumampattus* and *Metaphidippus*) have previously been found at the same location. We do not presently consider this species to be a synanthrope in this area as it has not been found living on man-made structures, but its survival in Brazil may nonetheless be dependent on cultivated plants in a semi-urban environment. We do not know if this spider has invaded unaltered natural habitats in Brazil, but the finding of this species in a semi-natural habitat in the state of Rio de Janeiro should not be ignored, since some introduced spiders can become invasive and displace native species. Although the best-known introduced spiders are synanthropic and cosmopolitan (Cutler 1990; Taucare-Ríos & Edwards 2012; Taucare-Ríos 2013), some recent salticid introductions that are neither synanthropic nor cosmopolitan have also been very successful (Kaldari et al. 2011; Gall & Edwards 2016).



Figure 23. Sites (Figure 2: sites 1-2) where one of the authors (RMM) found *Thyene coccineovittata* in Rio de Janeiro. **1-3,** Cultivated plants near man-made walls and other structures at site 1. **4-6,** Pathways and cultivated plants at the Oswaldo Cruz Institute (site 2), where this spider was first discovered on the leaves of *Triplaris* sp. (6).

Methods

The stereo microscope used for ethanol preserved specimens (including non-cleared epigynum and pedipalps) was a ZEISS Axio Zoom.V16 (TM) equipped with an Axiocam HRm (TM) color camera. Each epigynum was dissected and cleared with 10% NaOH for 8 hours at room temperature, then photographed in a ZEISS Primo Star (TM) microscope equipped with an Axiocam 105 (TM) color camera. Stacking of several images of the male pedipalp and the cleared epigynum of the female, as well as some photographs of these spiders, was performed with Adobe® Photoshop® software.

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