

Exasperating taxonomy of the colourful ant-mimic *Myrmarachne exasperans* (Araneae: Salticidae: Astioida: Myrmarachinae)

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The jumping spider originally described as *Emertonius exasperans* by Peckham & Peckham (1892) retains that name in two comprehensive catalogs (Metzner 2015, Prószyński 2015), but in a third catalog (WSC 2015), and several recent publications on the large genus *Myrmarachne* MacLeay 1839 (Edwards & Benjamin 2009, Edwards 2013), this spider is known as *Myrmarachne exasperans* (Peckham & Peckham 1892). Errors related to the naming of this colourful ant-mimic began when the Peckhams (1892) described a female from Java as a male (Table 1, [1]). This error may have been the result of confusion due to the fact that the black pedipalps of the female are enlarged and cover the chelicerae in life (Figure 1:3). Simon (1901) did not correct this error in gender, but added a second species from Madagascar, *E. rufescens* (Simon 1900), to the genus *Emertonius*. Wanless later (1978) dedicated a paper to his resolution of the identity and generic placement of this species, and he recognized that the Peckhams had in fact described a female, which he designated as the lectotype (also [1]). Wanless listed a second female from Java ([2]), but it is not known whether the female in his figures was this specimen, or [1]. Wanless also described a male from Palawan ([3]) that he considered to be the same species. More than 30 years later Prószyński & Deeleman-Reinhold (2010) recognized three spiders similar to *E. exasperans* from colour photographs of a live male ([4]; Figure 1:1-2), a female specimen from Bali ([5]), and a female specimen from Sabah ([6]). We have identified two more records from photographs ([7], [8]).

Table 1. Records associated with *Myrmarachne exasperans*, with their published interpretations. It appears that Prószyński & Deeleman-Reinhold thought that Wanless had listed two specimens from the Peckham collection.

record	description	Peckham & Peckham 1892	Wanless 1978	Prószyński & Deeleman-Reinhold 2010	Otto & Hill 2015 (this paper)
[1]	♀ specimen from Java (MCZ, Harvard)	examined, described as ♂ in error	examined, designated as ♀ lectotype from Bantam	listed as ♂♀, "original series of specimens" including ♀ lectotype	single ♀ from Bantan, W. Java (<i>M. exasperans</i>), now missing epigynum
[2]	♀ specimen from Mt. Tenggu (Gunung Tenggu), Java (MNHN, Paris)		examined, may be the ♀ specimen that he drew (if not [1])	may be ♀ specimen drawn by Wanless	♀ <i>M. exasperans</i> (perhaps)
[3]	♂ specimen from Palawan Manialingajan Pinigisan, Philippines (BMNH)		examined and drawn with abdominal fringes	♂ <i>Emertonius</i> sp.	♂ <i>M. exasperans</i> (perhaps)
[4]	♂ photographs in life by David Knowles, from Alas Kedaton, Bali			♂ <i>Emertonius</i> sp., listed with <i>E. exasperans</i>	♂ <i>M. exasperans</i> (likely)
[5]	♀ photographs of specimen from Ambengan, Bali			♀ <i>E. exasperans</i>	♀ <i>M. exasperans</i> (likely)
[6]	♀ photographs of specimen from Rafflesia garden, Perkasa Hotel, Tenom, Sabah			related to <i>E. exasperans</i>	♀ may represent local variety of <i>M. exasperans</i>
[7]	♀ photograph in life from Cat Tien NP, Vietnam, by Paul Bertner (Figure 1:3)				♀ <i>M. exasperans</i> (likely)
[8]	♂ photograph in life by Tiziano Hurni-Cranston, from Bali (Hurni-Cranston 2010)				♂ <i>M. exasperans</i> (likely)

It is not known how the Peckhams came up with the species name '*exasperans*', but this Latin word can be interpreted as either 'exasperating', 'irritating', or 'rough'. It may be a reference to a 'rough' tract of setae on the postero-median dorsal ridge behind the eye region of the female. The type drawing of the Peckhams closely matches a recent photograph of a living female from Vietnam (Figure 1:3-4). According to Edwards (personal communication; reported by Prószyński & Deeleman-Reinhold 2010) the epigynum has been removed from the lectotype and lost.

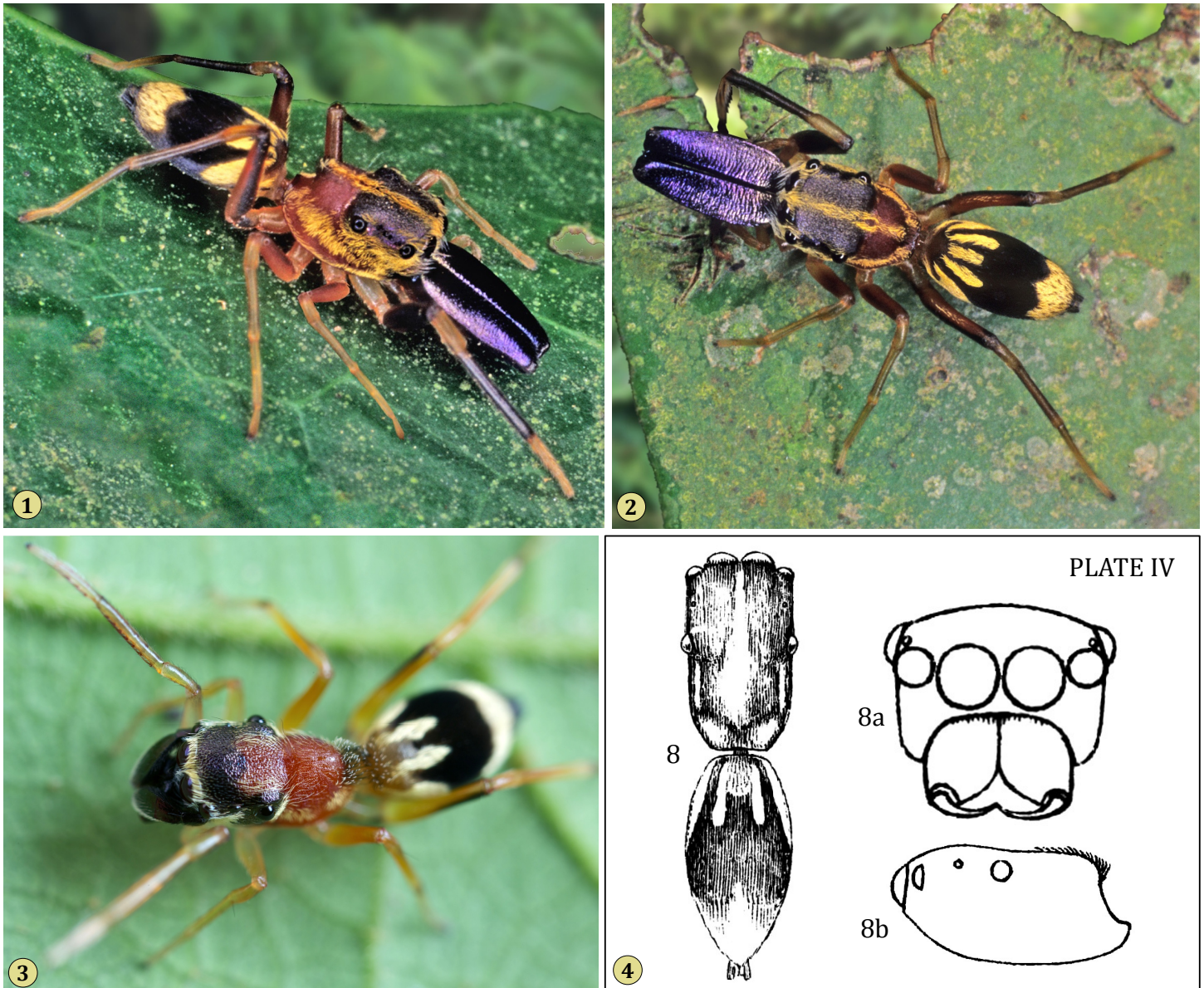


Figure 1. 'Likely' male (1-2), 'likely' female (3), and drawing of the lectotype female (4) *Myrmarachne exasperans*. 1-2, Two views of a male from Alas Kedaton, a small forest located in the middle of a rice field in Tabanan regency in west Bali. The bright colouration and sharp posterior middorsal ridge of the carapace are distinctive. 3, Photograph of a female from Cat Tien National Park, an ecotourism center in a lowland tropical rainforest to the northeast of Ho Chi Minh City, Vietnam. Note the rough appearance of setae projecting from the dark posterior median of the carapace (drawn in 4:8b), and the wide, black, bordered pedipalps that cover the chelicerae. 4, Original drawings by J. H. Emerton of the female, mislabelled as a male (Peckham & Peckham 1892). The genus name *Emertonius* was without doubt meant to honor Emerton's work. Original photographs by David Knowles (1-2; <http://spinelesswonders.smugmug.com/>) and Paul Bertner (3), used with permission.



Figure 2. Males representing six different species of *Myrmarachne*. **1**, *M. plataleoides* (O. Pickard-Cambridge 1869) from Makunda Christian Hospital, Karimganj District, Assam (5 MAR 2014). This well-known species, with swollen distal chelicerae and a distinct constriction of the pedicel, is widely distributed in tropical south and southeast Asia. **2**, *M. smaragdina* Cecarelli 2010, recently described from northern Queensland. This species is very similar to *M. plataleoides*, but the distal chelicerae are not as swollen. Before it was named, *M. smaragdina* was the subject of several published behavioural studies (Ceccarelli 2008, 2009). **3**, *M. maxillosa* (C. L. Koch 1846) from Lombok (15 JUL 2014). **4**, *M. cornuta* Badcock 1918 from Kuala Selangor, Selangor, Malaysia (3 FEB 2015). **5**, *Myrmarachne* sp. from Fraser's Hill, Pahang, Malaysia (6 APR 2015). This species, with iridescent and colourful chelicerae, resembles *M. exasperans*, even to details of leg colouration. **6**, *Myrmarachne* sp. from Fraser's Hill, Pahang, Malaysia (10 JUN 2010). See Hill (2010) for more photographs of *Myrmarachne* species. Original photographs by Vijay Anand Ismavel (1), Robert Whyte (2), Jürgen Otto (3), Shamsul Hidayat Omar (4), Nicky Bay (5), and Farhan Bokhari (6), used with permission.

M. exasperans is a very colourful species, quite unlike most *Myrmarachne* (Figure 2) that usually closely resemble the ants with which they associate (Figure 2:1-4). It lacks the very long carapace, the long pedicel, and the opisthosomal constriction seen in species like *M. plataleoides*. The chelicerae of the male are similar to those of other species with transverse ridges on the dorsal surface of each paturon, but are brightly coloured and iridescent (Figure 1:1-2). There are similar species from Sunda, perhaps not named, that also exhibit bright or bold colour patterns (Figure 2:5-6).

The very large genus *Myrmarachne* is part of the Myrmarachinae subfamily or clade within a larger Australasian (Sahulian) clade termed the Astioida (Maddison *et al.* 2008). It is likely that many of the Indonesian or Papuan species within this genus have not yet been collected or named (Hill 2010). *M. exasperans* is not associated with any of the hypothetical sub-genus clades or groups within *Myrmarachne*, and may represent a new '*exasperans* group' (Edwards & Benjamin 2009). Should the genus *Myrmarachne* be divided in the future, the genus name '*Emertonius*' remains available and may once again be associated with this species (Edwards 2013).

The ant associations of many *Myrmarachne* species are well-known (Ceccarelli 2008, 2013; Jackson 1982; Nelson 2010; Nelson & Jackson 2007; Nelson *et al.* 2005, 2006). Presently the ant or arthropod associations of *M. exasperans*, and the reason for its colouration, remain a mystery.

Distribution. The localities associated with *M. exasperans* (or closely related forms; Table 1, [1] to [8]) represent part of the now largely submerged Sunda region of southeastern Asia (Figure 3). The lectotype female specimen was associated with "Java, Bantam" (Prószyński and Deeleman-Reinhold 2010), probably a reference to Bantam in West Java. The greatest number of records for this species are from Bali.

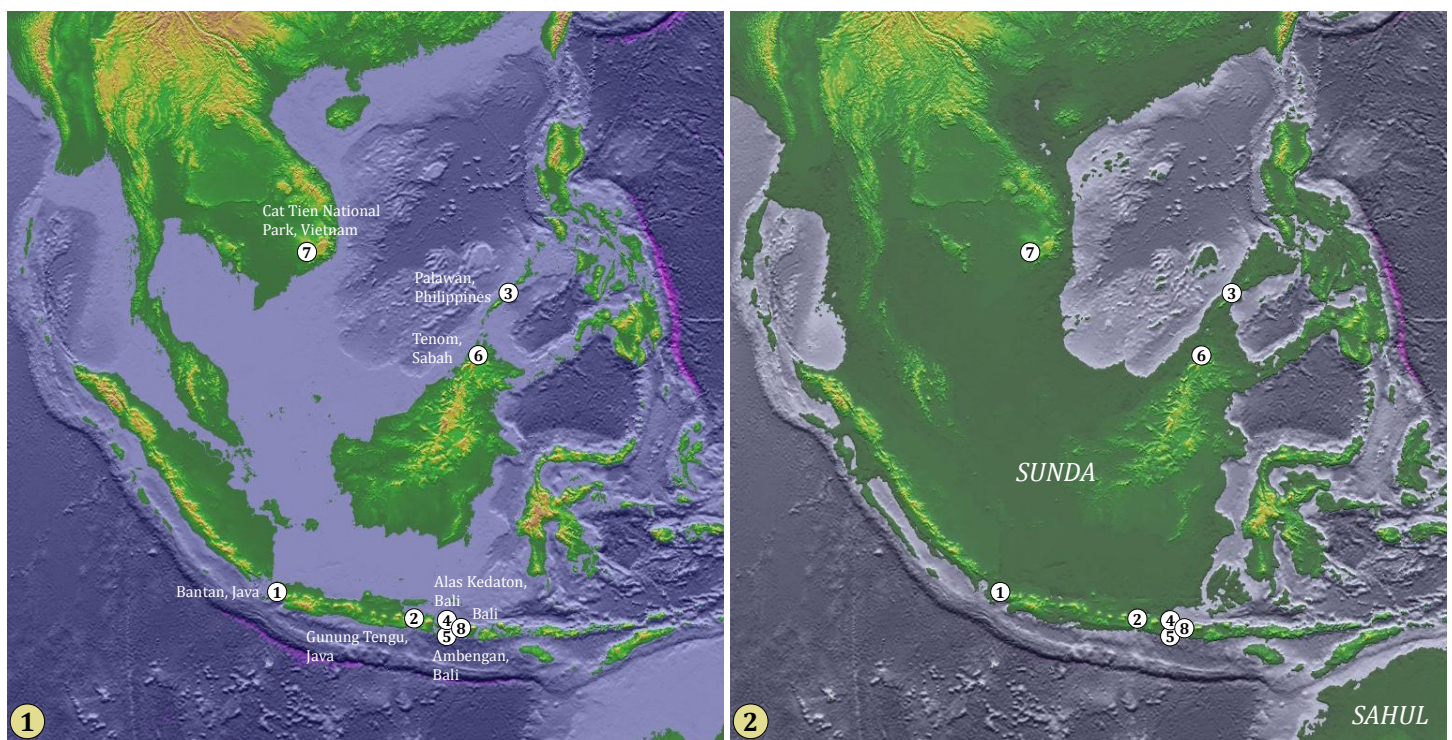


Figure 3. Distribution of *Myrmarachne exasperans* (or closely related species) in Sunda. **1**, Localities plotted on a modern-day relief map, with numbers corresponding to those shown in Table 1. The type female is from Bantam in West Java. **2**, The same localities plotted on a relief map of Sunda during the Last Glacial Maximum (LGM, 15-22Ka) when the sea level was 110 m lower than it is today. Relief maps courtesy of NOAA.

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