

Description of a new jumping spider, *Artabrus aurantipilosus* sp. nov. (Araneae: Salticidae: Plexippina), from Banda Neira, Indonesia

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Abstract. A new species, *Artabrus aurantipilosus*, is described from Banda Neira in the Wallacean biogeographical province that separates Sunda (tropical Asia) from Sahul (Australasia). This species is parapatric with respect to the only other member of the genus *Artabrus*, *A. erythrocephalus*. Living representatives of both species are figured and their relationship is discussed.

Key words. *Artabrus erythrocephalus*, Gunung Api, Maulana Hotel, Wallacea

Artabrus Simon 1902 is presently associated with a single species, *Artabrus erythrocephalus* (C. L. Koch 1846), primarily Sundan in distribution, with a range that extends from the southern end of the Malay peninsula to the island of Sumbawa (Figure 1; Table 1). Maddison (2015) considered this to be a member of the Plexippina, a mostly Afroeurasian clade with few representatives in either Wallacea or Sahul (Hill 2010). Here we describe a second species of *Artabrus*, from Banda Neira in the eastern reaches of Wallacea. Photographs of living *A. erythrocephalus* are also presented here for comparison.



Figure 1. Known distribution of the two *Artabrus* species in the East Indies. *A. erythrocephalus* (green circles) ranges from the southern end of the Malay Peninsula to Sumbawa. *A. aurantipilosus* sp. nov. (red circle) has only been found far to the east, on one small island, Banda Neira, to the south of Seram. Numbers in circles correspond to records in Table 1. Unnumbered records for *A. erythrocephalus* are based on validated reports posted on iNaturalist.

Table 1. Published or posted records for the distribution of *Artabrus erythrocephalus*.

map	locality	sex	reference	collection date
	Java	♂	C. L. Koch 1846	
	Malaisia [SIC]	♂	Simon 1903	
1	Lombok	♂	Prószyński 1984	
	Java	♂♀	Prószyński 1987	
	peninsular Malaysia		Murphy & Murphy 2000; Nasir et al. 2014	
2	Krakatau Islands		Žabka & Nentwig 2002	
3	Bukit Timah Nature Reserve, Singapore	♂♀	Zhang, Song & Li 2003	28 FEB 1968
4	Danum Valley, Sabah		Suhan 2004; Dzulhelmi MN et al. 2014	
5	Padang, Sumatra	♂♀	Prószyński 2009	
6	Samokat, near Sumbawa Besar	♂♀	Prószyński & Deeleman-Reinhold 2010	01 MAR 1990
7	Gunung Lambak, Malaysia	♀	Bay 2012	18 NOV 2012
8	Bali	♂♀	this paper	18 FEB 2016
9	Bandung, West Java	♂	Ng 2018	26 AUG 2018
10	Puncak, West Java	♀	Boediman 2019	03 FEB 2019

Taxonomy

Family Salticidae
 Subfamily Salticinae
 Tribe Plexippini
 Subtribe Plexippina
 Genus *Artabrus* Simon 1902

Artabrus Simon 1902: 404.

Type species: *Plexippus erythrocephalus* C. L. Koch 1846: 102.

Artabrus erythrocephalus (C. L. Koch 1846)

Figures 2-7

Material examined. One adult ♂ (HC-Ba1) was collected by the senior author (THC) on a *Ficus* tree in Bali, 18 FEB 2016. This specimen will be deposited in the Florida State Collection of Arthropods (FSCA), Gainesville.

Artabrus erythrocephalus are relatively large and robust salticids, close to 1 cm in body length. Unfortunately published descriptions of this species (C. L. Koch 1846; Simon 1903; Prószyński 1984, 1987, 2009; Prószyński & Deeleman-Reinhold 2010) are based only on a handful of specimens in alcohol that have lost the distinctive, bright green colour of the living animals. The original description of a ♂ by C. L. Koch (1846) is given here in Appendix 1. With no type specimen available, Prószyński (2009) designated a ♂ lectotype and a ♀ paralectotype for this species.

Males have a black eye-region surrounded by red or orange scales, black faces, and large, shiny black chelicerae. The face is covered with scattered white scales. Legs are usually bright, translucent green except for the darker brown distal segments of legs I and II. Some males have yellow-green legs (Figure 4:7). Legs I bear ventral fringes comprised of black or off-white setae, primarily under the patella, tibia and metatarsus. The dorsal opisthosoma carries a pattern of orange and off-white scales. Although structure of the pedipalp has been used as an important character, this is not remarkable (Figure 2). In life (Figures 3-4), adult males are easy to identify. Penultimate males closely resemble females and vary

in general colour from light brown (Figure 5) to green as they develop, but all adults appear to be yellow-green to green, and most are bright green.

Females, like immatures, are translucent and mostly green when resting on a green leaf, or brown (Figures 6-7). Like males, they have a pattern of orange and off-white scales on the dorsal opisthosoma, laterally striated (Figure 7:5). The eye region carries a distinctive pattern of white scales on a dark brown background, surrounded by orange scales.



Figure 2. Ventral views of *Artabrus erythrocephalus* ♂ specimens. **1-3**, ♂ (HC-Ba1) from Bali. **2-3**, Two views of the left pedipalp of (HC-Ba1). **4**, Simon's (1903) drawing of the right pedipalp, shown here in mirror image to appear as a left pedipalp for purposes of comparison. Unlike subsequent drawings published with descriptions, Simon missed the recurvature or loop of the embolus at its origin on the medial side of the embolus. Photo credits: 1-3, D. E. Hill.



Figure 3. Frontal view of an adult ♂ *Artabrus erythrocephalus* from Bandung, West Java, 26 AUG 2018 (Ng 2018). **2**, Detailed view of mouthparts. Note the prominent promarginal tooth at the base of each fang. There is also a prominent retromarginal tooth at the base of each fang, figured in the description by Simon (2003). Photo credits: 1-2, Yongi Ng, used with permission.



Figure 4. Views of living adult ♂ *Artabrus erythrocephalus* from Bali. **1-6**, Collected ♂ (HC-Ba1). **7**, Male with yellow-green legs, missing left leg I. Photo credits: 1-6, T. Hurni-Cranston; 7, Mehd Halaouate, used with permission.



Figure 5. Views of a penultimate ♂ *Artabrus erythrocephalus* from Bali. This spider changed colour from green to brown as it was maturing, finally becoming a typical green adult as shown in Figure 4: 1-6. Photo credits: 1-2, T. Hurni-Cranston.



Figure 6. Views of a light brown adult ♀ *Artabrus erythrocephalus* from Bali. Photo credits: 1-4, T. Hurni-Cranston.



Figure 7. Penultimate (1-3) and light-green adult ♀ *Artabrus erythrocephalus* from Bali. Photo credits: 1-5, T. Hurni-Cranston.

***Artabrus aurantipilosus* sp. nov.**

Figures 8-11

Type material. The holotype ♂ (HC-BN2m) and paratype ♀ (HC-BN2f) were collected by the senior author (THC) on a Banyan tree (*Ficus* sp.) in the middle of an intersection near the Cilu Bintang Estate, Banda Neira (4.527642°S, 129.898610°E, FEB 2016; Figures 1, 8). Both were found on leaves at a height of about 2 m above the ground. The female had a large nest that might have contained eggs, between two attached Banyan leaves. The same species was also seen on the balcony of the Maulana Hotel on Banda Neira, but was not collected at that time (Figure 10:1-3). Both specimens will be deposited in the Florida State Collection of Arthropods (FSCA), Gainesville.

Etymology. The species group name, *aurantipilosus* (Lat., adj., m.), refers to the prominent fringe of orange setae extending below legs I and II of the male.

Diagnosis. Genitalia of the male and female *Artabrus aurantipilosus* are not significantly different from those of the closely related, but widely parapatric, *A. erythrocephalus*. Unlike the male *A. erythrocephalus*, the male *A. aurantipilosus* is generally dark brown, with a prominent fringe of long orange setae beneath legs I and II, extending from each patella to the metatarsus. The female *A. aurantipilosus* is light yellow-brown and translucent. Neither the male nor the female exhibits the bright green colouration characteristic of *A. erythrocephalus*.

Description of male (Figures 9-10). Body length close to 1 cm. The prominent chelicerae and face are dark brown or dark red-brown. The pedipalps are lighter brown. The carapace is dark brown and glossy, with red-orange scales around the eyes at the margins of the eye region, and few scattered orange scales elsewhere. Each ALE is more than half the diameter of an AME, with the bottom of the ALE situated at the height of the center of the AME. The PME are closer to the ALE than to the PLE. The dorsal opisthosoma is brown with some black mottling, with indistinct lateral striations. The venter of the opisthosoma is more uniform brown, with black and white rings at the rear. In front of the spinnerets is a small tuft of red setae extending laterally on either side (Figures 9:7, 10:1), appearing as the extension of a red lateral stripe. The spinnerets are surrounded by bright orange setae. Legs I and III have a prominent ventral fringe of long, orange setae from at least the patella to the metatarsus, and also carry many orange scales along the sides. Except for the femora, legs III and IV are lighter brown. Each pedipalp has relatively long basal segments (from coxa to tibia), and a simple RTA. The embolus is long, recurved proximomedially near the tegulum as in the related *A. erythrocephalus*, curving laterodistally (extending counterclockwise in the distal direction on the left pedipalp as viewed from below).

Description of female (Figure 11). Body length close to 1 cm. Scale and setation patterns of the female *A. aurantipilosus* resemble those of the related *A. erythrocephalus*, but the female *A. aurantipilosus* is often green or light green in colour. The eye region of *A. aurantipilosus* is darker red-brown, with a less distinct pattern of off-white scales than those seen in the female *A. erythrocephalus*, and unlike that species orange scales are not present around the eyes. The eye arrangement is like that of the male. The carapace is mostly glabrous, with scattered off-white scales. The pattern of scales that cover the dorsal opisthosoma, and account for the lateral striations of the opisthosoma, are very similar to those of the female *A. erythrocephalus*, but the lateral striations are more off-white in *A. aurantipilosus*. Venter of opisthosoma almost uniform off-white in colour. Variation in the appearance of the genitalia of the female *A. erythrocephalus* has not been documented, but the epigynum of *A. aurantipilosus* is similar to the published drawings for that species.

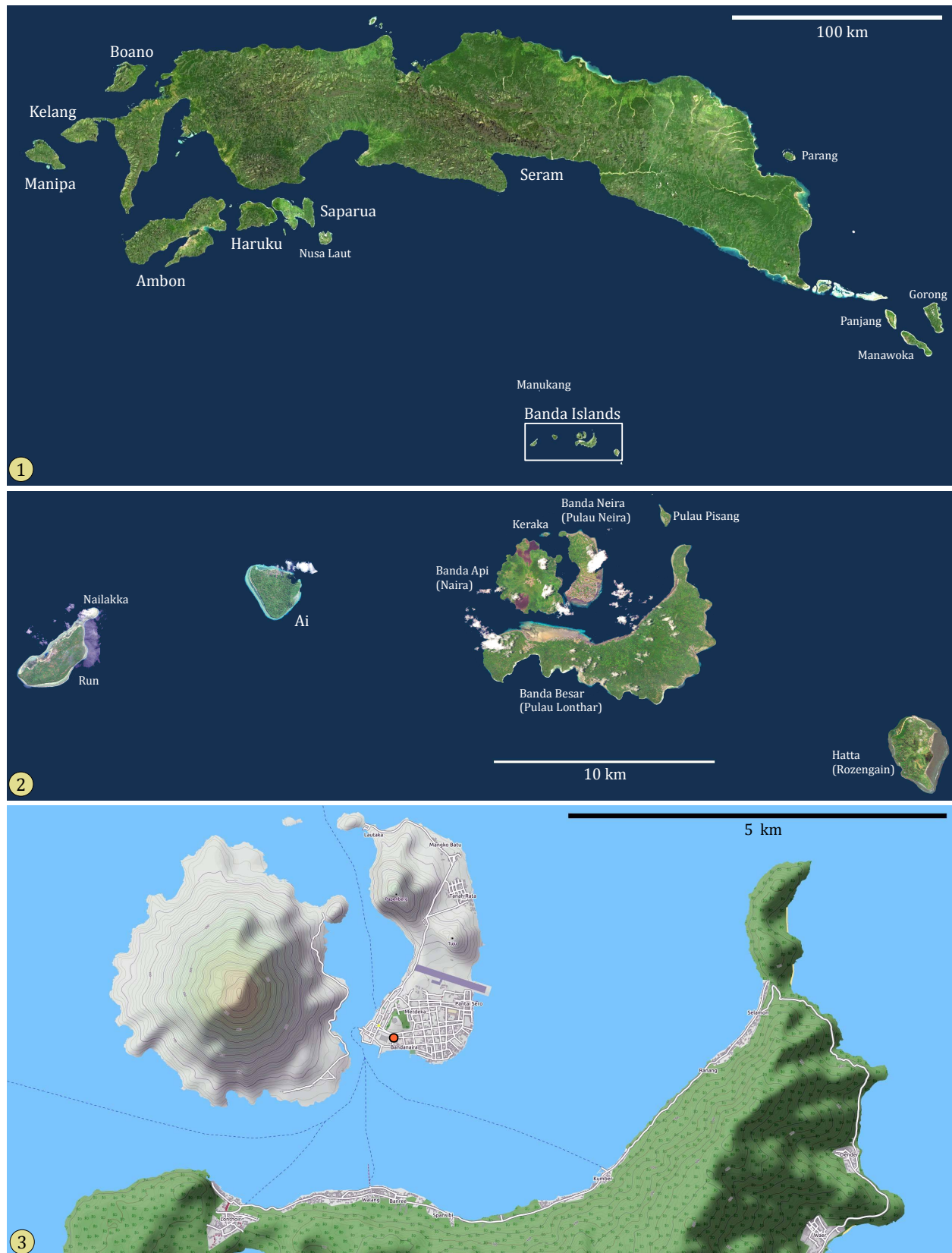


Figure 8. Type locality for *Artabrus aurantipilosus*, sp nov., on Banda Neira. **1**, Location (inset) of the Banda Islands south of Seram in the Wallacean biogeographic province. **2**, Detail of the larger Banda Islands showing Banda Neira just to the east of the live volcano, Gunung Api (Banda Api). **3**, Further detail in contour map of the central Banda Islands, showing the type locality (small red circle) in the more settled part of Banda Neira, near sea level. Image credits: 1-2, NASA/USGS Landsat; 3, [© OpenStreetMap contributors](#), base map and data from OpenStreetMap and the OpenStreetMap Foundation.



Figure 9. Living holotype ♂ (HC-BN2m) *Artabrus aurantipilosus*, sp nov. Photo credits: 1-8, T. Hurni-Cranston.



Figure 10. *Artabrus aurantipilosus*, sp nov. **1-3**, Adult male with missing legs I and II, found on hotel balcony (Figure 15:6) but not collected. **4-8**, Ventral views of holotype ♂ (specimen HC-BN2m) in alcohol. **7-8**, Pedipalps, including mirror image of right pedipalp (7).



Figure 11 (continued on next page). Paratype ♀ (HC-BN2f) *Artabrus aurantipilosus*, sp nov. 1-6, Views of spider in life. Photo credits: 1-9, T. Hurni-Cranston; 10-13, D. E. Hill.



Figure 11 (continued from previous page). Paratype ♀ (HC-BN2f) *Artabrus aurantipilosus*, sp nov. **7-9**, Views of spider in life. **10-13**, Paratype ♀ specimen in alcohol. **13**, Ventral (exterior) view of epigynum, with anterior toward the top of the page.

Habitat and biogeography. Banda Neira is a small (~1 km by 3 km) island that is situated only 100 m from Gunung Api, a very active volcano with a long history of both lava flows and explosive pyroclastic flows (Figures 12-14; Badan Geologi 2014; Hidayat et al. 2020). This island has a long history of European trade, occupation and conflict dating back to the arrival of the Portuguese in 1511, driven by the high value of cultivated spices to include nutmeg and mace (Loth 1995). Today the island can be divided into a relatively flat and densely populated sector south of the airport, and a mountainous, less populated sector to the north. A considerable amount of tropical vegetation, as well as ruins associated with the earlier European occupation, remains on both inhabited and less inhabited parts of the island (Figure 15).



Figure 12. Views of Banda Neira and nearby Gunung Api. **1,** Aerial view taken during approach to the airport on Banda Neira from the North. **2,** View of Banda Neira, looking toward the east from the summit of Gunung Api. **3,** View of Gunung Api to the west of Banda Neira. Photo credits: 1, Bluemotion Banda, with permission; 2-3, Hike Indonesia, used under Creative Commons [Attribution 2.0 Generic \(CC BY 2.0\)](https://creativecommons.org/licenses/by/2.0/) license.

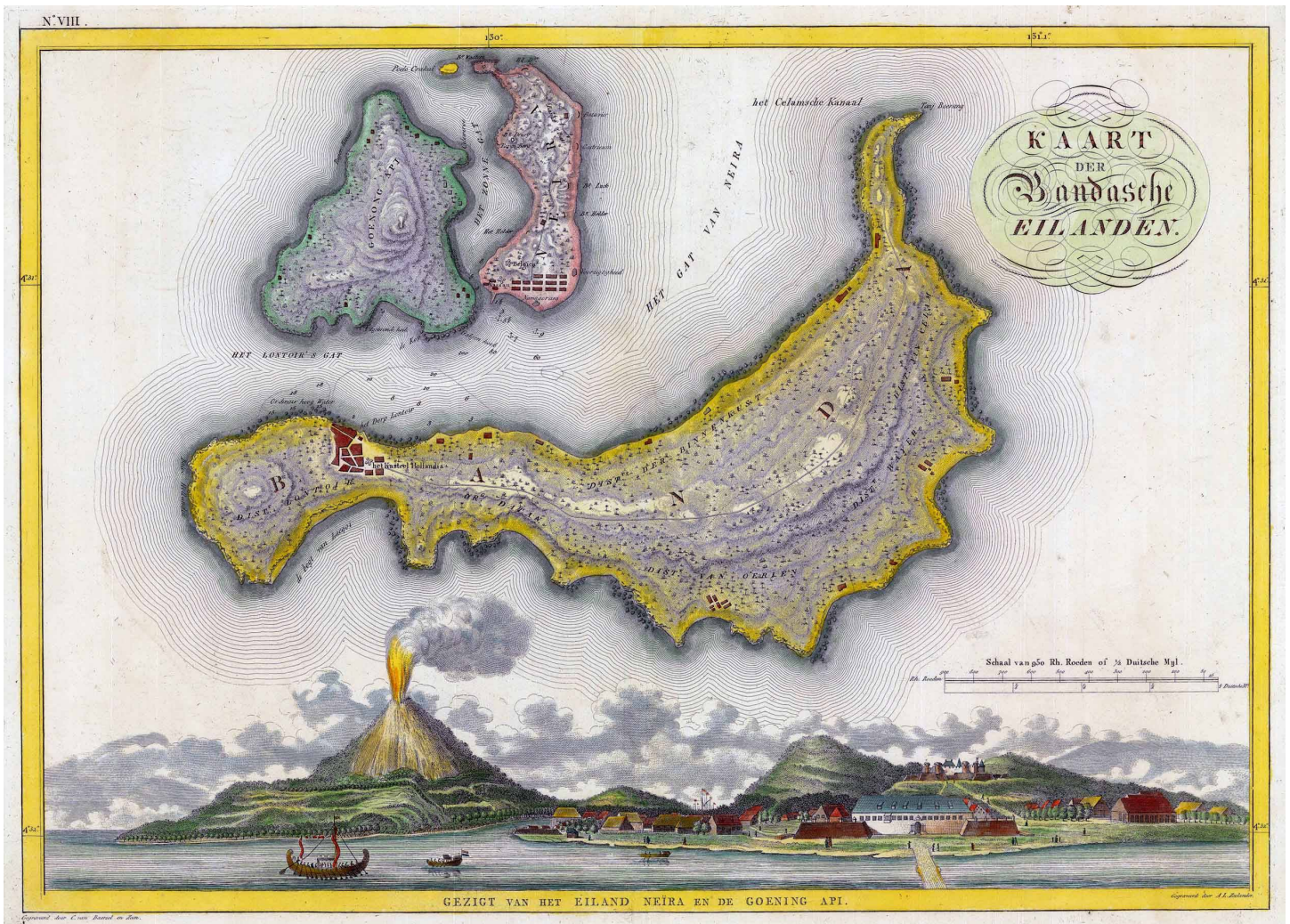


Figure 13. Antique map of the central Banda Islands by Van Baarsel (1818). The drawing at bottom (facing north) shows an eruption of Gunung Api to the west, and the settlement on Banda Neira to the east.



Figure 14. Two views of volcanic activity on Gunung Api in 1988. **1**, Explosive eruption including pyroclastic flows. **2**, Steaming lava on the northwestern slopes of Gunung Api. Banda Neira can be seen in the background. Photo credits: 1-2, Tom Casadevall, USGS.



Figure 15 (continued on next page). Ground-level views of Banda Neira. **1-2**, Foot paths through tropical vegetation. **3**, Descending street. **4-5**, Streets on the southern part of the island. **6**, Maulana Hotel, a remaining Dutch colonial building. One ♂ *Artabrus aurantipilosus* (Figure 10:1-3) was found on the balcony of this hotel, but not collected. Photo credits: 1-5, 7-9, T. Hurni-Cranston; 6, Charlie and Jennifer McNamara, used with permission.



Figure 15 (continued from previous page). Ground-level views of Banda Neira. 7-9, Ruins on the southern part of the island.

Banda Neira is quite isolated from known populations of *A. erythrocephalus*. The existence of this distinctive *Artabrus* on a small island near the eastern edge of Wallacea poses several questions. First, how and when did it get there? With a long history of human habitation and spice trade in the area, including more than 500 years of more recent European presence, there has been more than enough time for the introduction and subsequent evolution of *A. erythrocephalus* into a distinct local form. Rapid evolution would be favored by random effects or *genetic drift* associated with a small population size (Ellstrand & Elam 1993; Masel 2011; Xiong et al. 2017; Costanzi & Steifetten 2019). This could be impacted by the presence of *Artabrus* on nearby islands, particularly if there is frequent movement of the human population between these islands. The distinctive native flora of the southern Moluccas, including the Banda Islands, is quite different from the flora of Sunda (Rutgrink et al. 2018), and the more recent introduction of plants as well as human settlement have also contributed to the unique vegetation found there. It is quite possible that the success of *Artabrus* on Banda Neira is the result of synanthropy.

Is *Artabrus aurantipilosus* endangered? If this species is restricted to Banda Neira, or to both Banda Neira and the nearby Banda Api, then it is certainly as endangered as the human settlements are on those islands as a result of highly unpredictable volcanic activity. It is far safer if its range extends to other islands in the area. The general theory of island biogeography suggests that smaller islands can support less biodiversity, and that continued existence of populations that have survived is precarious (MacArthur & Wilson 1967). Although this is generally supported by the comparison of larger island biota, there are exceptions when it comes to smaller islands (Chisholm et al. 2016) that to some extent may be due to environmental diversity that is produced by human activity. Isolation is also thought to reduce species diversity on islands, but there may be compensation for the physical isolation of Banda Neira in the level of human traffic to and from this island (lack of *economic isolation*; Helmus et al. 2014). We still know little about the behaviour of *Artabrus* species, and the niche dimensions that support their success in the places where they are found. Is *A. aurantipilosus* a facultative or an obligatory synanthrope on Banda Neira?

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Appendix 1: Early descriptions of *Artabrus erythrocephalus* (C. L. Koch 1846)

1. Original description by C. L. Koch (1846), in German

102-103

Plexippus erythrocephalus.

Tab. CCCXLIX. Fig. 1164.

Vorderleib, Taster und Beine ockergelb, die Kopfplatte braunroth, die Hügelchen über den Seitenaugen schwarz; Hinterleib bräunlichgelb mit schwarzen Seiten; Fresszangen kastanienbraun.

Länge fast 4'''.

Klug Königl. Sammlung in Berlin.

Ich habe nur ein einziges, und zwar nur ein männliches Exemplar vor mir. Die Haut des Vor- und Hinterleibes, der Taster und Beine ist nackt, keine Spur der der Gattung eigenthümlichen Schuppenhäärchen ist zu sehen, nur unter der vordem Augenreihe zeigen sich liegende, licht angebrachte Härchen. Die Formen bieten nichts Besonderes dar, sie nähern sich sehr der von *Plex. lacertosus*, auch die Beine stehen in demselben Verhältniss, die Taster aber sind wie bei *Pl. mutillarius* gestaltet, aber licht behaart. Die Augen haben regelmässige Grösse und Stellung. Die Genitalien sind vollständig ausgebildet. Die Querrunzeln der grossen Fresszangen zeigen sich sehr fein, daher sind letztere viel glänzender als gewöhnlich.

Der Vorderleib ist ockergelb, die Stirnplatte und das Gesicht braunroth, die Hügel über den Scheitelaugen und die Vorderrandskanten sind schwarz, die Härchen auf letzteren gelblich, und Spuren eines die Augen umgebenden Schuppenringchens feuerroth. Die zwei vordem Glieder der Taster sind hellockergelb, das dritte geht ins Röthliche, die folgenden ins Braunrothe über; die Genitalien sind schwarz. Der Hinterleib ist dunkler ockergelb, an den Seiten der Länge nach braunschwarz. Alle Beine haben die ockergelbe Farbe des Thorax, ohne Zeichnung, nur das Krallenpfötchen ist schwarz. Die Fresszangen sind braunroth, an der Seite nach innen zu dunkler, glänzend, etwas grünlich metallisch spielend; die Fangkrallen sind roth.

Vaterland: Java.



2. New Translation of C. L. Koch (1846), in English

Plexippus erythrocephalus.

Tab. CCCCXLIX. Fig. 1164.

Prosoma, pedipalps and legs ocher yellow, the head plate red-brown, the (articular prominence) over the side eyes black; abdomen brownish yellow with black sides; chelicerae maroon.

Length nearly 11 mm.

Klug Königl. collection in Berlin.

I have only one, and indeed only one male specimen in front of me. The cuticle of the prosoma and opisthosoma, the pedipalps and legs is naked, no trace of the setae characteristic of the genus [*Plexippus*] is to be seen, only scattered light setae under the anterior eye row. The shape is nothing special, close to that of *Plexippus lacertosus*, the legs are of the same shape, the pedipalps however situated like those of *Plexippus mutillarius*, but lightly haired. The eyes have the usual size and position. The genitals are fully developed. Transverse lines of the large chelicerae are very fine and therefore these are much more shiny than usual.

The prosoma is ocher-yellow, the eye region and face red-brown, the bumps above the (apex eyes) and the anterior border are black, the setae of the latter yellowish, and there areas around the eyes are fire-red. The first two anterior [distal] segments of the pedipalps are chrome yellow, the third [more distal] reddish, and the distal segment red-brown above; the genitals [tegulum and associated parts] are black. The abdomen is darker ocher-yellow, brown-black on the sides along the length. All legs have the ocher-yellow color of the thorax [prosoma behind eye region], without characters, only the clawed feet are black. The chelicerae are red-brown, darker on the inner [medial] sides, shiny, somewhat greenish metallic; the fang is red.

Locality: Java.

3. Latin (Neolatin) description of ♂ by Simon (1903)

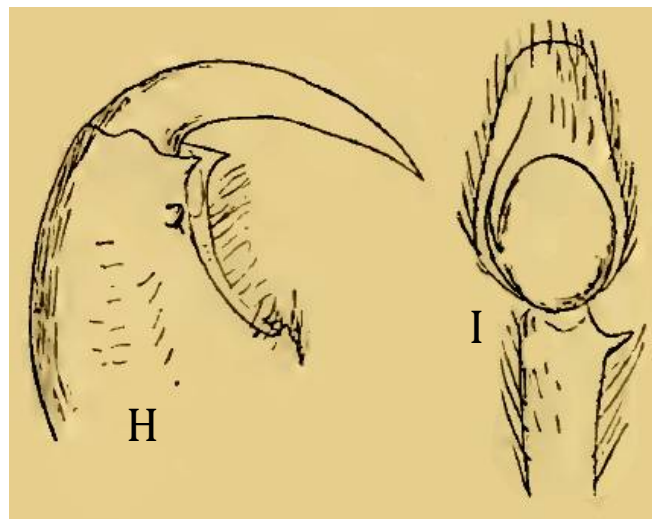
Artabrus E. Simon, *Ann. Soc. ent. Fr.*, 1902, p. 404. — *Plexippus* C. Koch, *Arachn.*, XIII, 1846 (ad part. *P. erythrocephalus*).

A Palpelio differt metatarsis 2ⁱ paris aculeis lateralibus carentibus, abdomine angustiore et longiore, teretiusculo, chelis maris crassissimis et divaricatis, subtus prope marginem dentatis, marginibus sulci longis valde excavatis sed ad angulum prominulis, chelis feminae dente inferiore mediocri, pedibus 3ⁱ paris haud vel vix longioribus quam pedibus 4ⁱ paris, metatarsorum posticorum verticillo basali ex aculeis quatuor. Cephalothorax oculique fere *Palpelii* sed tuberibus ocularibus majoribus.

Typus: *A. erythrocephalus* C. Koch.

Ar. geogr.: Malaisia.

[Figures 846 (H) and mirror image of 847 (I):]



Erratum

This correction is a supplement to, but not part of the original paper (Peckhamia 222.1)

The last paragraph on page 7 reads: Scale and setation patterns of the female *A. aurantipilosus* resemble those of the related *A. erythrocephalus*, but the female *A. aurantipilosus* is often green or light green in colour. This should read: Scale and setation patterns of the female *A. aurantipilosus* resemble those of the related *A. erythrocephalus*, but the female *A. erythrocephalus* is often green or light green in colour.