

## Notes on *Necrosia punctata* (Gray, 1835) and *Necrosia bistriolata* (Redtenbacher, 1908)

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### Abstract

*Necrosia punctata* (Gray, 1835) and *Necrosia bistriolata* (Redtenbacher, 1908) are two species that were synonymised by Günther in 1935 but removed from synonymy by Brock in 1996. The species are compared and illustrated. The type series of *bistriolata* contains at least two species which could explain why the synonym was first proposed. A lectotype is selected for *Aruanoidea bistriolata* Redtenbacher, 1908. The status of *N. punctata* in Borneo is reviewed.

### Key words

Phasmida, *Necrosia punctata*, *Necrosia bistriolata*, *Aruanoidea bistriolata*, Lectotype, Borneo, Sumatra, Java, Peninsular Malaysia.

### Introduction

*Necrosia punctata* (Gray, 1835) was described from a single male. The holotype in the Natural History Museum, London (BMNH) is in poor condition, it lacks mid legs, hind and the abdomen. From what remains it is not possible to identify the species with certainty: there are too many similar species.

The species was described from the East Indies (Indiâ Orientali), a rather vague locality. The British presence in Malaysia and Singapore in the 1830s means there is a good possibility that this is the source of Gray's specimen; particularly as *Necrosia annulipes* (Gray, 1835), which was also described from the East Indies (albeit from a different private collection), is a very distinctive species found in Mainland Malaysia. Sumatra, Cambodia and Thailand, the other subsequently recorded localities for *annulipes*, are unlikely sources for specimens imported to Britain in the 1830s.

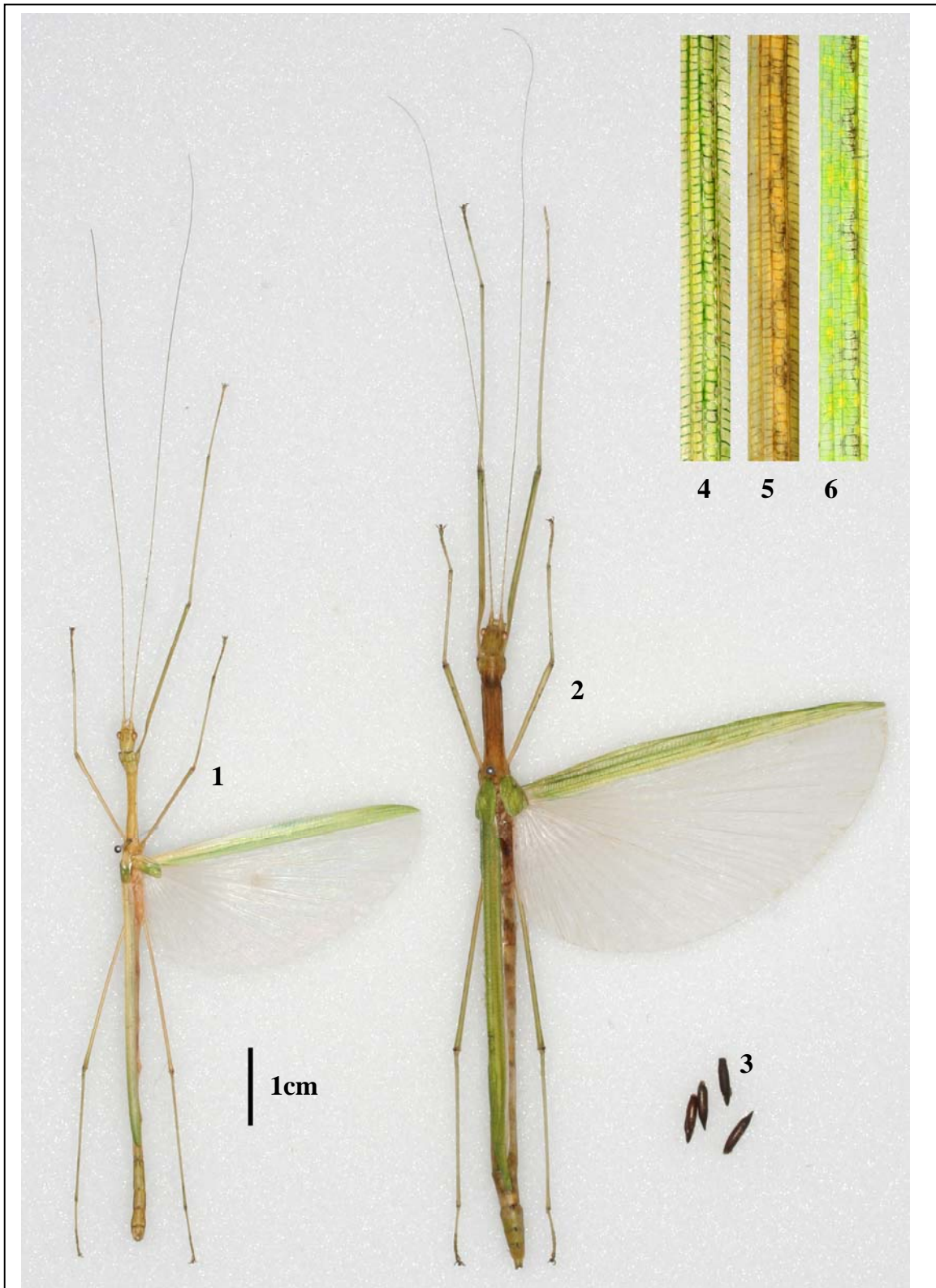
Brock (1999) gives a key to the species of *Necrosia* in Mainland Malaysia and Singapore and a brief description of *N. punctata*. Since Malaysia is a very likely source for Gray's specimen, it is reasonable to assume that Brock has correctly identified the species.

### Complications with *Necrosia punctata*

The coloration of *punctata* is quite variable. Although often fairly plain green, mottled specimens are quite common and Brock states that red, yellow and brown specimens occur. There are a considerable number of mottled species of *Necrosia* in South East Asia. Illustrations of *punctata* in Brock's (1999) and in Seow-Choen's (2000) books are not sufficiently detailed to be of use for identifying the species outside Peninsular Malaysian and Singapore.

One of the complications is that historically, mottled species were often assumed to be *punctata*; for example, de Haan (1842) recorded three variations of *punctata* based on coloration, two of these were later named as distinct species: *N. haanii* Kirby, 1904 from Borneo, and *N. horsfieldii* from Java. Another mottled species, *N. westwoodii* Kirby, 1904 from Singapore, was also originally thought to be *punctata* by Westwood (1859: 142).

In his 1935 paper on Bornean species, Günther synonymised *Aruanoidea bistriolata* Redtenbacher, 1908 (described from Java and Sumatra) with *Necrosia punctata* (Gray). In 1996 Brock said that Günther was in error and reinstated *Necrosia bistriolata* (Redtenbacher, 1908) as a valid species. Having recently examined three of the type specimens of *bistriolata*, I found both authors were wrong – or both correct depending on one's point of view! In fact, of the three I have examined, one is very similar to *punctata* and the other two are clearly a different species.



**Figures 1-6.** *Necroschia punctata* (Gray, 1835).

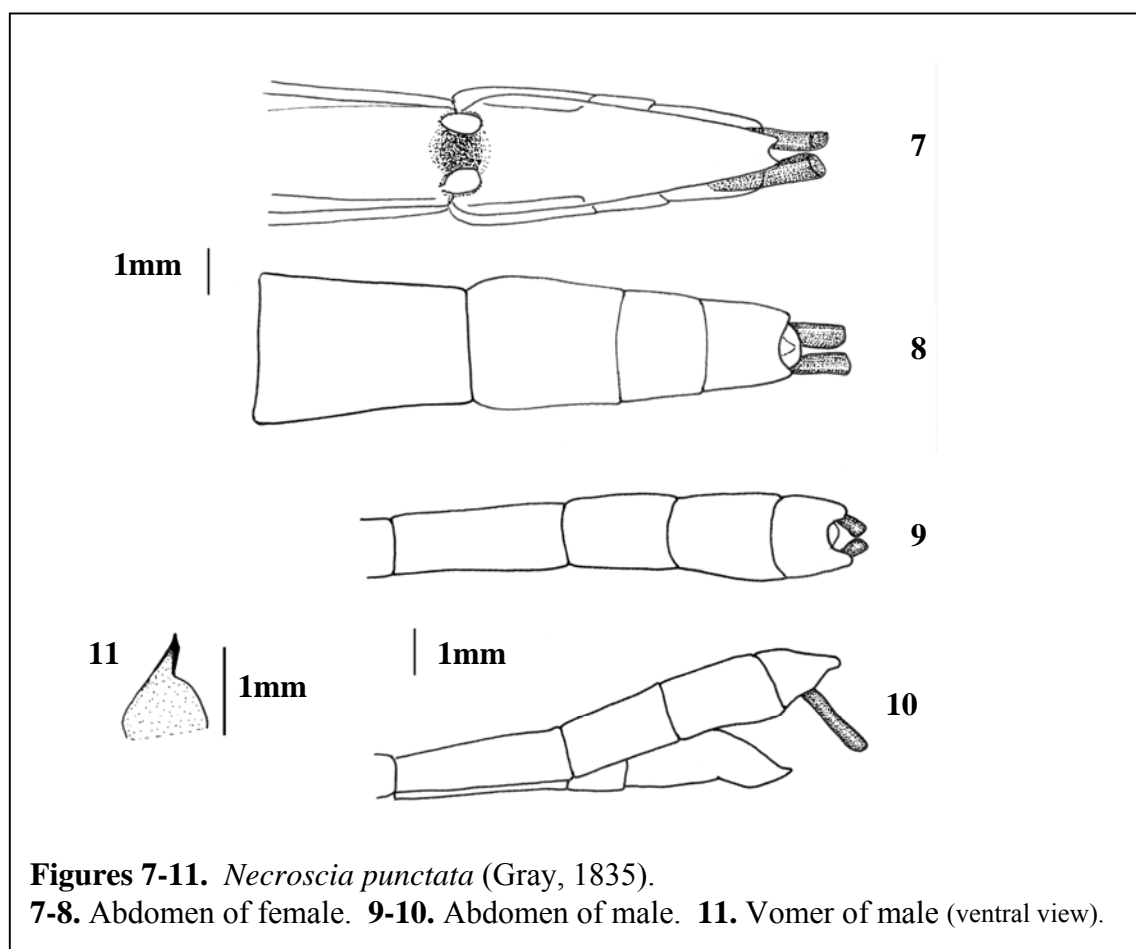
**1.** Male. **2.** Female. **3.** Eggs.

**4-6.** Portions of costal region of the hind wing of three different specimens (not to same scale as figs. 1-3).

### The status of *Necrosia punctata* as a Bornean species

My main interest is in Bornean species and *punctata* is one of several mottled species to be recorded from the island. However, although I have collected *punctata* in both Singapore and Peninsular Malaysia, I have yet to see a specimen from Borneo.

Redtenbacher (1908: 528) recorded a specimen of *punctata* from Borneo in Berlin Museum (ZMHB); this specimen was also examined by Günther (1935: 14). I have examined this specimen and found it is clearly not *punctata*. Redtenbacher's specimen is the same as a specimen in my own collection that I had, until very recently, treated as *Necrosia haanii*. However, when I put them under the microscope to do drawings of my specimens of *haanii*, intending to include them here, I was surprised to find that they appear to be three different, but superficially similar, species. Which of the three is the true *haanii* I will only be able to determine by re-examining the type material. Fortunately, the three species are from very different localities and I have both sexes from each locality.



Günther's (1935) record of *punctata* in Borneo included Redtenbacher's specimen (above) and he considered the three type specimens of *bistriolata* in Berlin Museum to be the same species. This raises serious doubt about the identity of the other Bornean specimens that Günther identified as *punctata*.

There are three other records of *punctata* from Borneo. Westwood (1859) recorded *punctata* from Sarawak but, as the female he described at the same time was later found to be a different species (*N. westwoodii*), this is an unreliable record. Westwood did not say which museum contains the Sarawak material but I recently visited Oxford (OXUM) and found two specimens from Sarawak labelled *punctata*, the female is clearly not *punctata*, the male lacks the abdomen so cannot be identified with certainty but is patterned very similarly to one of

my *haanii*-like specimens. *Aruanoidea tenera* Redtenbacher, 1908 was synonymised with *punctata* by Brock (1996); Hausleithner (1991) recorded *tenera* from Kinabalu Park HQ, Sabah but this is suspect because *tenera* had not been recorded from Borneo previously and one of my *N. haanii*-like species occurs in the Park HQ area. *Necrosia chloe* Günther, 1935 was described from Borneo and Brock (1996) synonymised it with *punctata*; however, the synonym is based on material in Leiden Museum not on Günther's type material; Günther's illustration of the abdomen of this species is too small for identification.

***Necrosia punctata* (Gray, 1835)** (figs 1-13, & 25)

*Platycrana punctata* Gray, 1835: 37. Holotype ♂ (BMNH) East Indies.

*Aruanoidea tenera* Redtenbacher, 1908: 528. Synonymised by Brock, 1996: 90.

*Necrosia chloë* Günther, 1935: 20, fig. 5a-b (♂). Synonymised by Brock, 1996: 90.

*Aruanoidea adspersa* Redtenbacher, 1908 3: 528. Synonymised by Brock, 1999: 190.

[*Aruanoidea bistriolata* Redtenbacher, 1908: 528. Synonymised by Günther, 1935a: 13 - in error].

Material examined:

♂ Holotype (BMNH) East Indies.

♀ (PEB-2774) WEST MALAYSIA, Cameron Highlands. 1997. [Bought from dealer, price £2.00].

♂ (PEB-2379) WEST MALAYSIA, Pahang, Tasik Chini. P.E. Bragg, 16-10-1994.

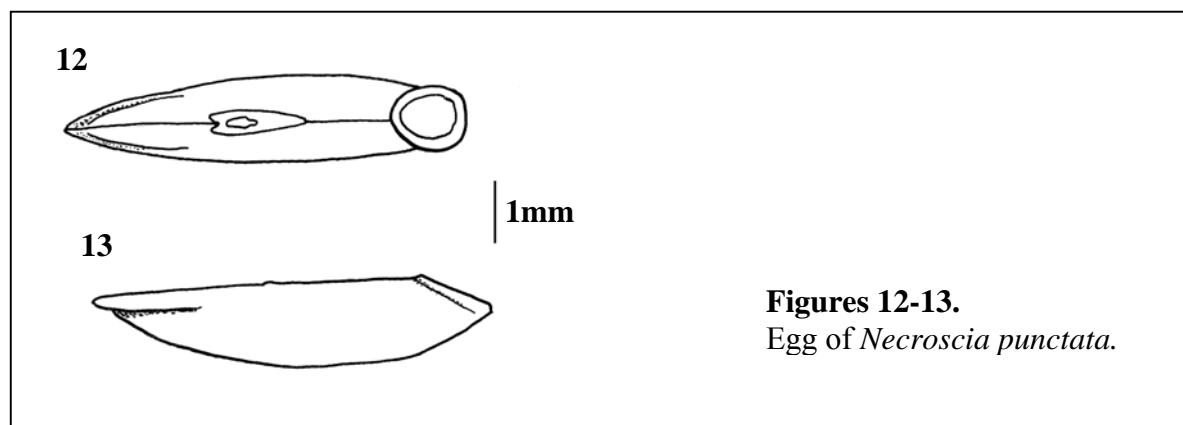
♂ (PEB-1507) SINGAPORE, Nee Soon, Swamp Forest. P.E. Bragg, 25-07-1992.

♀ & eggs (PEB-2398), ♀ (PEB-2397), ♂ (PEB-2387) SINGAPORE, Upper Pierce Reservoir. P.E. Bragg, 18.x.1994.

2♀♀ with eggs removed from the body (PEB-3092, PEB-3093) SINGAPORE, Upper Pierce Reservoir. P.E. Bragg, 28.vii.2001.

Female: Body length 74-91mm. The wings reach half way along 7<sup>th</sup> tergite. The female has a very distinct praepercular organ which is composed of a deep hollow and two large oval swellings. The hollow is formed by a depression in the 7<sup>th</sup> sternite and an indentation of anterior margin of the operculum. The oval swellings lie almost parallel to each other, longitudinal to the body (fig. 7). The apices of the cerci are very angular, almost rectangular.

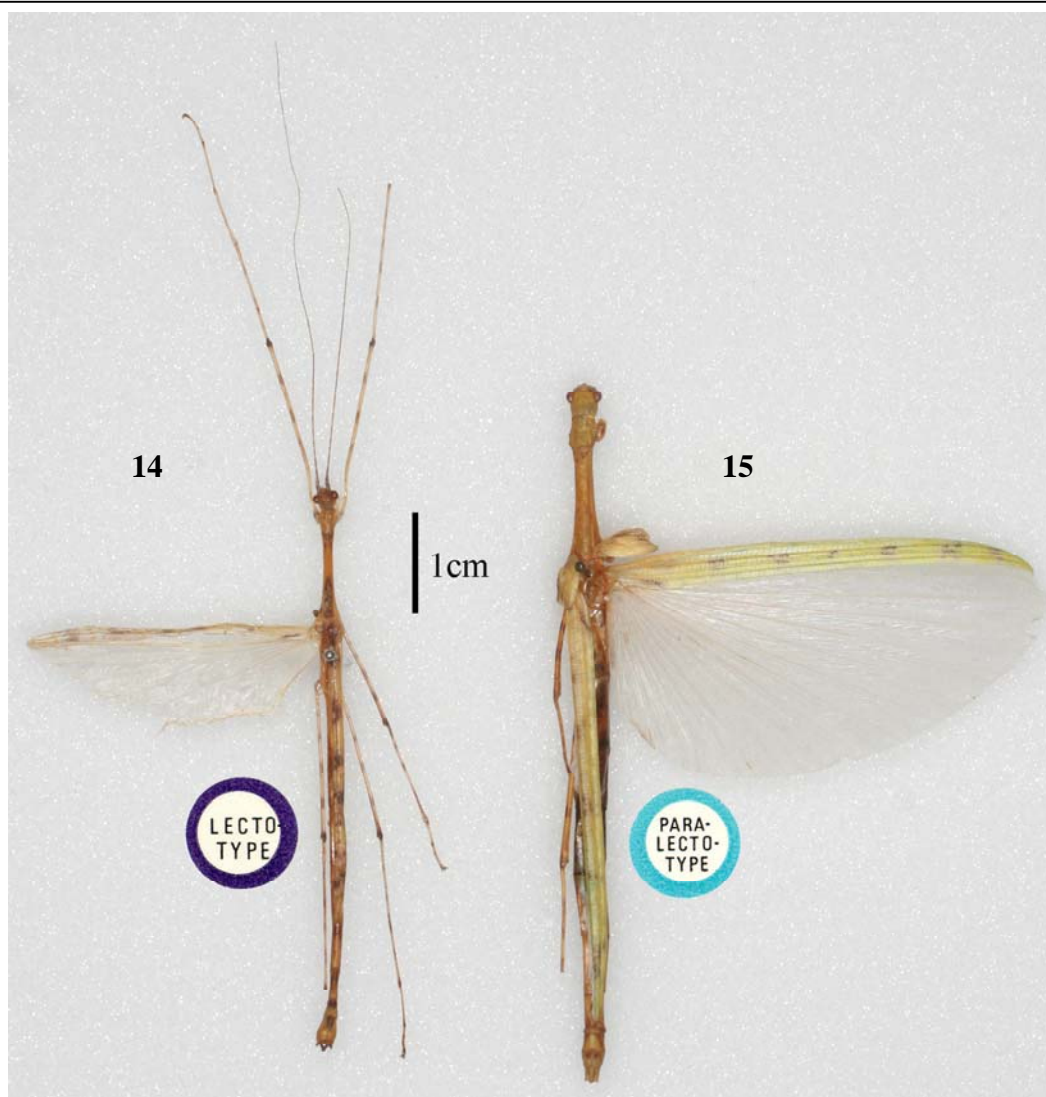
Male: Body length 64-67mm. Wings reach to half way along 6<sup>th</sup> tergite. Anal segment (excluding processes) about half as long as 9<sup>th</sup> tergite; posterior margin with a concave curve, with a rounded extension on the corners. The 11<sup>th</sup> segment is clearly visible as a rounded lobe (fig. 9). Cerci clubbed (broadest at apices). Vomer unispinose (fig. 11).



**Figures 12-13.**  
Egg of *Necrosia punctata*.

***Necroschia bistriolata* (Redtenbacher, 1908)** (figs 14-24)

*Aruanoidea bistriolata* Redtenbacher, 1908: 528, plate 27, fig 11 (♂ abdomen). **Lectotype** ♂ from Sumatra (ZMHB – Berlin) [**here selected** – data below]. Paralectotypes: ♀ from Sumatra, ♀ from Java (ZMHB); 2♀♀ from Sumatra, 5♂♂ & 3♀♀ from Java (NHMW – Wien); ♂ & ♀ from Java (ISBN - Brussels); several ♂♂ & ♀♀ from Sumatra & Engano Island (MCSN – Genoa); 2♂♂ & 3♀♀ from Java (SMNS – Stuttgart). The paralectotypes represent at least two species. For details of the type data see Brock (1998: 18), except for types in Berlin which are listed below (and seem to have been overlooked by Brock).



**Figures 14-15.** *Aruanoidea bistriolata* (Redtenbacher, 1908), specimens from Sumatra.  
**14.** Male lectotype. **15.** Female paralectotype.

**Material examined:**

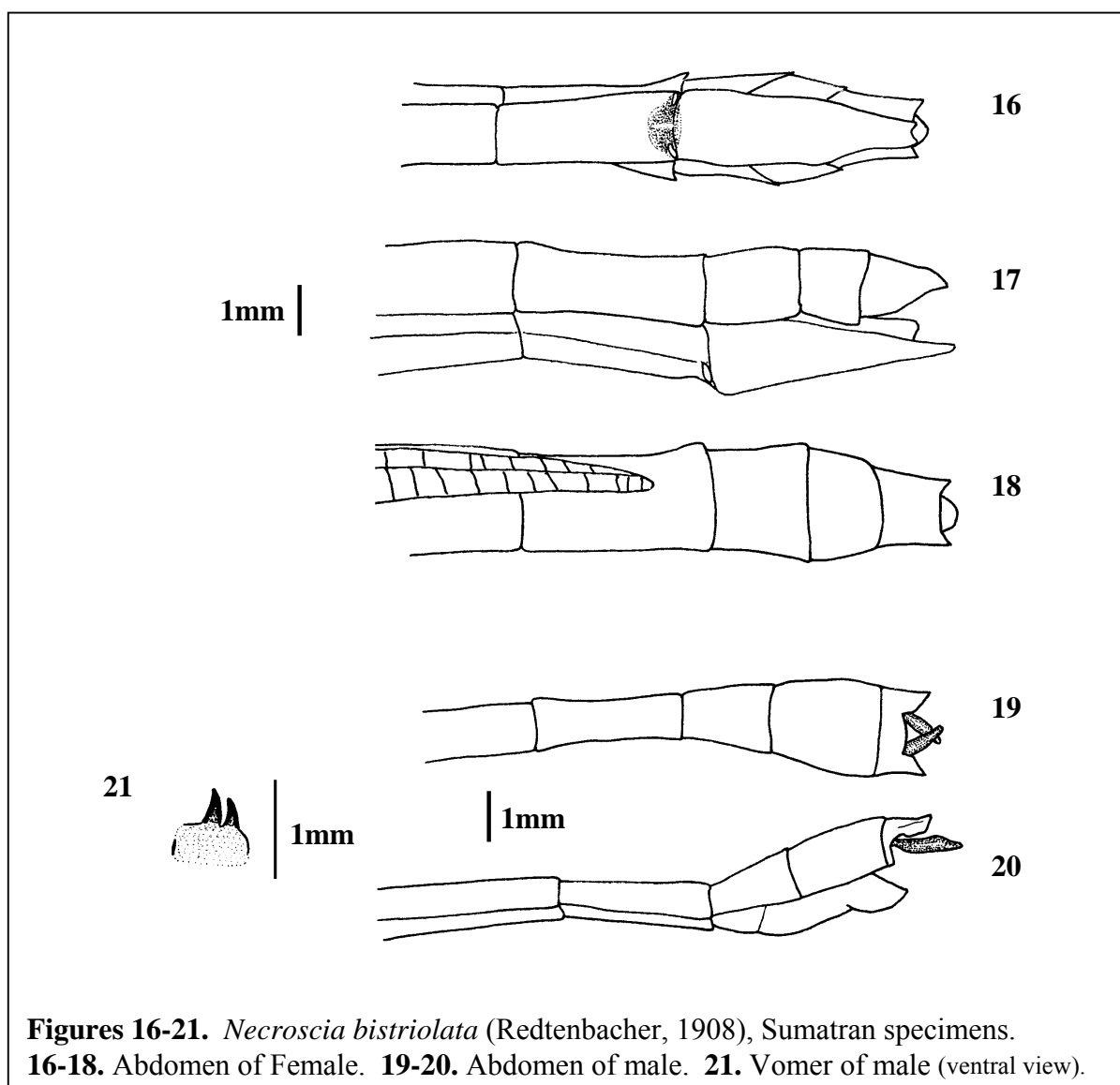
♂ Lectotype (ZMHB) SUMATRA, Deli. Hartert. Fruhstorfer.; *Aruanoidea bistriolata* Br. Brunner det. [specimen lacks left hind leg, and front right and mid left tarsi].

♀ Paralectotype (ZMHB) OST-SUMATRA, Glen Bervi in Beneden Langkat. Ernst von Beneden.; *Aruanoidea bistriolata* Br. Brunner det. [specimen lacks all right legs, left fore leg, all tarsi, antennae and cerci, and hind tibia is broken].

♀ (OXUM) SUM.; E. coll.(1830-73) W.W. Saunders. Purchased and pres. '73 by Mrs. F.W. Hope.

♀ Paralectotype (ZMHB) JAVA Occident., Sukabumi 2000, 1893 H. Fruhstorfer.; *Aruanoidea bistriolata* Br. Brunner det. [specimen lacks mid & fore legs].

I have only examined the three types in the Berlin collection; I do not know to which species the other types belong, but I suspect the Javan and Sumatran specimens will be different species. The OXUM female had been misidentified as *punctata* but is the same species as the paralectotype from Sumatra.

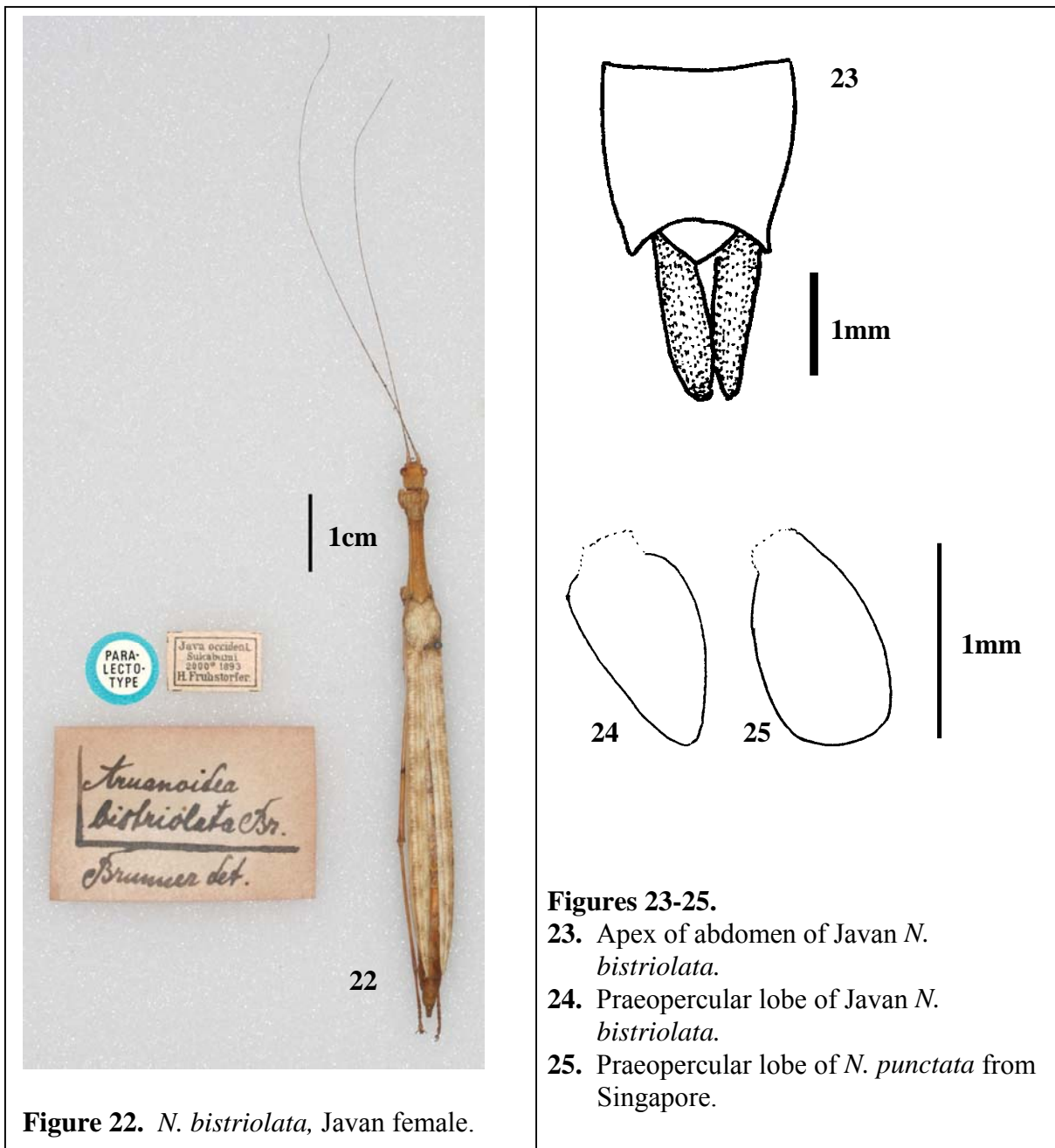


**Figures 16-21.** *Necroschia bistriolata* (Redtenbacher, 1908), Sumatran specimens. **16-18.** Abdomen of Female. **19-20.** Abdomen of male. **21.** Vomer of male (ventral view).

The Sumatran female has a praeopercular organ composed of a deep hollow divided by a narrow, longitudinal ridge, the anterior margin of the operculum is more or less convex and only very slightly incised to form part of the hollow; on each lateral margin of the hollow there is a small oval swelling, these lie transverse to the body (fig. 16). The wings reach slightly more than half way along the 7<sup>th</sup> tergite. The cerci are missing from this specimen.

The male was originally pinned with legs pointing in all directions, which is probably why it had been damaged and repaired in the past. It was in need of further repair so I took the opportunity to reset the specimen with the legs straightened to reduce the risk of future damage, and opened a wing. Male body length 55mm; full measurements in table 1: lengths of the metanotum and median segment are approximate as they are partly obscured by the unopened wing. The wings reach to the end of the 5<sup>th</sup> tergite. Anal segment very short, about one quarter as long as 9<sup>th</sup> tergite (excluding processes); posterior margin almost straight, with a very distinctive long point on the corners. Cerci circular in cross-section, of almost uniform diameter, apices rounded. Vomer bispinose (fig. 21).

	♂	♀		♂	♀
Total length	55	68	Fore femur	17.1	-
Antennae	> 45	-	Fore tibia	16.0	-
Head	2.6	3.3	Fore tarsus	8.2	-
Pronotum	2.5	3.5	Mid femur	10.9	13.0
Mesonotum	8.6	10.4	Mid tibia	10.0	11.2
Metanotum	<i>circa</i> 4.1	6.2	Mid tarsus	5.2	-
Median segment	<i>circa</i> 3.3	5.2	Hind femur	15.2	19.1
Fore wing	3.3	6.1	Hind tibia	14.6	-
Hind wing	28	44	Hind tarsus	7.5	-



**Figure 22.** *N. bistriolata*, Javan female.

**Figures 23-25.**  
 23. Apex of abdomen of Javan *N. bistriolata*.  
 24. Praeopercular lobe of Javan *N. bistriolata*.  
 25. Praeopercular lobe of *N. punctata* from Singapore.

The female from Java (figs. 22-24) is very similar to *Necroschia punctata* (Gray), but there are quite a number of differences. The differences may be due to geographical variation; comparison of the males would be necessary to decide if they are distinct species. The coloration is the same as the Sumatran *bistriolata* specimens, this is not inconsistent with the variable coloration of *punctata*. The praeopercular organ is almost identical to *punctata* but differs by the oval lobes being more pointed (figs. 23-24) and by the presence of a slightly raised densely setose area (sensory?) in the middle of the hollow; the lamina supraanalis is shorter and triangular (fig. 25) rather than rounded; the wings are longer, reaching to the end of the 8<sup>th</sup> tergite (compared to only half way along 7<sup>th</sup>); the body is relatively broad; the apices of the cerci are not as angular as my *punctata* specimens. The body length is 70mm.

### Acknowledgements

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