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Papakula and *Hesydrimorpha*: how two spider genera were described from the same species collected from the same locality (Araneae: Pisauridae)

PETER JÄGER
Senckenberg Research Institute, Arachnology, Senckenberganlage 25, 60325 Frankfurt am Main, Germany.
E-mail: peter.jaeger@senckenberg.de

While identifying Pisauridae from Laos and checking various genera of this family from Southeast Asia, two monotypic genera were striking: *Hesydrimorpha* Strand 1911 and *Papakula* Strand 1911. Both were described by Strand (1911) from Eastern Indonesia and the type material was deposited in the Senckenberg Museum (SMF). They were recorded from the same island (Kobroor) and the same locality (Papakoela, Papakula). The labels and original descriptions state they were collected by H. Merton. Strand (1911) also mentioned in the publication that the specimens were collected in a house, most likely the same house, as Merton collected both series on the same day.

When examining the female holotype of *Hesydrimorpha gracilipes* Strand 1911, the epigyne was already dissected but still connected with the opisthosoma. Many legs are missing or loose and the specimen is much faded, which is probably why Strand wrote that he could not provide a complete description for this species. He did not illustrate the epigyne, but provided a description of it along with somatic characters (Strand 1911).

In contrast, copulatory organs of the male and female syntypes of *Papakula niveopunctata* Strand 1911, which are both still in a good state of preservation, were illustrated (epigyne in ventral view, palp in ventral and dorsal view), but there was no written description of the male palp and the epigyne was only described in one short paragraph (basically, Strand wrote [translated from German]: “epigyne brown, with dark longitudinal bands”).

After examining and drawing all three specimens available it was clear that all three were conspecific and, therefore, both type species and, thus, both genera were synonyms. In the present paper, types of both species are illustrated, and relationships of the genus *Papakula* are discussed.

***Papakula* Strand 1911**

Papakula Strand 1911: 166 (description of genus)
Hesydrimorpha Strand 1911: 168 (description of genus) **syn. nov.**

Papakula was chosen as valid name as it was described from a male and a female and both syntypes are in good condition. Therefore, they contribute better to stability as recommended in the International Code of Zoological Nomenclature (ICZN 1999: article 24.2, recommendation 24A). As there is only one *Papakula* species known, no separate generic diagnosis or description is provided additionally to those of the type species.

***Papakula niveopunctata* Strand 1911**

Figures 1–14

Papakula niveopunctata Strand 1911: 167, pl. 5, fig. 59 (Description of male and female; 1 male, 1 female synytpes: Kobrooor, Papakuela, H. Merton leg. 30.IV.1908, SMF 4873, examined).
Hesydrimorpha gracilipes Strand 1911: 168 (Description of female; female holotype: Aroe, Papakuela, Kobrooor, H. Merton leg. 30.IV.1908, SMF 4862, examined) **syn. nov.**

Diagnosis. Small Pisauridae, 3.4–4.7 mm body length. Posterior eye row strongly recurved, PME widely spaced, AME much larger than ALE (Fig. 9). Males with distal apophysis and membranous conductor retrolaterad (Fig. 1). RTA with distinct bend distally (Fig. 1) and pointed tip ventrad (Fig. 2). Females with deep atrium, longitudinal median ridge and

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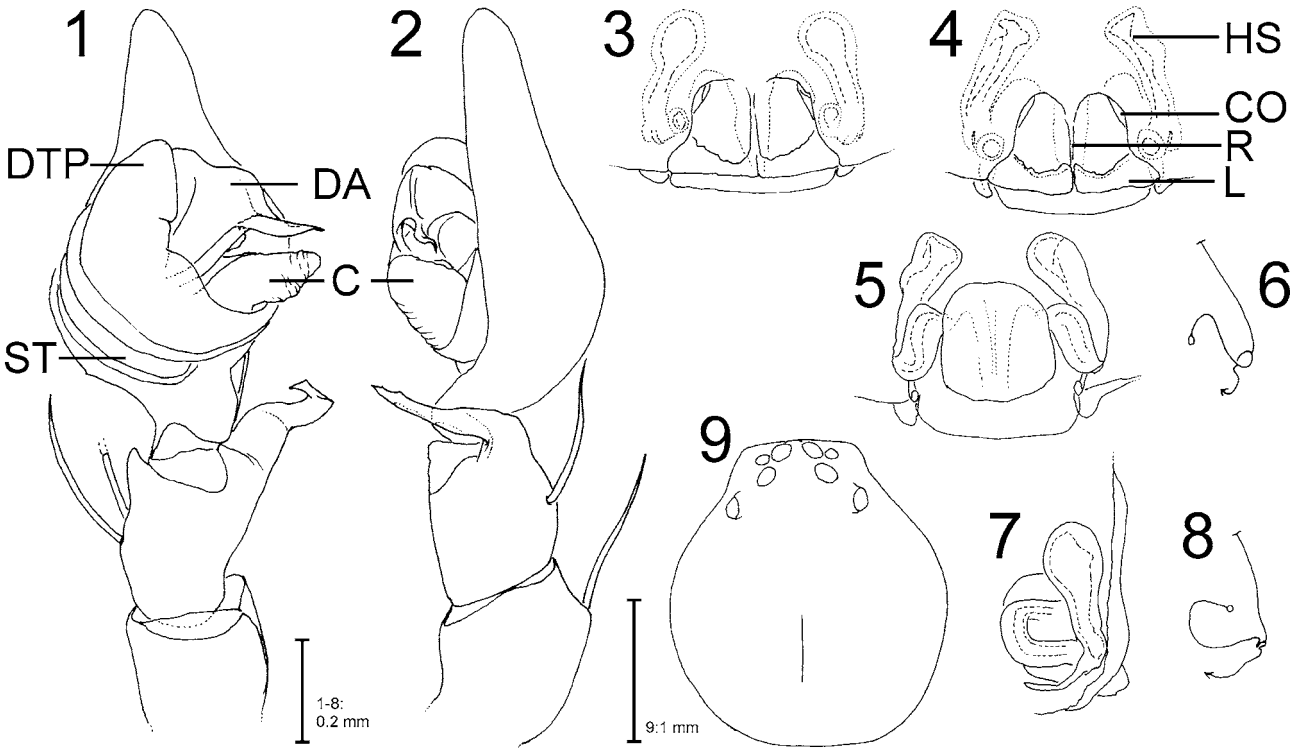
broad posterior lip, the latter with irregular anterior margin (Figs 3–4). Internal duct system with atrium wall with fine reticulation (not shown in Fig. 5). Head of spermathecae extending anteriorly distinctly beyond atrium (Figs 3–5, 7). More differential characters are discussed in the paragraph "Relationships".



FIGURES 1–9. *Papakula niveopunctata* Strand 1911 from Indonesia, Maluku Province, Kobroor (1–3 Syntype male and female, SMF 4873; 4–9 Holotype female of *Hesydrimorpha gracilipes* Strand 1911, SMF 4862). 1–2 Palp (1 ventral, 2 retrolateral; C—conductor, DA—distal apophysis, DTP—distal tegular projection, ST—subtegulum). 3–4 Epigyne, ventral (CO—copulatory opening, HS—head of spermatheca, L—posterior lip of median field/septum, R—median ridge of median field/septum). 5, 7 Vulva (5 dorsal, 7 lateral). 6, 8 Schematic course of internal duct system (6 dorsal, 8 lateral; circle—copulatory orifice, T—head of spermatheca, arrow—fertilisation duct in direction of uterus externus). 9 Dorsal shield of prosoma, dorsal.

Description. Male (holotype): Prosoma length 1.8, width 1.5, anterior width 0.7; opisthosoma length 1.6, width 1.1. Chelicerae with 3 anterior and 3 and 4 posterior teeth respectively. Male palp with embolus arising in central cavity of tegulum and hidden behind conductor in ventral view (Figs 1–2), cavity open to retrolateral side. Judging from the visible part, embolus most likely without membrane (hidden embolus was not examined due to fragile condition of unique male syntype).

Female: Prosoma length 2.1, width 1.8–1.9, anterior width 0.9–1.0; opisthosoma length 2.3–2.6, width 1.8–1.9. Chelicerae with 3 anterior and 3 posterior teeth. Median field trapezoid, wider posteriorly (Figs 3–4). Neither slit sense sensilla nor an epigynal field could be recognised. The latter may be faded judging from the overall pale appearance of the 100-year-old specimens.

For a detailed description see Strand (1911).

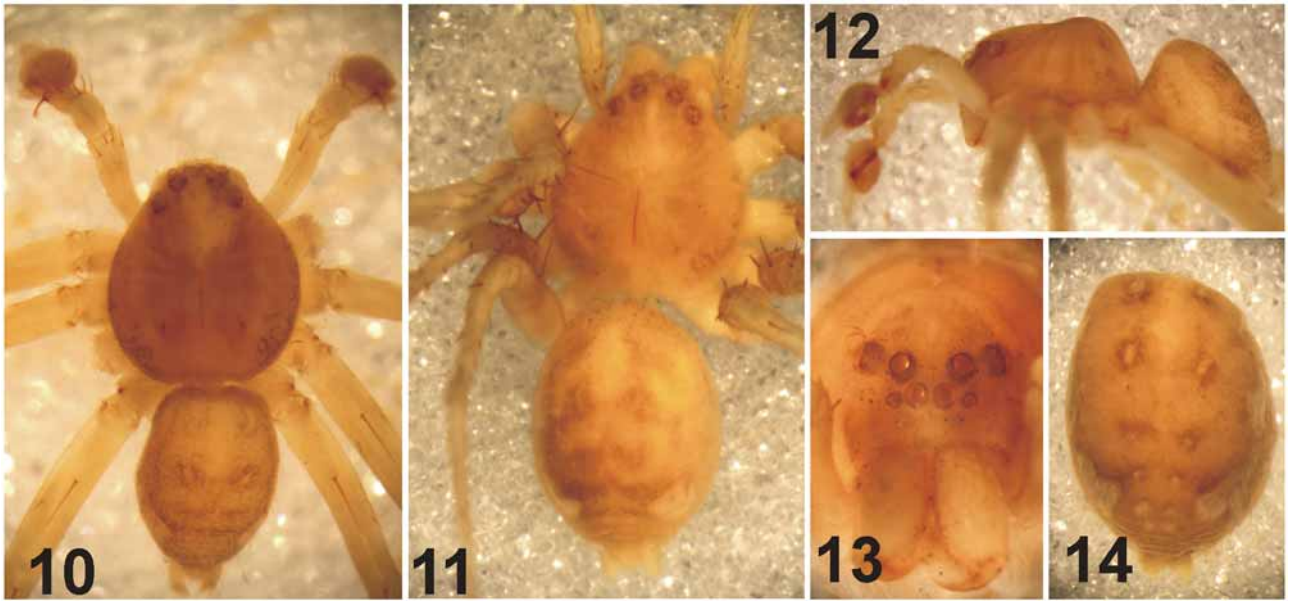
Distribution. Known only from the type locality. Pulau Kobroor is one of the Aru Islands in the Maluku Province of Eastern Indonesia, not New Guinea as indicated in Platnick (2010).

Relationships. Strand (1911) compared *Papakula* with *Dyrines* Simon 1903 and *Hesydrimorpha* with *Hesydrus* Simon 1898 respectively. Both genera belong to the family Trechaleidae. Except for some superficial similarity of the eye arrangement, prosoma shape and some aspects of the female copulatory organ, there is no evidence that *Papakula* belongs to Trechaleidae (Carico 2005, Carico & Silva 2008, Jocqué & Dippenaar-Schoeman 2006). Since *Papakula* has a distal tegular projection on the male palpus, which is a synapomorphy for Pisauridae (Santos 2007), it is very clear that it is not related to Trechaleidae (Cruz, in litt.).

Neither of the two genera were included in analyses performed by Sierwald (1989, 1990, 1997) or Santos (2007). There is a striking similarity with the general bauplan of the female copulatory organs of *Eurychoera* Thorell 1897: both genera possess an atrium, a longitudinal ridge (in *E. quadrimaculata* Thorell 1897 only in the anterior half; Jäger 2007), and copulatory openings situated anteriolaterally within the atrium (Fig. 4). The conformation of the male palp resembles that of *Architis gracilis* Santos 2008 (in Santos & Nogueira 2008) and *Tolma toreuta* Jocqué 1994 in having a similar shape and position of the distal tegular projection, but can be distinguished from both species by the embolus hidden behind the conductor and the distinct distal apophysis in *Papakula*.

The shape of the prosoma in lateral view appears to be characteristic and is similar to *Hala* Jocqué 1994 and *Tolma* Jocqué 1994 (see figs 13, 25 in Jocqué 1994). This is not considered to be evidence for a closer relationship, as this character has been recognised as dependent on size: the smaller the spider the more compact the prosoma (Jäger 2001: fig. 7 for *Pseudopoda* spp.; Jäger & Kunz 2005: fig. 9 for *Pleorotus braueri*).

Beyond all these similarities, no true phylogenetic relationships can be recognised. Therefore the systematic position of *Papakula* remains unclear.



FIGURES 10–14. *Papakula niveopunctata* Strand 1911 from Indonesia, Moluccas, Kobroor (10–13 Syntype male and female, SMF 4873; 14 Holotype female of *Hesydrimorpha gracilipes*, SMF 4862). 10 Male, dorsal. 11 Female, dorsal. 12 Male, lateral. 13 Female, frontal. 14 Opisthosoma, dorsal.

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