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## *Brignoliella ratnapura*, n. sp., and an enigmatic new structure in spiders (Araneae, Tetrablemmidae)

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## Introduction

Since my early survey of the family (Shear, 1978), numerous new species of tetrablemmid spiders have been discovered in tropical regions (e.g. Deeleman-Reinhold, 1980; Bourne, 1980), and a much more comprehensive review has been published (Lehtinen, 1981). The tetrablemmids are emerging as a major spider family in the tropical forest litter habitat.

In most tetrablemmid genera, sexual dimorphism is pronounced, and takes the form of strong modifications of the chelicerae, anterior legs, and carapaces of males. In the genus *Brignoliella*, for example, the male carapace is distinctly raised, often almost box-like, there is a clypeal horn, and the chelicerae bear anteriorly projecting spurs (Fig. 1). Previous authors have mentioned in passing another dimorphism not known in other spider families: the male tarsi I are

swollen, pyriform, or spindle-shaped (Fig. 2). Herein a detailed description of this neglected aspect of sexual dimorphism is provided, illustrating for the first time modified setae, probably chemosensory, located on the ventral surface of the enlarged tarsi (Figs. 4, 5).

Family TETRABLEMMIDAE O. P.-Cambridge

Subfamily *Brignoliellinae* Shear

Genus *Brignoliella* Shear

*Brignoliella ratnapura*, new species (Figs. 1-5)

*Type*: Male holotype (American Museum of Natural History) from leaf litter in Ratnapura Peak wilderness area, Sri Lanka, collected 5 November 1979 by W. Sedgwick.

*Diagnosis*: Unique in the details of the male palpus, which has an unusually swollen tibia (Fig. 3), abruptly narrowed distally, to provide an almost pyriform impression. No other described species of *Brignoliella* has the swollen first tarsi with special setae (but see footnote below).

*Male holotype*: Length 1.56 mm. Carapace 0.86 mm long, 0.55 mm wide (length measurements include clypeal horn). Unsclerotised areas of abdomen white, otherwise dark orange-brown. Clypeal horn and cheliceral teeth black.

Structure typical for genus. Carapace (Fig. 1) with cephalic part strongly raised, box-like, raised region with 16 marginal setae. Eyes six, on distinct tubercles, median eyes nearly touching, separated from posterior

lateral eyes by about two diameters. Carapace margin with evenly spaced angular warts; these extending posteriorly onto dorsal surface. Clypeus steeply sloping, laterally somewhat wrinkled, with acuminate horn slightly longer than basal width, moderately deflexed. Each chelicera with prominent mesofrontal tooth.

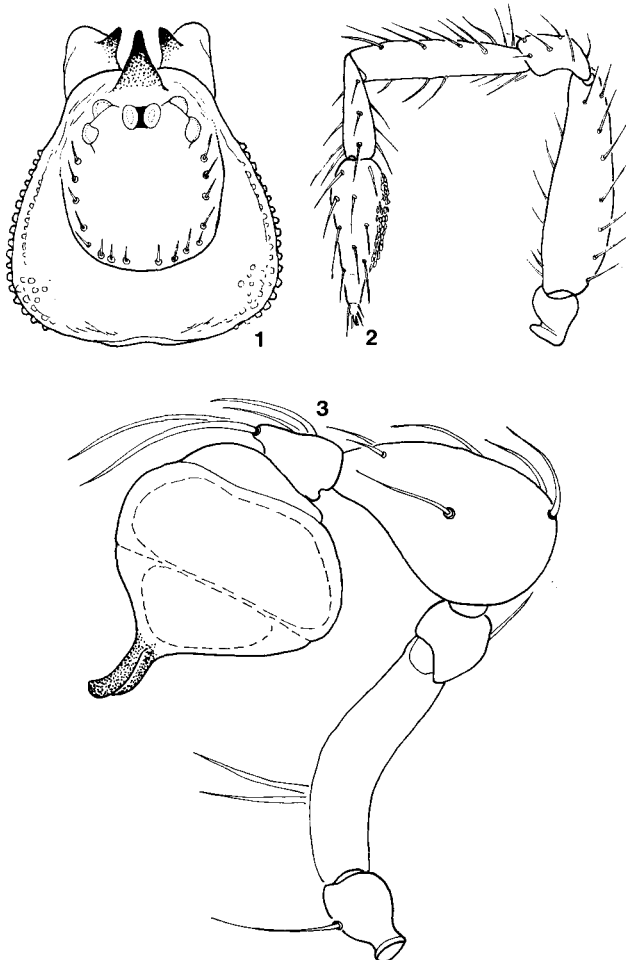
Abdomen typical of genus (see Lehtinen, 1981).

Palpus (Fig. 3) with strongly curved femur, short patella, and strongly swollen, pyriform tibia; tarsus with four prominent setae. Bulb subglobular, embolus short, curved, truncate.

Structure of legs typical except for first leg (Fig. 2); tarsus (Fig. 4) distinctly swollen at base to about twice diameter of metatarsus, tapering evenly to claws, ventrally set with more than 100 modified setae (Fig. 5) in about five transverse ranks; setae short, stout, with ovoid cap surrounding central pore (?), posterior surface of each bearing six fimbriae in two ranks of three each.

*Female:* Unknown.

*Notes:* The holotype specimen is unique. Simon (1893) described *Brignoliella scrobiculata* on a female from Sri Lanka, but it is unlikely that the present species is the male of Simon's species. Lehtinen (1981) places *scrobiculata* in a species group in which the males are very different from *B. ratnapura*. In terms of



Figs. 1-3: *Brignoliella ratnapura*, new species, male. **1** Carapace, dorsal view; **2** Right first leg, mesal view; **3** Right palpus, mesal view.

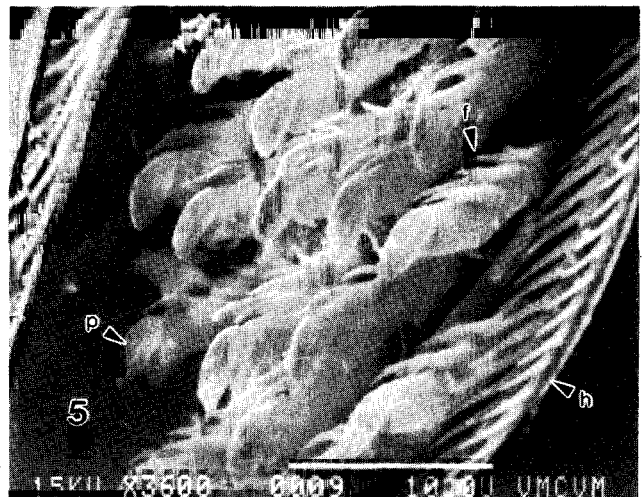
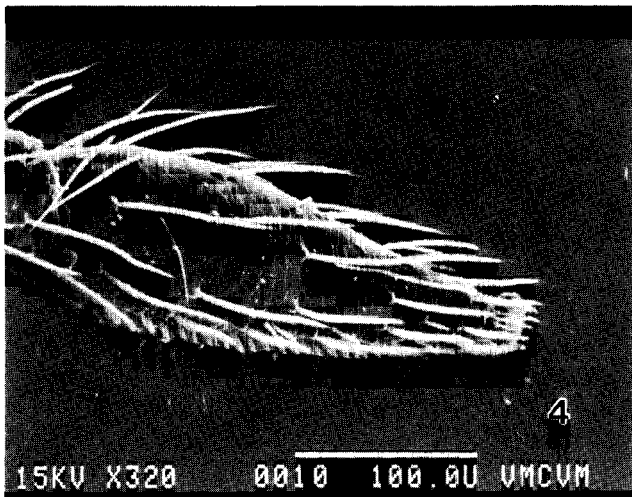
structure (clypeal horn, cheliceral teeth, palpal anatomy) *B. ratnapura* looks most like *B. delphina* Deeleman-Reinhold, 1980, from Jayapura, Irian Jaya, New Guinea. As Lehtinen (1981) remarks, *Brignoliella* will undoubtedly turn out to contain many species from tropical Asia, and the relationships of species groups are at present not clear because only a small fraction of these species are known.

The peculiar modification of the first leg tarsus and the unusual sensilla on its ventral surface represent structures that previously have not been examined in detail, though the swollen tarsi have been mentioned briefly in species descriptions without reference to the special setae (*Ablemma circumspectans* Deeleman-Reinhold, 1980, *Borneomma roberti* Deeleman-Reinhold, 1980, and *Ablemma lempake* Lehtinen, 1981). In these previous accounts, the swollen, pyriform, or spindle-shaped tarsi were mentioned only for males.<sup>1</sup>

Finding the exact function of these modifications would depend on behavioural studies. However, because the modified setae appear to have pores at their tips (*p*, Fig. 5), a good working hypothesis would be that they are chemosensors (Foelix, 1970, 1985), perhaps designed to detect female pheromones. The pores cannot be conclusively demonstrated except by sections studied under the electron microscope, because in preserved specimens coagulated lymph may plug them. None of the setae was broken so the characteristic double lumen could not be demonstrated. The rows of fimbriae (*f*, Fig. 5) or "secondary hairs" on each of the modified setae suggests their derivation from the biserrate hairs found on all body surfaces in the Tetrablemmidae (*h*, Fig. 5). Some rather similar setae were discovered by Heimer, Hunter, Oey & Levi (1982) on the dorsal surface of the first tarsus of species of *Arcys* and *Archemorus* (Araneidae). Their scanning electron micrographs (of *Archemorus roosdorpi* Chrysanthus) show setae similar to those illustrated here, but lacking the double row of fimbriae. The araneid species examined had these special setae only on the first tarsi of males, so it seems likely that they are involved in courtship or mating, possibly in the detection of a species-specific female pheromone. Contact chemoreceptors on the palpi of male *Lycosa punctulata* (Lycosidae) are shorter than mechanoreceptive setae, curved, and have fimbriae or "accessory hairs" (Tietjen & Rovner, 1982).

The araneids likewise did not have swollen first tarsi, as seen in *B. ratnapura* and possibly in the few tetrablemmids mentioned above. Again, it was not possible to examine the internal structure of the tarsus, but if a large mass of glandular tissue is present, a second hypothesis of function for the entire assemblage

<sup>1</sup>In reviewing this paper for publication, Dr Deeleman-Reinhold reported that she had been moved to examine a number of undescribed species of tetrablemmids, and found swollen tarsi and special setae in males of four species of *Ablemma* and one species of *Brignoliella*. She also confirmed the presence of the modifications in males of *Borneomma roberti*, though the enlargement of the first tarsi was not as large as figured here for *B. ratnapura*.



Figs. 4, 5: *Brignoliella ratnapura*, new species, male, scanning electron micrographs. **4** Tarsus of left first leg, mesal view; **5** Specialised setae from ventral surface of tarsus of left first leg. See text for meaning of labels.

is the dispensing of a pheromone, rather than the detection of one. The setae could provide increased surface area for the evaporation of an airborne pheromone, although it is not clear why they should be modified in such a peculiar way.

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