

## Review of the genus *Sobasina* (Araneae: Salticidae)<sup>1</sup>

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### Abstract

The genus *Sobasina* Simon, 1898 (Araneae: Salticidae) from Pacific Islands is reviewed and its main diagnostic characters (internal structures of epigyne, body shape, palps) documented for all species in a comparative way. The systematic position of the genus is shown to be non-aligned to any major groups of Salticidae.

**Key words:** Salticidae, *Sobasina*, Pacific Islands, pragmatic classification, morphological similarities.

### Introduction

The genus *Sobasina* is unique because of congruent characters of this assemblage of 16 species - none were ever synonymized with, or transferred to, or from, other genera. That happened, rather paradoxically, because the morphology of these species were studied in modern times only by three specialists, competent and adequately equipped: F. R. Wanless (1978), J. Prószyński (with J. W. Berry, J. A. Beatty, M. Edmunds and C. L. Deleleman -Reinhold respectively - 1998, 201, 2010, 2013) and Zhang J. (with W. P. Maddison - 2012, 2013, 2015).

Of the three, F.R. Wanless (1978), who described 5 species from Central Melanesia, was limited by being the first and by inadequate technique: while his microscopes were good, his drawing apparatus projected only very small image of epigyne from microscope onto paper (Fig. 3K1- M1), blurring simultaneously direct view through microscope itself (according to tests carried out in Wanless laboratory by J. Prószyński), It is not certain whether Wanless sufficiently cleared epigyne preparations and certainly he did not stain them.

Prószyński, who studied characters of 9 species (1998 - from Caroline Islands, Fiji and Tonga, 2001 - from Malaysia: Peninsula Malaya, 2010 and 2013 - from Indonesian Borneo: Kalimantan) and documented them in drawings displayed here, was well equipped for study of such minute spiders by having stereomicroscope with additional lens (magnifications up to 200x), compound microscope of medium power (2-10 x 40x) in transmitted light, his advanced technique included making drawings with an ocular grid and staining preparations in Chlorazol Black E. He benefited from advice of collector J. W. Berry and an expert

<sup>1</sup> Present paper constitutes partial publication of sections of the Internet "Monograph of Salticidae (Araneae) of the World 1995-2016", parts I & II by Prószyński (2016a, b), available at: <http://www.peckhamia.com/salticidae/Subfamilies/> and <http://www.peckhamia.com/salticidae/> respectively.

knowledge of J. A. Beatty (both contributed general parts and description of non-genital characters in the 1998 paper), also from C. L. Deeleman-Reinhold and M. Edmunds.

Zhang J. (with Maddison 2012, 2013, 2015, division of work between authors described once by W. P. Maddison), who described one species and tried to add phylogenetic interpretation, has both impressive experience and assistance of W. P. Maddison, her equipment was certainly adequate. Diagnostic drawings of the above authors, reviewed in the present paper, provide new definition of the genus and are occasion to compare methodology of research on Salticidae, enriching conclusions drawn from study of more complicated genera.

## Material and Methods

Rich material of 9 species of *Sobasina* from Polynesia was studied by the author in J. W. Berry's laboratory in the Butler University in Indianapolis in 1991/1992 (Berry, Beatty & Prószyński 1998). The collection of both identified and incompletely identified material was latter deposited by J. W. Berry in the American Museum of Natural History, New York, NY and in the Bishop Museum, Honolulu, Hawaii. Species described later were studied at the Museum and Institute of Zoology, Polish Academy of Sciences in Warsaw. The specimens are deposited in the Natural History Museum of London, and in the private collection of C. L. Deeleman-Reinhold. The presentation here differs from traditional ones by the graphic method of defining material presented in comparative plates, it includes both original diagnostic drawings by the author and other documentation of relevant characters, available in the literature. These drawings are intended for direct comparison, drawing by drawing and detail by detail, without translating them into word descriptions, which always impoverish and falsify conclusions. The background of that work are comparison of diversity of all 4800 recognizable species of Salticidae (Prószyński 2017), compiled in the Internet "Monograph of Salticidae (Araneae) of the World 1995-2016. Parts I & II" by Prószyński (2016a, b), instantly accessible at: <http://www.peckhamia.com/salticidae/Subfamilies/> and <http://www.peckhamia.com/salticidae/>, available also as PDF's.

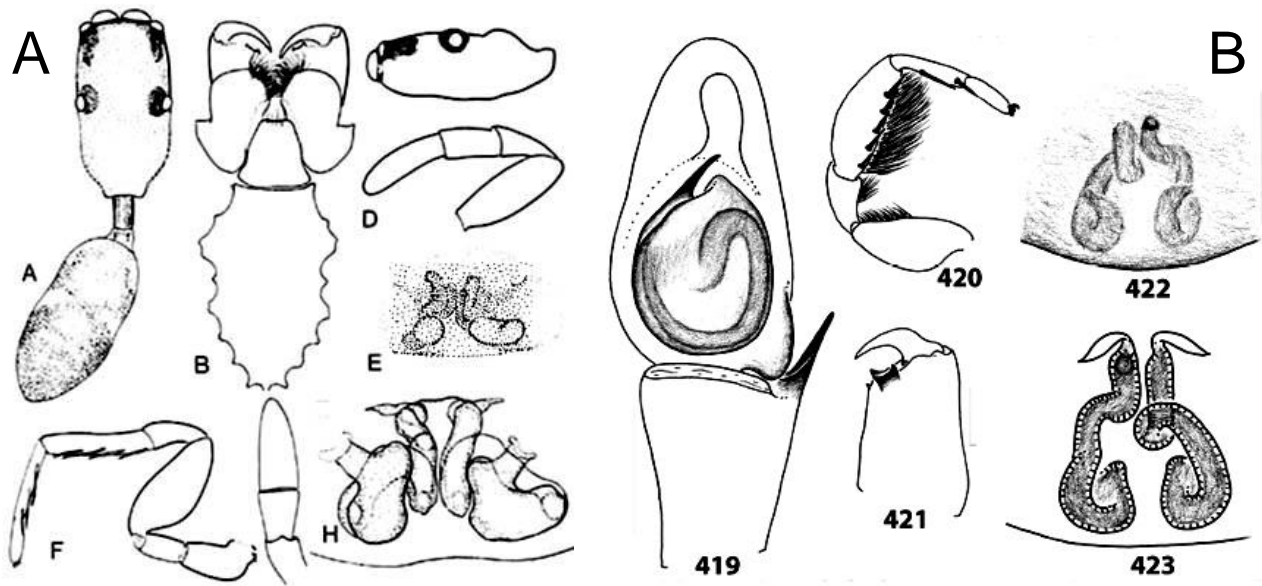
## Taxonomic description

### Gen. *Sobasina* Simon, 1898

**Type species:** *Sobasina amoenula* Simon, 1898

**Definition.** Minute jumping spiders (majority of species has body length 3-4 mm, only exceptionally more than 4 mm) characterized by internal structures of epigyne (Fig. 3A-G), unique within Salticidae and permitting unequivocal recognition of species when examined under medium power of a compound microscope. Epigyne itself is too small to have much diagnostic value (Figs 3A-C, F, K1-M1). Male palps are relatively homogenous within the genus (Fig. 5), too small to be examined under dissecting microscope, therefore useless for purpose of species identification but characteristic for the genus. The body shape (Figs 2, 4) is diagnostic, to certain extent, but is too diversified (some species are ant-like, other not) to be used to define genus.

**Description.** The genus of *Sobasina* is easily identifiable by general appearance of the body shape (their diversity shown in Figs 2, 4), elongated and narrow, with differentiated silhouette of carapace and characteristic microsculpture of body surface, full of microscopic pits and/or sclerotized warts (Fig. 4C-D, G-H). Tegument is light reflecting and in some species form abdominal scutum, those species which have ant-like shape of body may have constrictions additionally marked by white spots or belts (Fig. 4A, E). Genital organs are unique to *Sobasina*. The legs are thin and rather uniform, leg I are somewhat longer, tibia I may have, sometimes but not always, a ventral mane of black setae, number of spines variable. Body size is minute in most species, in six species its length is 2.07- 3 mm, in several other 3.07-4.27 mm; only females of two species are larger - *S. cutleri* reach 5.0, *S. magna* even 7 mm. Classification of these unusual specimens is confirmed by typical internal structure of epigyne (also in case of very unusually shaped *S. paradoxa*).



**Figure 1.** Main diagnostic characters of the genus *Sobasina* (for details see Figs 3-5). **A** - type species of the genus - *S. aemonula* Wanless, 1978, **B** - newest described species *S. wanlessi* Zhang J. & Maddison, 2012.

SOURCES. **A** - Wanless, F. R. (1978d). *Bulletin of the British Museum of Natural History (Zool.)* 33: 247-248, f 2A-H, **B** - Zhang J. & Maddison (2015) *Zootaxa* 3938(1): 71, f. 419-423. All copyrights are retained by the original authors and copyright holders, used here by their courtesy.



**Figure 2.** General appearance of some *Sobasina*, both live and preserved in alcohol. Note inconsistency of characters: carapace and abdominal constrictions, presence of tibia I "flag" of black setae (for more differences see Fig. 4, 6). **A** - *Sobasina wanlessi* live, **B** - the same, discolored after long preservation in alcohol, **C** - live *S. cf. platnicki*. Source: Zhang J. & Maddison, *Zootaxa*, 2015: 71, f. 838-841. ©Copyrights by Magnolia Press and W. P. Maddison. By courtesy.

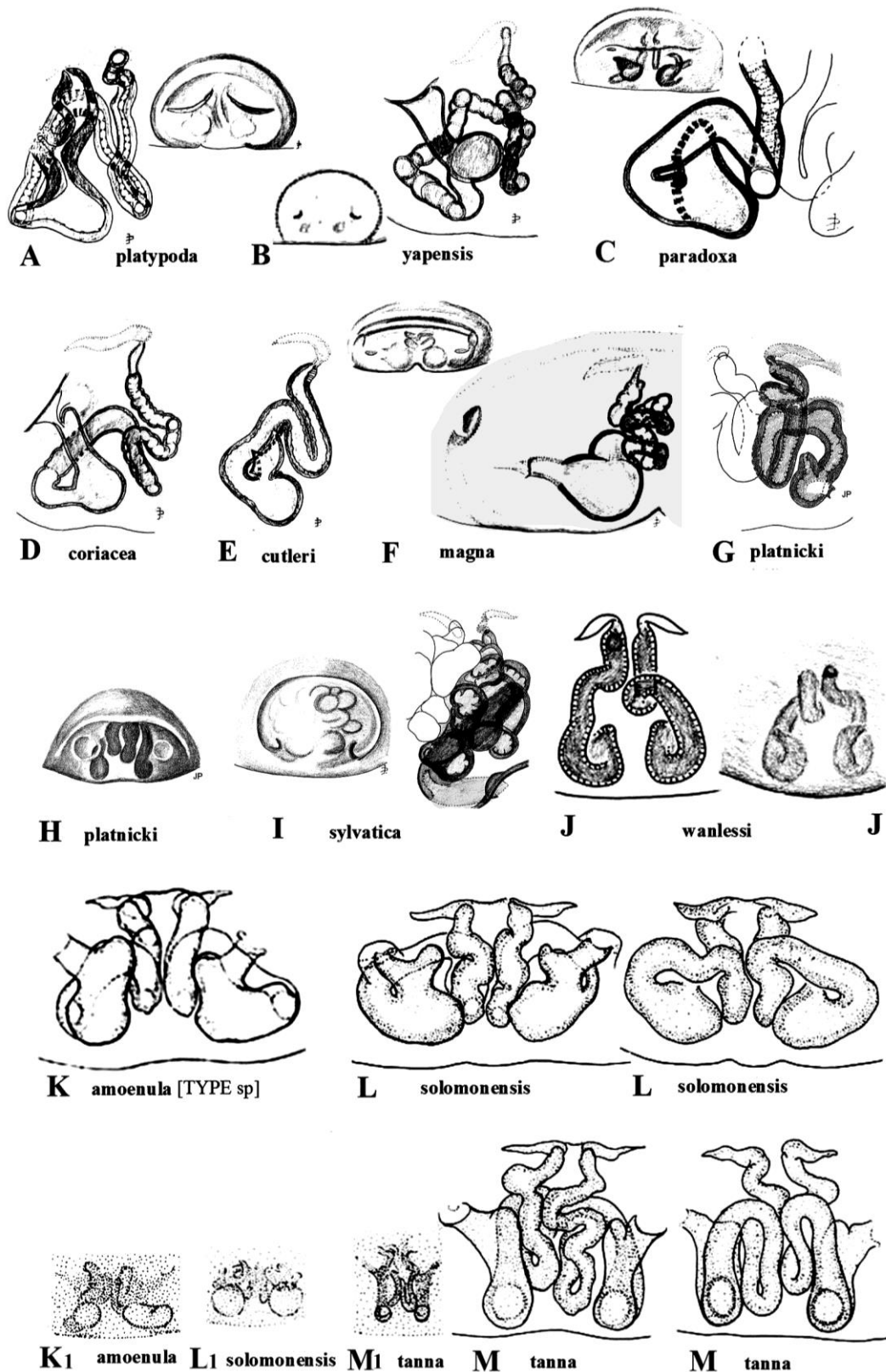
The most useful character separating species are well visible, sclerotized internal structures of epigyne, unique within the whole family Salticidae, but requiring clearing, staining, mounting in a temporary slide and examination under medium power of a compound microscope (magnification 2-10 x 20-40x). They consist of a long, narrow and entangled (or bent in a complicated way) spermathecae, which opens to the surface of epigyne by indistinct opening and after very short, less sclerotized duct (sometimes not even discernible) pas into slightly broader entrance chamber, which is continued by a narrow but very long "tail" like pipe, which may be differentiated into numerous superficial, sclerotized "beads" (fig. 3B, D) or have internal surface armored with spines or sclerotized rings (Fig. 3A, C, G, I). It should be stressed that understanding such structures require very precise drawings and/or photographs (Fig. 3A-I), drawings simplified or diagrammatic (Figs 1A-B, 3J-M) may be misleading. The superficial sculpture of epigyne is poorly known and of little value (Fig. 3A, C, F, H, I), due to its minute size requiring 200 x magnification of dissecting microscope.

In difference to internal structures of epigyne, the palps are so uniform that are useless for identification of species within the genus *Sobasina*, their usage is also impracticable because of extremely small dimensions – requiring magnification 200 x (!) of dissecting microscope. Under such power bulbos appears broad oval, spermophor distinct and following margin of bulbos without creating any additional loops (Fig. 5). The embolus is very short, arising from antero-retrolateral "angle" of bulbos, it is not yet clear how it separates from bulbos. The tibial apophysis is thin and pointed, sometimes slightly waving or inclined, its length is equal to one fourth, rarely half of length of bulbos.

**Remarks.** 16 cryptic species, known at present, may be hypothesized as the first sample of a diversifying genus in its early phase of island speciation process (Prószyński, 2010). From our present knowledge, every small Polynesian island tested has its endemic, different species, but on larger islands (Viti Levu), there are cases of local speciation. The discovery of single species on larger land masses: Peninsula Malaya, Borneo and New Guinea presumably heralds potential existence of many species there. Environments of *Sobasina* - forest litter (and also moss on higher mountains on Fiji) - are very little studied. All that indicates possibility of existence of more species than heretofore discovered.

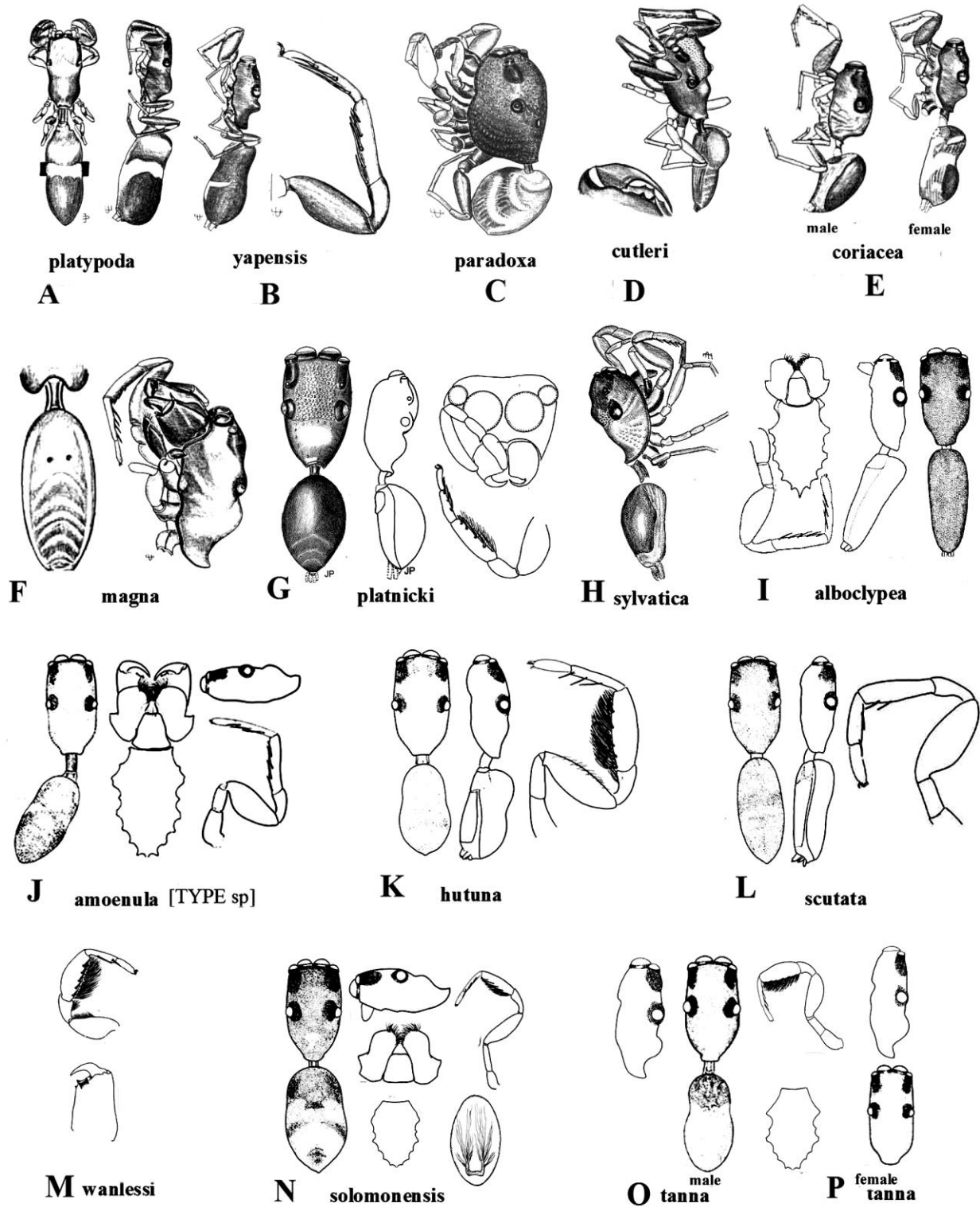
**Placement of the genus** is at present controversial. Simon (1901-1903: 515) knowing only single species proposed a separate group, Sobasineae, for it (together with *Fluda* Peckham & Peckham, 1892, rather not related) based on apparently unimportant minor morphological characters, having no apparent phylogenetical importance (parallel to *Myrmarachne* and other "pluridentate" groups, including Diolenieae). Zhang J. & Maddison (2015: 27) placed *Sobasina* in euophryines (within their *Diolenius* clade), claiming that it is "well supported in molecular phylogeny". That placement stands out and their documentation reveals some peculiarities: embolus is slightly different (Figs 1B, 5H) and drawing of spermatheca is diagrammatized and therefore uncertain (Fig. 3J) – could it be that their specimens are misidentified? The body characters are not exclusive to *Sobasina*. It is always safer to compare series of species, not single one. Prószyński (2016a, 2017b: 110) placed *Sobasina* provisionally in the informal group of genera DIOLENINES (but not included into EUOPHRYINES!) only because of a single criterion - slightly elongate coxa and trochanter I, which in DIOLENINES, however, is strikingly developed. Looking at the unique development of spermathecae and uncertain interpretation of palps, all these classification seems to be unconvincing and *Sobasina* will probably be placed among genera whose relations cannot be established. An incidental observation of some distant similarities between *Sobasina* and another unclassifiable genus– *Synageles* Simon, 1876, represented by Palaearctic *Synageles venator* (Lucas, 1836), may deserve some considerations. There are some distant similarities in palp, spermathecae and habitus, which may indicate some relationships, if confirmed. It seems certain, however, that it cannot be placed within EUOPHRYINES.

**Definitions and descriptions of individual species.** This paper presents morphological data in a form of precise diagnostic drawings, arranged in a comparative way on plates Fig 3-5. Such complicated structures cannot be translated into description in words without loss of important details of properties. Owing to facilities provided by the World Spider Catalog, the original descriptions of each species, as well as keys to their identification by somatic characters, can be viewed instantly, or downloaded, by Internet at <http://www.wsc.nmbe.ch/>. The procedure followed here can be considered a test of future taxonomic descriptions.



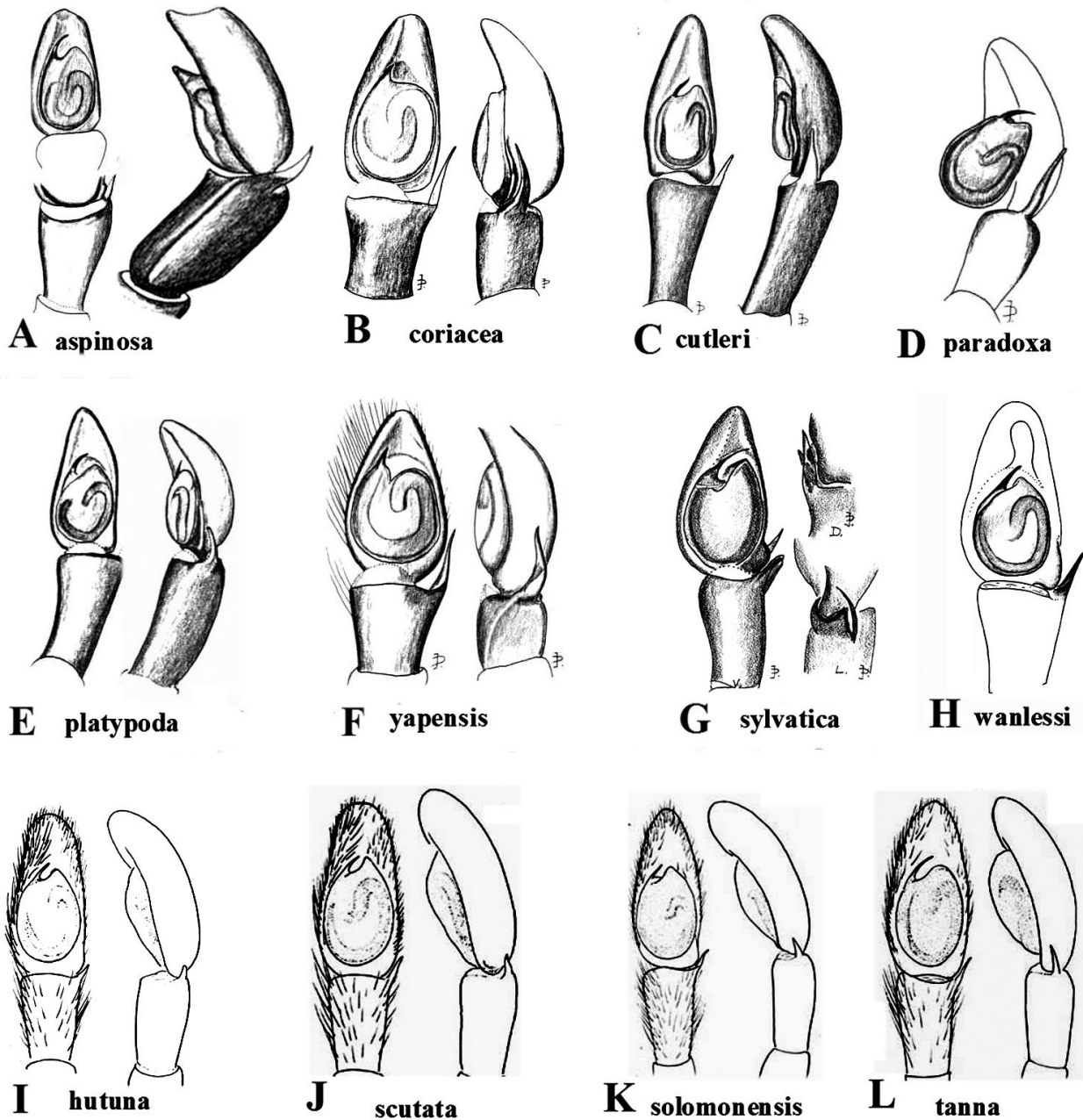
**Figure 3.** Diversity of epigyne and its internal structures in *Sobasina*. **A** - *S. platypoda*, **B** - *S. yapensis*, **C** - *S. paradoxa*, **D** - *S. coriacea*, **E** - *S. cutleri*, **F** - *S. magna*, **G** - *S. platnicki*, **H** - *S. platnicki* - epigyne, external view, **I** - *S. sylvatica*, **J** - *S. wanlessi*, **K-K1** - *S. amoenula* - type species, **L-L1** - *S. solomonensis*, ventral and dorsal views, **M-M1** - *S. tanna*, ventral and dorsal views.

**SOURCES:** **A-F** - Berry, Beatty & Prószynski (1998) *Journal of Arachnology* 26: 171-181, f. 67-100, **G-H** - Prószynski & Deeleman-Reinhold (2013) *Arthropoda Selecta* 22: 141, f. 116-122, **I** - Edmunds & Prószynski (2001) *Bulletin of the British Arachnological Society* 12: 141, f. 9-14, **J** - Zhang J. & Maddison (2012) *Zootaxa* 3491: 42, f. 23-204., **K-M1** - Wanless, F. R. (1978). *Bulletin of the British Museum of Natural History (Zool.)* 33: 245-257, f. 1-8. All copyrights are retained by the original authors and copyright holders, used here by their courtesy.



**Figure 4.** Diversity of body shape and some parts in the genus *Sobasina*. **A** - *S. platypoda*, **B** - *S. yapensis*, **C** - *S. paradoxa*, **D** - *S. cutleri*, **E** - *S. coriacea*, **F** - *S. magna*, **G** - *S. platnicki*, **H** - *S. sylvatica*, **I** - *S. alboclypea*, **J** - *S. amoenula* - type species, **K** - *S. hutuna*, **L** - *S. scutata*, **M** - *S. wanlessi* (see also Fig. 2A), **N** - *S. solomonensis*, **O-P** - *S. tanna*.

**SOURCES:** A-F - Berry, Beatty & Prószyński (1998) *Journal of Arachnology* 26: 171-181, f. 67-100, G - Prószyński & Deeleman-Reinhold (2013) *Arthropoda Selecta* 22: 141, f. 116-122, H - Edmunds & Prószyński (2001) *Bulletin of the British Arachnological Society* 12: 141, f. 9-14, I-P - Wanless, F. R. (1978). *Bulletin of the British Museum of Natural History (Zool.)* 33: 245-257, f. 1-8, M - Zhang J. & Maddison, 2012. All copyrights are retained by the original authors and copyright holders, used here by their courtesy.

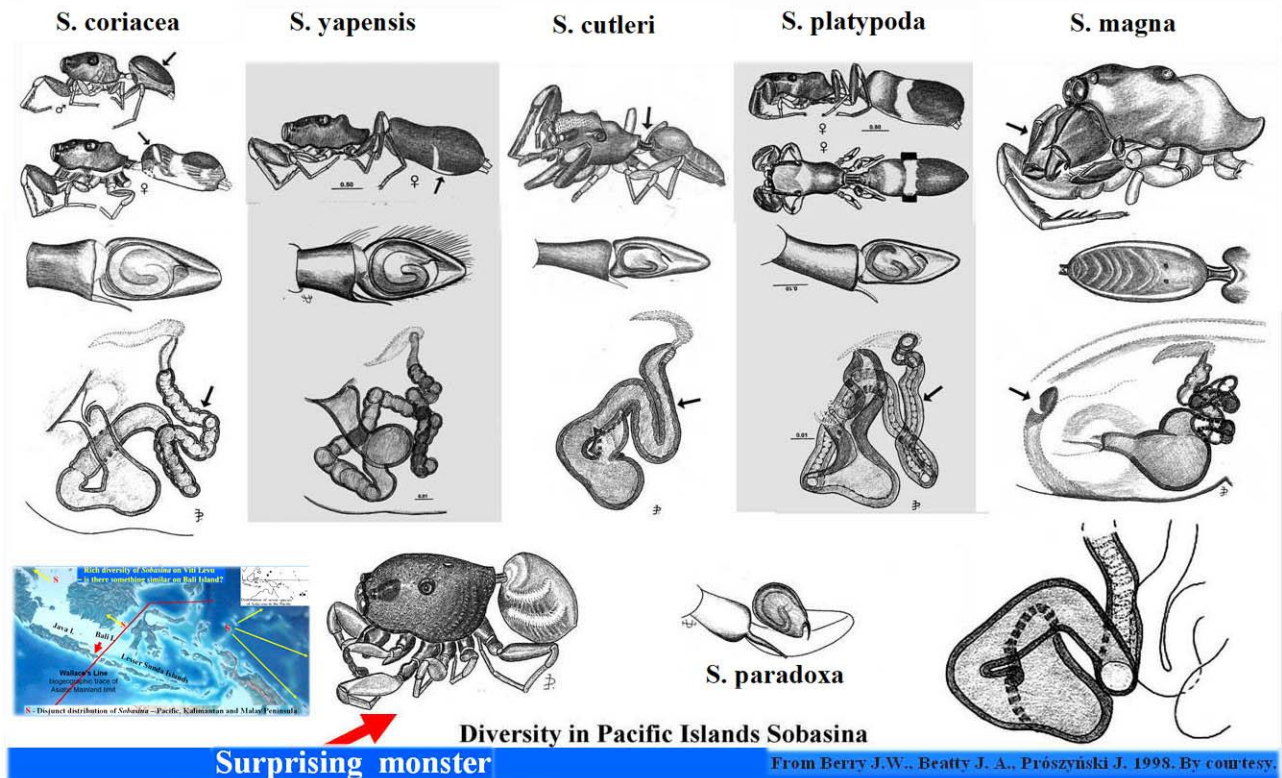


**Figure 5.** Diversity of palps in *Sobasina* (note that while relatively uniform within the genus, they effectively separate it from other genera and groups of genera). **A** - *S. aspinosa*, **B** - *S. coriacea*, **C** - *S. cutleri*, **D** - *S. paradoxa*, **E** - *S. platypoda*, **F** - *S. yapensis*, **G** - *S. sylvatica*, **H** - *S. wanlessi*, **I** - *S. hutuna*, **J** - *S. scutata*, **K** - *S. solomonensis*, **L** - *S. tanna*.

SOURCES: **A-F** - Berry, Beatty & Prószyński (1998) *Journal of Arachnology* 26: 171-181, f. 67-100, **G** - Edmunds & Prószyński (2001) *Bulletin of the British Arachnological Society* 12: 141, f. 9-14, **H** - Zhang, J. X. & Maddison, W. P. (2012) *Zootaxa* 3491: 42, f. 200-204, **I-L** - Wanless, F. R. (1978). *Bulletin of the British Museum of Natural History (Zool.)* 33: 245-257, f. 1-8. All copyrights are retained by the original authors and copyright holders, used here by their courtesy.

**Composition. Type species:** *Sobasina amoenula* Simon, 1898 (Solomon Is.), *S. alboclypea* Wanless, 1978 (Solomon Is.), *S. aspinosa* Berry, Beatty & Prószyński, 1998 (Fiji), *S. coriacea* Berry, Beatty & Prószyński, 1998 (Caroline Is.), *S. cutleri* Berry, Beatty & Prószyński, 1998 (Fiji), *S. hutuna* Wanless, 1978 (Solomon Is. - Rennell Is.), *S. magna* Berry, Beatty & Prószyński, 1998 (Tonga), *S. paradoxa* Berry, Beatty & Prószyński, 1998 (Fiji), *S. platnicki* Prószyński & Deeleman-Reinhold, 2013 (Borneo-Kalimantan), *S. platypoda* Berry, Beatty & Prószyński, 1998 (Fiji), *S. scutata* Wanless, 1978 (Bismarck Archipelago), *S. solomonensis*

Wanless, 1978 (Solomon Is.), *S. sylvatica* Edmunds & Prószyński, 2001 (Malaysia - Peninsula Maya), *S. tanna* Wanless, 1978 (Vanuatu), *S. wanlessi* Zhang J. & Maddison, 2012 (New Guinea), *S. yapensis* Berry, Beatty & Prószyński, 1998 (Caroline Is.).



**Figure 6.** Summary of diversity of most useful diagnostic in 6 *Sobasina* species. Columns show body shape, palps and spermathecae of (from left) 1) *S. coriacea*, 2) *S. yapensis*, 3) *S. cutleri*, 4) *S. platypoda*, 5) *S. magna*, 6) bottom row - *S. paradoxa*. Note evolution of structure of spermathecae (which are unique for each species), contrasting with weak differentiation of palps. Body shape variable - in some species ant-like, in other remarkably not, also differences between male and female of *S. coriacea*.

SOURCE: Prószyński (2010) – presentation at the 18th International Congress of Arachnology, in Siedlce, Poland, ©Copyrights by J. Prószyński. By courtesy.

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