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ARTÍCULO:

Proposal for the Synonymy of some South-East Asian Whip Scorpion Genera (Arachnida, Uropygi, Thelyphonida)

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Proposal for the Synonymy of some South-East Asian Whip Scorpion Genera (Arachnida, Uropygi, Thelyphonida)

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Abstract:

The South-East Asian whip scorpion fauna has never been systematically revised, with numerous new species and genera added. There are several opinions what kind of character may serve to distinguish different genera, but it is relatively sure that certain characters cannot serve for this purpose, for example the number of 'ommatoids' on the metasoma. Therefore genera based on this character are proposed to be removed. Two other genera (*Minbosius* Speijer, 1933a, b and *Ginosigma* Speijer, 1933a, 1936) are also critically reviewed.

Key words: Uropygi, *Abaliella* n. syn., *Chajnus* n. syn., *Ginosigma*, *Minbosius* n. syn., *Tetrabalius* n. syn., *Thelyphonus*

Taxonomy: *Thelyphonus ambonensis* (Speijer, 1933) n. comb. for *Tetrabalius amboensis* Speijer, 1933. *Thelyphonus borneensis* (Speijer, 1933) n. comb. for *Tetrabalius borneensis* Speijer, 1933. *Thelyphonus borneonus* Haupt, 2009 n. nov (replacement name for *Tetrabalius borneensis* (Speijer, 1933b: 72-73)) n. comb. *Thelyphonus dammermanni* (Speijer, 1933b) n. comb. for *Tetrabalius dammermanni* Speijer, 1933. *Thelyphonus dicranotarsalis* (Rowland, 1973a) n. comb. for *Abaliella dicranotarsalis* Rowland, 1973, *Thelyphonus florensis* (Speijer, 1933) n. comb. for *Tetrabalius florensis* Speijer, 1933. *Thelyphonus gertschi* (Rowland, 1973) n. comb. for *Abaliella gertschi* Rowland, 1973. *Thelyphonus kopsteini* (Speijer, 1933b) n. comb. for *Minbosius kopsteini* Speijer, 1933. *Thelyphonus luzonicus* Haupt, 2009 nomen novum (replacement name for *Abaliella manilana* (Kraepelin, 1900) n. comb. *Thelyphonus manilanus* C.L. Koch, 1843 n. comb. for *Minbosius manilanus* Speijer. *Thelyphonus nasutus* (Thorell, 1888) n. comb. for *Tetrabalius nasutus* Thorell, 1888.*Thelyphonus rohdei* (Kraepelin, 1897) n. comb. for *Abaliella rohdei* (Kraepelin, 1897). *Thelyphonus samoanus* (Kraepelin, 1897) n. comb. for *Abaliella samoana* (Kraepelin, 1897). *Thelyphonus seticauda* Doleschall, 1857 n. comb. for *Tetrabalius seticauda* (Doleschall, 1857). *Thelyphonus willeyi* (Pocock, 1898) n. comb. for *Abaliella willeyi* (Pocock, 1898).

Propuesta de sinonimia de algunos géneros de vinagrillos del Sudeste Asiático (Arachnida, Uropygi, Thelyphonida)

Resumen:

La fauna de vinagrillos del Sudeste Asiático, a la que se han añadido numerosas nuevas especies y géneros, nunca ha sido revisada sistemáticamente. Hay diversas opiniones sobre qué clase de carácter puede ser utilizados para distinguir diferentes géneros, pero es relativamente seguro que ciertos caracteres no pueden ser utilizado para este propósito, por ejemplo el número de 'ommatoides' en el metasoma. Por lo tanto, los géneros basados en ese carácter son propuestos para ser eliminados. Otros dos géneros (*Minbosius* Speijer, 1933a, b y *Ginosigma* Speijer, 1933a, 1936) son también objeto de una revisión crítica.

Palabras clave: Uropygi, *Abaliella* n. syn., *Chajnus* n. syn., *Ginosigma*, *Minbosius* n. syn., *Tetrabalius* n. syn., *Thelyphonus*

Taxonomy: *Thelyphonus ambonensis* (Speijer, 1933) n. comb. for *Tetrabalius amboensis* Speijer, 1933. *Thelyphonus borneensis* (Speijer, 1933) n. comb. for *Tetrabalius borneensis* Speijer, 1933. *Thelyphonus borneonus* Haupt, 2009 n. nov (replacement name for *Tetrabalius borneensis* (Speijer, 1933b: 72-73)) n. comb. *Thelyphonus dammermanni* (Speijer, 1933b) n. comb. for *Tetrabalius dammermanni* Speijer, 1933. *Thelyphonus dicranotarsalis* (Rowland, 1973a) n. comb. for *Abaliella dicranotarsalis* Rowland, 1973, *Thelyphonus florensis* (Speijer, 1933) n. comb. for *Tetrabalius florensis* Speijer, 1933. *Thelyphonus gertschi* (Rowland, 1973) n. comb. for *Abaliella gertschi* Rowland, 1973. *Thelyphonus kopsteini* (Speijer, 1933b) n. comb. for *Minbosius kopsteini* Speijer, 1933. *Thelyphonus luzonicus* Haupt, 2009 nomen novum (replacement name for *Abaliella manilana* (Kraepelin, 1900) n. comb. *Thelyphonus manilanus* C.L. Koch, 1843 n. comb. for *Minbosius manilanus* Speijer. *Thelyphonus nasutus* (Thorell, 1888) n. comb. for *Tetrabalius nasutus* Thorell, 1888.*Thelyphonus rohdei* (Kraepelin, 1897) n. comb. for *Abaliella rohdei* (Kraepelin, 1897). *Thelyphonus samoanus* (Kraepelin, 1897) n. comb. for *Abaliella samoana* (Kraepelin, 1897). *Thelyphonus seticauda* Doleschall, 1857 n. comb. for *Tetrabalius seticauda* (Doleschall, 1857). *Thelyphonus willeyi* (Pocock, 1898) n. comb. for *Abaliella willeyi* (Pocock, 1898).

Introduction

As the human population increases, whip scorpions become more and more rare, because habitats are diminished, although some species like *Mastigoproctus giganteus* in USA and *Ginosigma schimkewitschi* in South-East Asia come along very well in the surroundings of human beings. But the possibility cannot be excluded that certain species even became extinct. Many landscapes become drier, because much water is used for other purposes, e.g. drinking water for human beings. Of course this is true for more developed countries like Japan, but there may be also such developments in other heavy populated areas like Indonesia. This is the dominant reason why this revision was carried out.
The Asian whip scorpion fauna currently consists of 83 species (Harvey, 2003), making it the most diverse region of the world. In contrast, only a single species is known from Africa, and 21 species are known from the America region. The Asian fauna is currently included within 11 genera, with another genus in Africa and six genera in America.

Certain genera of Thelyphonida are defined on the basis of their 'ommatoids'. *Tetrabalius* Thorell, *1888* has two pairs of 'ommatidia' instead of one pair, but *Abaliella* Strand, *1928* has none at all (Rowland & Cooke, 1973). Additionally, *Chajnus* Speijer, *1936* was created for a species which has a cuticular thickening in the otherwise thin cuticle of the 'ommatoids', but so far it is only represented by the holotype from the Indonesian island of Lombok.

Moreover, two genera of whip scorpions are critically assessed, *Minbosius* Speijer, 1933b and *Ginosigma* Speijer, 1936. A third genus name (*Teltus* Speijer, 1936) was synonymized with *Typopeltis* (Haupt & Song, 1996), and even a fourth name appeared (*Gipopeltis,* Speijer, 1934). Rowland & Cooke (1973) already cast some doubt on the creation of genera by Speijer and made some critical remarks: 'the four genera added by Speijer (1933, 1936) have gone virtually unnoticed, which is fortunate, for his inadequate understanding of the Uropygida adds only confusion to an already questionable classification'. Although, this fact may be due to the low interest in these arachnids, even by arachnologists.

Material

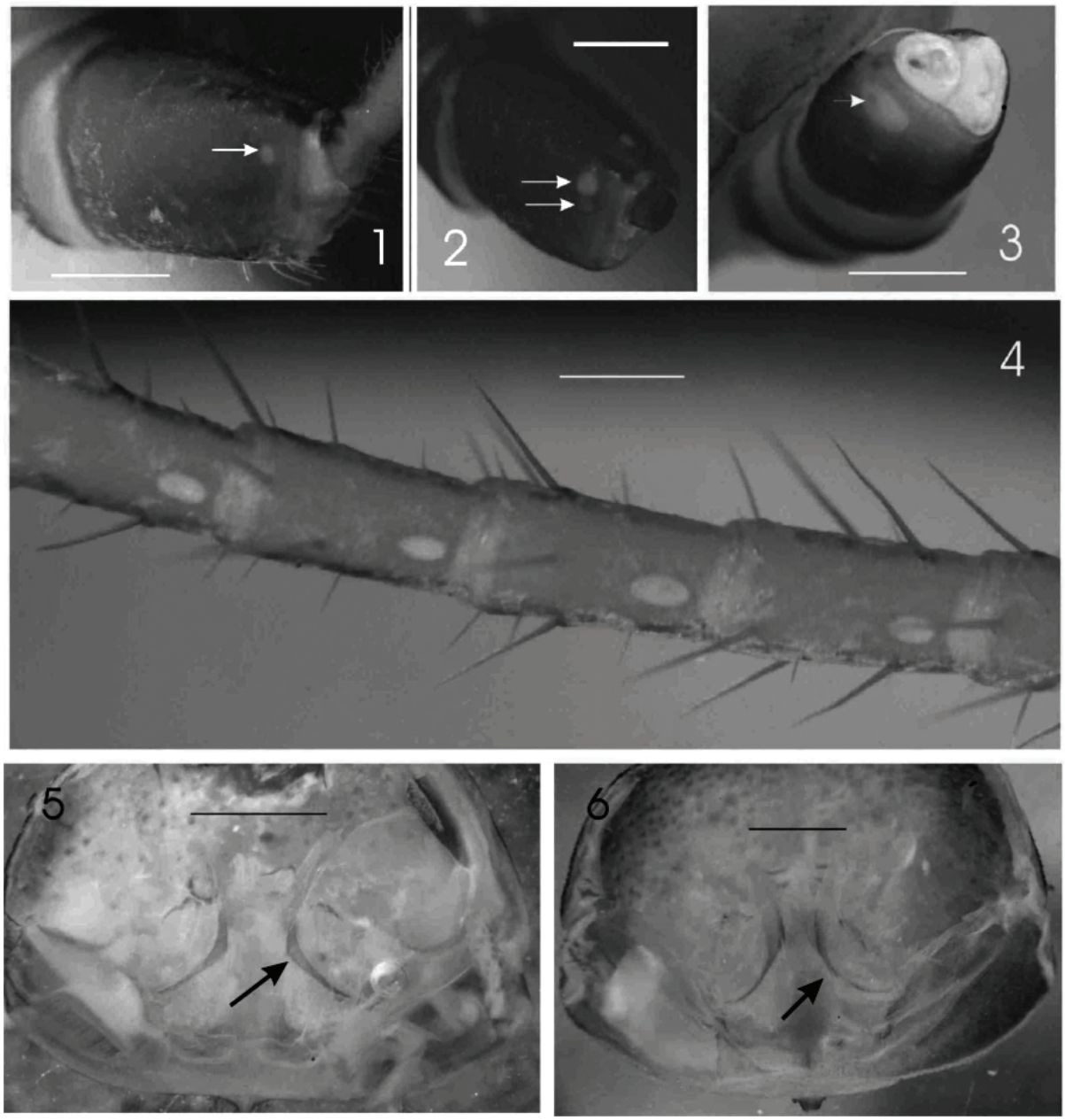
Abbreviations:
AMNH: American Museum of Natural History, New York.BM: British Museum of Natural History, London. INBio: Instituto Nacional de Biodiversidad, Heredia, Costa Rica.ML: Natuurlijke Museum, Leiden. SMF: Senckenberg Museum, Frankfurt. ZMB: Naturkundemuseum, Berlin

The following species were studied:
Abaliella dicranotarsalis Rowland, 1973a, ♀ holotype. Occ. Papers Mus. Texas Tech Univ. 10, 5. AMNH.
Abaliella gertschi Rowland, 1973a, ♀ holotype. Occ. Papers Mus. Texas Tech Univ. 10, 3. AMNH.
Abaliella rohdei (Kraepelin, 1897) syntypes. Abh. Geb. Naturwiss. 25, 16-17. ZMB.
Chajnus renschi Speijer, 1936 ♂ holotype. Mitt. zool. Mus. Berlin 21, 258-259. ZMB.
Ginosigma schimkewitschi (Tarnani, 1894) ♂. Horae Soc. Ent. Ross. 29, 116-120. ZMB.
Ginosigma lombokensis Speijer, 1936 ♀ holotype. Mitt. zool. Mus. Berlin 21, 256-257. ZMB.
Glyptogluteus augustus Rowland, 1973b ♂ holotype. Occ. Papers Mus. Texas Tech Univ. 16, 2-6. AMNH.
Mayacentrum guatemalae Víquez & Armas, 2006 ♀ paratype. Bol. Soc. Entomol. Aragonesa 38, 37-41. INBio.
Mayacentrum pijol Víquez & Armas, 2006 ♂ paratype, f holotype. Bol. Soc. Entomol. Aragonesa 38, 37-41. INBio.
Mimoscorpius pugnator (Butler, 1872) ♂ holotype. Ann. Mag. Nat. Hist. Ser. 4 10, 204. BM
Mimoscorpius pugnator (Butler, 1872), ♂, ♀. INBio.
Minbosius manilanus (C.L. Koch, 1843) ♂ syntype. Die Arachniden 10, 28. ZMB
Minbosius kopsteini Speijer, 1933b ♂ allotype. Zool. Mededeelingen 16, 68-69. ML
Ravilops wetherbeei (Armas, 2002) ♀ paratype. Bol. Soc. Entomol. Aragonesa 37, 95-98. INBio.
Tetrabalius ambonensis Speijer, 1933b ♀ holotype. Zool. Mededeelingen 16, 71-72. ML
Tetrabalius dammermanni Speijer, 1933b ♀ holotype, ♂, ♀. Zool. Mededeelingen 16, 73-74. ML
Tetrabalius seticauda (Doleschall, 1857) ♂, ♀. Natuurk. tijdschr. Nederl. Indie 13, 404. ML
Tetrabalius seticauda (Doleschall, 1857) ♂, ♀. Natuurk. tijdschr. Nederl. Indie 13, 404. ZMB
Thelyphonus billitonensis Speijer, 1931 ♂ holotype. Zool. Mededeelingen 14, 85. ML
Valeriophonus nara (Valerio, 1981) ♂, ♀. Bol. Soc. Entomol. Aragonesa 37, 95-98. INBio.

Results

In this section diagnoses of the genera in alphabetic order are provided, a proposition for synonymy including new combinations of species is made and a new key for Thelyphonida is established.

(*Abaliella* Strand, 1928: 4. 'Ommatoids' absent. Keel present. At least posterior opisthosomal tergites divided. Some species with modifications on distal female tactile leg.)
(*Chajnus* Speijer, 1936: 258. Sclerotized spot within the one pair of 'ommatoids'. Keel present. At least posterior opisthosomal tergites divided. Female unknown.)
Etienneus Heurtault, 1984, 122. One pair of 'ommatoids' present. Keel absent. Pedipalpal patellar apophysis of male unmodified, like female.
Ginosigma Speijer, 1936, 256. One pair of 'ommatoids' present. Keel present. Last joint of female tactile leg bayonet-shaped, some others modified. *G. schimkewitschi:* male with round spot on sternite V, filled



Figures 1-6. 1. The 'ommatoid' (arrow) on the 3rd segment of the metasoma of *Mastigoproctus giganteus*. Bar: 2 mm. **2.** Duplication of the 'ommatoid' in *Thelyphonus seticauda* Doleschall, 1857 (arrows). **3.** An area of thickened cuticula in the cover of the 'ommatoid' of *Thelyphonus renschi* holotype (arrow). Bar (Figs 2-4): 1.0 mm. **4.** Whip organs (light spots) of *Mastigoproctus giganteus*. **5.** Male of *Ginosigma schimkewitschi* terminal sexual organ. arrow: cuticular clasp with angle. Bar: 1.0 mm. **6.** Male of *Thelyphonus sucki* for comparison: cuticular clasp without angle. Bar: 1.2 mm.

with hair sensilla.

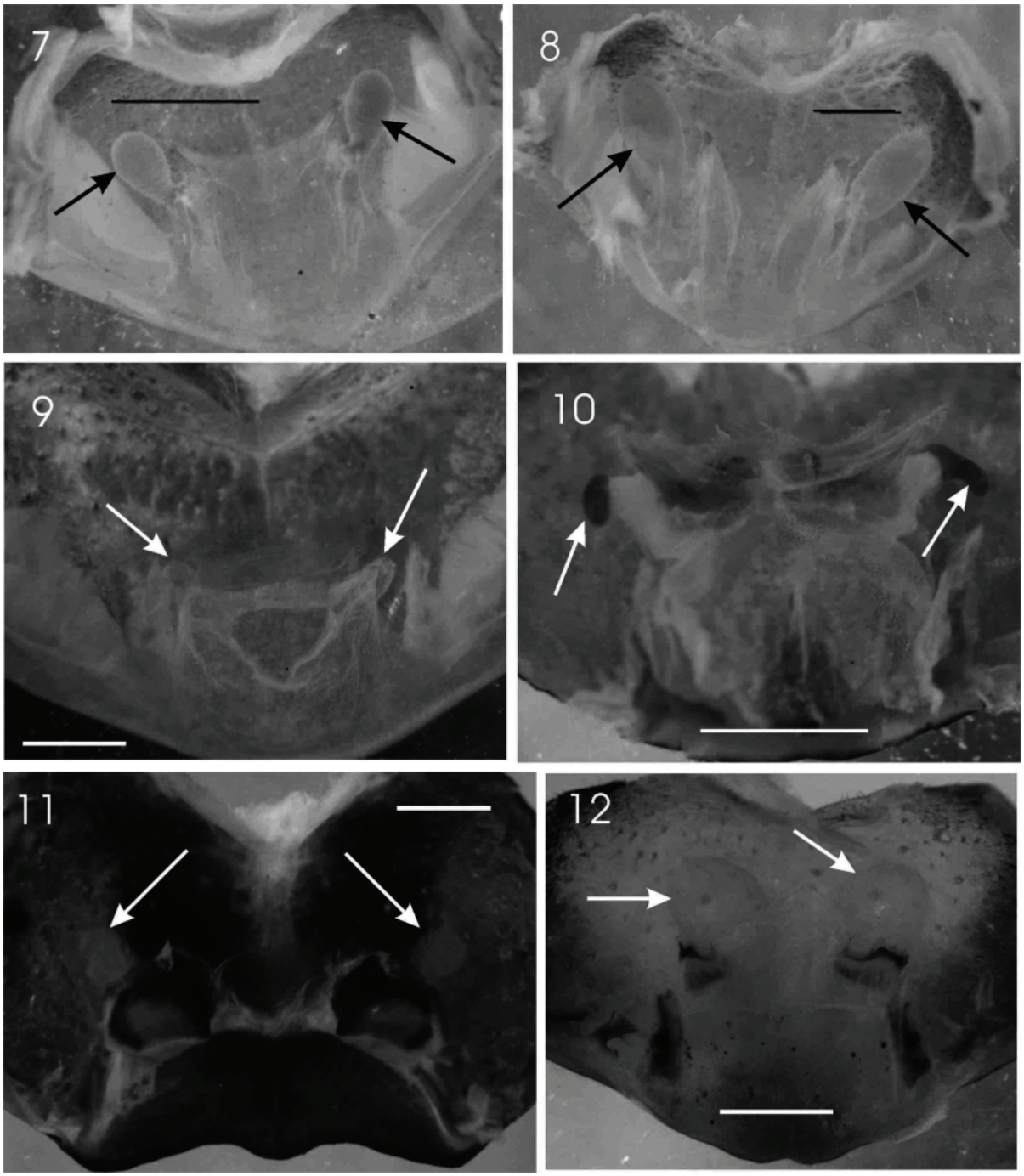
Glyptogluteus Rowland, 1973b, 2. 'Ommatoids' absent. Keel present. Posterior opisthosomal tergites divided. Male pedipalpal patellar apophysis unmodified. Male sternites 8 and 9 modified. Female unknown.

Hypoctonus Thorell, 1888, 360. One pair of 'ommatoids' present. Keel absent. Male pedipalpal patellar apophysis modified.

Labochirus Pocock, 1894, 132. One pair of 'ommatoids' present. Keel absent. Male pedipalpal patellar apophysis modified. Accessory tooth on inner margin of anterior process of pedipalpal coxae.

Mastigoproctus Pocock, 1894, 129. One pair of 'ommatoids' present. Keel present. Male pedipalpal patellar apophysis unmodified, similar to female. Posterior opisthosomal tergites undivided.

Mayacentrum Víquez & Armas, 2006, 37. One pair of 'ommatoids' present. Keel present, but solely in posterior part. All or part of the opisthosomal tergites divided, whip organs absent.



Figures 7-12. Female of *Thelyphonus caudatus* with receptacula seminis attached to the uterus externus laterally (plesiomorphic situation). Bar: 1.9 mm. **8.** Female of *Thelyphonus seticauda*: Bar: 0.8 mm. **9**. Female of *Thelyphonus rohdei.* Bar: 1.5 mm. The arrows point to the receptacula seminis. **10.** Female of *Mastigoproctus giganteus*. Bar: 1.2 mm. The arrows point to the receptacula seminis. **11.** Female of *Typopeltis crucifer* with anterior insertion of receptaculum seminis (arrows)(apomorphic situation). Bar: 1.3 mm. **12.** Female of *Typopeltis guangxiensis*: same.

Mimoscorpius Pocock, 1894, 132. One pair of 'ommatoids' present. Keel present. Male pedipalpal patellar apophysis modified, very long, pedipalpal femur very long. ♂, ♀ with setae on inner surface of pedipalpal patellar apophysis, tibia and tarsus
(*Minbosius* Speijer, 1933b, 68. One pair of 'ommatoids' present. Keel present. At least posterior opisthosomal tergites divided.)

Ravilops Víquez & Armas, 2006, 97. One pair of 'ommatoids' present. Keel absent. Opisthosomal tergites I-IV divided (IV only partially). Whip organs absent. Male pedipalpal patellar apophysis longer and more slender than in female.
(*Tetrabalius* Thorell, 1888, 361. Two more or less divided pairs of 'ommatoids' present. Keel present. At least posterior opisthosomal tergites divided. Distal

joints of tactile leg in females modified.)
Thelyphonellus Pocock, 1894, 133. 'Ommatoids' absent or one pair present. Keel absent. Male pedipalpal patellar apophysis unmodified.
T*helyphonus* Latreille, 1802. One pair of 'ommatoids' present. Keel present. Male pedipalpal patellar apophysis unmodified, but in some species longer than in female. At least posterior opisthosomal tergites divided. Distal joints of tactile leg in females modified.
Typopeltis Pocock, 1894, 126. One pair of 'ommatoids' present. Keel present. Male pedipalpal patellar apophysis modified. Posterior opisthosomal tergites undivided.
Uroproctus Pocock, 1894, 129. One pair of 'ommatoids' present. Keel present. Posterior opisthosomal tergites undivided. Male pedipalpal patellar apophysis modified. Accessory tooth on inner margin of anterior process of pedipalpal coxae.
Valeriophonus Víquez & Armas, 2005, 95. One pair of 'ommatoids' present. Keel present. Whip organs absent. With stridulation organ between pedipalpal coxae and chelicerae.

Thus the following genera are proposed to be synonymized with *Thelyphonus* for the following reasons:
The presence or absence of 'ommatoids' is obvious but it has nothing to do with taxonomy. Certainly, 'ommatoids' like whip organs are recognizable as light spots in the cuticle and serve an osmoregulative function (Haupt *et al*., 1980) which is related to ecological conditions.
Abaliella Strand, 1928, Archiv Naturgesch. 92 (8), 42.
Minbosius Speijer, 1933a, Tijdschr. Ent. 76, V.
Tetrabalius Thorell, 1888, Annali Mus. Civ. Stor. Natur. Giacomo Doria (2) 6, 327-428.
In the case of *Minbosius* no difference to *Thelyphonus* was found.
In *Chajnus* Speijer, 1936, Mitt. zool. Mus. Berlin 21, 258, the single specimen is a subadult male lacking genitalia, therefore it can only be treated as sp. dubium.

Morphology of genital organs

Studying the genial organs have revealed the following results:
The *Ginosigma* male has an angle on the genital attachment, therefore it is definitely different from various species of *Thelyphonus* males (Fig. 5, 6).
Nevertheless, the females of *Thelyphonus, Abaliella, Tetrabalius* (Fig. 7, 8, 9) have a common character, the receptacula seminis are located laterally on the uterus externus, while further species of other south east asian genera (e.g. *Typopeltis*) have receptacula seminis in direct continuation of the uterus externus in anterior position (Fig. 11, 12). In the case of *Minbosius manilanus* the only 'adult' male has no genital organs. As the second species (kopsteini) could not be studied, it remains an open question.

New combinations

Thelyphonus ambonensis (Speijer, 1933b) n. comb. (= *Tetrabalius amboensis* Speijer, 1933b: 71-72).
Thelyphonus borneensis (Speijer, 1933 b) n. comb. (= *Tetrabalius borneensis* Speijer, 1933 b: 72-73)
Thelyphonus borneonus Haupt, 2009 nomen novum (replacement name for *Tetrabalius borneensis* (Speijer, 1933b: 72-73)) n. comb. Etymology: *T. borneonus* originates from the island of Borneo.
Thelyphonus dammermanni (Speijer, 1933b) n. comb. (= *Tetrabalius dammermanni* Speijer, 1933b: 73-74).
Thelyphonus dicranotarsalis (Rowland, 1973a) n. comb. (= *Abaliella dicranotarsalis* Rowland, 1973a: 5-7).
Thelyphonus florensis (Speijer, 1933b) n. comb. (= *Tetrabalius florensis* Speijer, 1933b: 74-75).
Thelyphonus gertschi (Rowland, 1973a) n. comb. (= *Abaliella gertschi* Rowland, 1973a: 3-5).
Thelyphonus kopsteini (Speijer, 1933b) n. comb. (= *Minbosius kopsteini* Speijer, 1933, b: 68-69).
Thelyphonus luzonicus Haupt, 2009 nomen novum (replacement name for *Abaliella manilana* (Kraepelin, 1900: 7-8)) n. comb. Etymology: *T. luzonicus* is derived from the island of Luzon.
Thelyphonus manilanus C.L. Koch, 1843 (= *Minbosius manilanus* Speijer, 1936: 258).
Thelyphonus nasutus (Thorell, 1888) n. comb. (= *Tetrabalius nasutus* Thorell, 1888: 401-405).
Thelyphonus rohdei (Kraepelin, 1897) n. comb. (= *Abaliella rohdei* (Kraepelin, 1897): 16-17).
Thelyphonus samoanus (Kraepelin, 1897) n. comb. (= *Abaliella samoana* (Kraepelin, 1897): 17).
Thelyphonus seticauda Doleschall, 1857 n. comb. (= *Tetrabalius seticauda* (Doleschall, 1857): 404).
Thelyphonus willeyi (Pocock, 1898) n. comb. (= *Abaliella willeyi* (Pocock, 1898): 98).

In consequence of this synonymy, the following key is proposed, without distinguishing further families except Thelyphonidae.

1. Stridulation organ present between coxa of pedi palp and base of chelicera……..*Valeriophonus*
- Stridulation organ absent …….2
2. ♂♂…….. 3
- ♀♀ (♂♂ included)..... 4
3. Sternite III with median tooth (Asian species)..... 4
- Sternite III without median tooth (American and African species)……...…….. 11
4. Pedipalpal coxa with median tooth 5
- Pedipalpal coxa without median tooth 6
5. Keel present between lateral and median eyes .. ..…… *Uroproctus*
- Keel absent between lateral and median eyes ..... *Labochirus, (Hypoctonus stoliczkae*?)
6. Asian species..... 7
- American and African species 11
7. Keel present between lateral and median eyes…8
- Keel absent between lateral and median eyes .....…… *Hypoctonus*
8. Male pedipalpal patellar apophysis clearly modified or very slender, female genital plate sculptured, at least its posterior part differentiat..... .....*Typopeltis*

- Male palpal apophysis nearly the same as in female ,,,,,,,,…… 9, 10
9. Male sternites VIII and IX modified ……. …….. *Glyptogluteus* (female unknown)
- Male sternites VIII and IX not modified, female genital plate unmodified…..... *Thelyphonus* (including female *Ginosigma*)
10. Male with round structure on sternite V filled with hair sensilla, pedipalpal tibia enlarged but palpal apophysis similar to female… *Ginosigma*
- Male without any differentiation on sternite V.... ……,……..…. 11
11. Keel present between lateral and median eyes, at least in posterior part …..... 12
- Keel absent between median and lateral eyes ..... ,,……...…… 14, 15
12. Male pedipalpal femur very long, tibia extremely flat. ♂, ♀ with long setae on inner surface of pedipalpal patellar apophysis, tibia and tarsus ....*Mimoscorpius*
- Male pedipalpal femur normal, no setae present on inner surface of pedipalps .....…….. 13
13. Opisthosomal tergites undivided, keel between anterior and lateral eyes in full length ……. ……...……...*Mastigoproctus*
- Opisthosomal tergites at least partly divided.……..……...… 14
14. Keel only present in posterior part ……. ……... *Mayacentrum*
- Opisthosomal tergites I-IV divided (IV only partly), with neither whip organs nor keel ….. .....*Ravilops*
15. Opisthosomal tergites II and III divided, the following one partially divided, median eyes more anterior, without keel, American species….. ,,,,,……*Thelyphonellus*
Median eyes more posterior than in *Thelyphonellus*, without keel, African species ..... *Etienneus*

Discussion

One of the main questions today is on the phylogeny of Thelyphonids. At least it has been possible to distinguish plesiomorphic (i.e. *Thelyphonus*), and apomorphic (i.e. *Typopeltis*) genera, even though a phylogenetic tree could not be constructed.
Weygoldt (1988, cf. discussion) distinguished two types according to spermatophore function and morphology:

Thelyphonus which does not deal with the sperm packages, at all.

Mastigoproctus, Thelyphonellus and *Typopeltis* which at the end of mating embrace the opisthosoma of the female in order to empty the sperm packages.
He subdivided the second type in *Mastigoproctus – Thelyphonellus* and *Typopeltis* which emptied the sperm packages entirely (2a & 2b).

I am inclined to raise this second type to independence in order to mirror the morphology of sexual organs, lateral attachment of receptalula seminis to the uterus externus (in *Thelyphonus, Thelyphonellus*, *Mastigoproctus* etc.) and direct, anterior attachment of the receptacula seminis to the uterus externus (in *Typopeltis*). In fact, we will have to deal with three types: 1. *Thelyphonus*, 2. *Mastigoproctus – Thelyphonellus*, 3. *Typopeltis. Thelyphonus* will be considered the most plesiomorphic, *Mastigoproctus – Thelyphonellus* intermediary and *Typopeltis* apomorphic.

Some female Thelyphonids have marks on the distal joints of the first leg. In order to be not misled one should distinguish whether these are cuts, black marks or really morphological distinctions. In at least one species of *Typopeltis* cuts are inflicted by the male, they are typically not symmetrical (Haupt, 1997). The unmated females are devoid of it and also devoid of darkenings on the distal joints of the tactile leg. The same could be true for the black marks of *Thelyphonus* – they are in many cases also not symmetrical. In the genus *Abaliella*, there are morphological differentiations, but not in all species (e.g. *A. rohdei*). What they are good for? This question can only be solved by observing living female specimens.

Thorell (1888) and Kraepelin (1897) agree about the monotony of Thelyphonida (...erweisen sich die Beschreibungen und namentlich die Abbildungen der älteren Autoren als vollkommen unzulänglich...[und so ist] vielfach nur mit Hilfe des Originalexemplars ein sicheres Urteil über ihre Identität...zu gewinnen.) Unfortunately, this situation has not changed much – especially in South East Asia. Many details were described which nowadays seem to be 'traditional', while certain other information much needed (e.g. on genital organs) is lacking.

While Kraepelin (1899) only knew one single family – Thelyphonidae - several authors tried to divide up Thelyphonida into separate subfamilies or families (Pocock, 1899, Speijer 1936, Rowland & Cook, 1973), but apparently it is too early to do that (Weygoldt, 1979). In addition, the biology of several genera is not fully understood – or not understood at all.

Börner (1904) mainly studied *Thelyphonus caudatus* and species of *Mastigoproctus*, i.e. plesiomorphic species. This resulted in the fact that he did not recognize differences in apomorphic species. Moreover, he stated that 'ocelli or ommatoids' do not have the slightest similarity with real ocelli and he also did not find a similarity to luminary organs of other land arthopods. Kraepelin (1900) expressed doubt concerning the importance of 'ommatoids' at the generic level.

Weygoldt (1979) studied *Thelyphonellus amazonicus* (Butler, 1872) and found 'ommatoids' in some specimens, although small, while other specimens did not have such organs. The genera *Abaliella* Strand, 1928 and *Glyptogluteus* Rowland, 1973b totally lack such organs.

Apparently, 'ommatoids' were overestimated in the past concerning their taxonomic importance. Their function was not understood. Once it became known that they are related to the whip organs and contain a transporting epithelium (Haupt *et al*., 1980) engaged in the resorption of solutes and/or water, their presence or absence is certainly related to ecological conditions in the surrounding atmosphere.

Therefore, the following genera are synonymized with *Thelyphonus*: *Tetrabalius* and *Abaliella.*

Some genera like *Minbosius* and *Ginosigma* contain two species, each. In the case of *Minbosius* species, they are from the Northern part of the Philippines (*T. luzonicus* = *Minbosius manilanus*) and from an island (Noesa Laoet) near Ambo(i)n(a) in Indonesia (*kopsteini*). The holotype of *Minbosius kopsteini* is a female only known from the literature, in the same vial are a very small male (inspected) and a subadult female. No wonder, why a generic definition is lacking: apparently, there is no difference to *Thelyphonus* and therefore I synonymize the genus *Minbosius* to *Thelyphonus*.

In the case of *Ginosigma* the male has a round spot on sternite V with hair sensilla and the genital attachment shows an angle as compared with *Thelyphonus* (Fig. 5). The last joint of the female tactile leg is bayonet-shaped and the penultimate joint shows three processes. Speijer (1936) included two species in this genus, *G. schimkewitschi* and *G. lombokensis*. As the second species, of which only a female is known, has a bayonet structure on the last joint of the tactile leg as well and only smaller processes on the penultimate one joint, it could well be considered as an island form from Lombok of the widely distributed *G. schimkewitschi* – once the male will be found with the same typical structure on sternite V. A bayonet-shaped last joint of the female tactile leg is fairly common among species of the genus *Thelyphonus*. It occurs in *Thelyphonus leucurus* Pocock, 1898 (T. X), *T. asperatus* Thorell, 1888 (as the holotype happens to be a male, see depiction by Kraepelin, 1897), *T. burchardi* Kraepelin 1911, *T. lawrenci* Rowland, 1973a (although tooth more basally). This shows that *Ginosigma* is rather closely related to *Thelyphonus*.

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