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Systematic notes on several Tessaratominae genera described by Arnold Lucien Montandon (Heteroptera, Tessaratomidae)

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Abstract. – After studying photographs of the type specimens of two tessarratomid species described by Montandon (*Anacanthopus flavolimbatus* Montandon, 1894, and *Notopomus isidorei* Montandon, 1894), it is apparent that the genus *Anacanthopus* Montandon, 1894, is a junior subjective synonym of *Mattiphus* Amyot & Serville, 1843. This results in the new combination *Mattiphus flavolimbatus* (Montandon, 1894), n. comb. Additionally, a comparison between the two genera *Notopomus* Montandon, 1894, and *Siphnus* Stål, 1863, indicates that *Notopomus* should be downgraded to a subgenus of the latter. Consequently, Notopomini Horváth, 1900, becomes a junior synonym of Tessaratomina Stål, 1863.

Résumé. – **Notes systématiques à propos de quelques genres de Tessaratominae décrits par Arnold Lucien Montandon (Heteroptera, Tessaratomidae)**. L'étude de photos des types de deux espèces de Tessarratomidae décrites par Montandon (*Anacanthopus flavolimbatus* Montandon, 1894, et *Notopomus isidorei* Montandon, 1894) a fait apparaître que le genre *Anacanthopus* Montandon, 1894, est synonyme subjectif junior de *Mattiphus* Amyot & Serville, 1843, entraînant la nouvelle combinaison *Mattiphus flavolimbatus* (Montandon, 1894), n. comb., tandis que la comparaison entre *Notopomus* Montandon, 1894, et *Siphnus* Stål, 1863, a conduit à le ramener au rang de sous-genre de ce dernier. Conséquemment, Notopomini Horváth, 1900, devient un synonyme junior de Tessaratomina Stål, 1863.

Keywords. – Taxonomy, morphology, new synonyms, Tessaratomini, Notopomini, *Anacanthopus*, *Notopomus*, *Mattiphus*, *Siphnus*.

Arnold Lucien Montandon (1852-1922) was a self-taught entomologist. Born in France, he re-located to Romania at the age of twenty and remained there until his death. As a renowned hemipterist, he was interested in all aspects of the natural sciences; he collected and exchanged material in many fields, from entomology to malacology and even herpetology. For ten years, he worked at the Museum of Bucharest as an assistant to Grigore Antipa. He exchanged specimens with some of the greatest hemipterists of his time (e.g., A. Puton, G. von Horváth, and O. M. Reuter). During his career as an entomologist, he described more than four hundred species (Andrei, 1982).

In his only paper dealing with Tessaratomidae (Montandon, 1894), he described three new genera (*Anacanthopus*, *Notopomus*, and *Selenymenum*) and seven new species of tessaratomid bugs (*A. flavolimbatus*, *Eurostus moutoni*, *E. ochraceus*, *N. isidorei*, *Selenymenum. contractum*, *S. piriforme* and *Tessaratoma miscella*), some of which require further study. Among the new genera, two are monospecific: *Anacanthopus*, which Montandon placed near *Eusthenes* Laporte, 1833, and *Mattiphus* Amyot & Serville, 1843, both placed in the subtribe Eusthenina Stål, 1870, and *Notopomus*, about which he wrote that it could not be placed in any existing section of the Tessaratomidae.

The family level for the Tessaratomidae was first recognized by Stål (1865). Previously, the members of the family were considered as belonging to the Pentatomidae. Its three subfamilies, Natalicolinae, Oncomerinae and Tessaratominae, were also recognized by Stål (1865, 1870).

The current tribal and sub-tribal levels are mainly the result of the above-mentioned works of Stål, and also that of HORVÁTH (1900). These levels apply only to the tribal categories within the subfamily Tessaratomine. The tribe Notopomini was erected by HORVÁTH (1900) for *Notopomus* and is presently considered as *incertae sedis*.

Thanks to the care of Mrs Aurora Stanescu from the Grigore Antipa Museum in Bucharest (Romania), who sent to me some years ago a series of pictures of the seven Montandon species in the collection of this institution, I have been able to compare them with other species of Tessaratomidae. The comparison of *Anacanthopus* with other species of Eusthenina has led to the conclusion that it is in fact a synonym of another previously described genus, *Mattiphus* Amyot & Audinet-Serville, 1843 (Tessaratomini, Eusthenina). Similarly, it appears that *Notopomus* is in fact at most a subgenus of *Siphnus* Stål, 1863 (Tessaratomini, Tessaratomina).

MATERIAL AND METHODS

Abbreviations. – Specimens studied in this paper are deposited in the following institutions and collections: **BMNH**, The Natural History Museum, London, United Kingdom; **MGAB**, Museum of Natural History "Grigore Antipa", Bucharest, Romania; **MNHN**, Muséum national d'Histoire naturelle, Paris, France; **NHRS**, Naturhistoriska Riksmuseet, Stockholm, Sweden; **PMPF**, Philippe Magnien private collection, Paris, France; **RMNH**, Naturalis Biodiversity Centre, Leiden, the Netherlands; **ZJPC**, Zdeněk Jindra private collection, currently deposited at the Department of Plant Protection, Czech University of Life Sciences, Prague, Czech Republic.

Genitalia preparation. – Male pygophores were dissected in water after clearing in cold 10% potassium hydroxide solution for about one day. The phallus was inflated with the use of forceps. To avoid osmotic crushing, transfer of genitalia to glycerol was made by the use of a 10% glycerol/water solution, and left to evaporate at ambient temperature. Examination of genitalia was conducted in glycerol using a semi-covered cavity slide.

Imaging. – Habitus pictures were taken with an Olympus OM D camera, using focus bracketing. Pictures of genitalia were made with a Tucsen IHS 1000 camera on a Paralux microscope. Macro- and micrograph were assembled with the software Helicon Focus.

Material examined. – For comparison with *A. flavolimbatus*: numerous male and female specimens of *Mattiphus aurifer* Stål, 1870 (fig. 3), *M. hians* Stål, 1871, *M. reflexus* Dallas, 1851, and *Mattiphus sp*. near *M. aurifer*, from the Philippines, specially Mindanao (MNHN, PMPF), and *Mattiphus celebensis* Blöte, 1945 (holotype *in* RMNH, PMPF).

For comparison with *Notopomus isidorei*: ♂ syntype of *Siphnus alcides* Stål, 1863 (Cambodia) (NHRS); holotype of *Siphnus dilatatus* Walker, 1868 (Thailand) (BMNH); ♂ syntype of *S. hector* Stål, 1863 (Ligor Malacca, today Nakhon Si Thammarat, Peninsular Thailand) (NHRS); ♀ holotype of *Siphnus hercules* Blöte, 1945 (Long Blu-u, Mahakkam, which is in Kalimantan, November 1893, Borneo Expedition, *Dr Nieuwenhuis*, XI.1893); *Siphnus spp*. (♂ and ♀, Cambodia, Vietnam, MNHN; ♀, Peninsular Malaysia, ZJPC; ♂, India (Andaman Isl.), ♂ and ♀, Kalimantan (Indonesia), ♂ and ♀, Laos, ♂ and ♀, Palawan (Philippines), ♂, Thailand, PMPF).

TAXONOMY

For a complete list of citations for the species studied herein, readers are directed to ROLSTON *et al*. (1994). Photographs of all the species quoted in this work can be found in the online catalogue of Tessaratomidae (MAGNIEN, 2022).

Subfamily **Tessaratominae** Stål, 1865

Tribe **Tessaratomini** Stål, 1865

Subtribe **Eusthenina** Stål, 1870

Genus ***Mattiphus*** Amyot & Audinet-Serville, 1843

Mattiphus Amyot & Serville, 1843: 168. Type species: *Mattiphus carrenoi* Amyot & Serville, 1843 (syn. *Eusthenes laticollis* Westwood, 1837), by monotypy.
Syn. *Anacanthopus* Montandon, 1894: 639, **n. syn.**

Diagnosis. – Medium size (20-30 mm); metasternal carina elevated to the level of meta- and meso-coxae; overall shape regularly ovoid, save for the anterolateral margins which can be angular or even slightly produced forwards (e.g., *M. laticollis* Westwood, 1837); male metafemora not incrassate, male metatibiae not curved. Phallus fitted with four pairs of processus, one dorsal membranous, one lateral strongly sclerotized, and two ventral, the distal biramose and partially sclerotized, the proximal very small, membranous; spermatheca of the common tessaratomine type, with the exception of small invagination of the proximal ductus, near its junction with the vaginal sack.

Discussion. – Montanton (1894) described *Anacanthopus* from a single male specimen collected in Jolo. The characters used in this description apply equally well to our present day understanding of *Mattiphus*. So, for any distinctive criteria, we have to rely on his discussion, in which he compared *Anacanthopus* to various other Eusthenina genera, among which he selected *Eusthenes* and *Mattiphus* as the closest. About those, he wrote: "*Ce genre est très voisin des* Eusthenes *et* Mattiphus*. Avec la forme et les élévations sternales et abdominales dans le genre de celles des premiers (l'élévation métasternale ne fait cependant pas exactement suite au tubercule abdominal) ; il a les pattes simples et grêles des seconds.*" [= This genus is very close to *Eusthenes* and *Mattiphus*. With the shape and the sternal and abdominal elevations similar to those of the first (metasternal elevation however not exactly in the continuation of the abdominal tubercle). It has the simple and thin legs of the second.]

To summarize those arguments, he found the general shape of his specimen to be closer to *Eusthenes* than to *Mattiphus*, the disposition of the metasternal elevation and abdominal tubercle similar to that of *Eusthenes* but not quite, and the legs are similar to those of *Mattiphus*.

In his first argument, Montandon implies that the shape of the habitus is more like that of *Eusthenes* than that of *Mattiphus*. This is somewhat surprising, as the habitus shape of species of both genera is very similar; the habitus of *A. flavolimbatus* (fig. 1) is, for example, close to that of *M. aurifer* (fig. 3). One can only speculate that the author had in mind a species that has been since transferred to *Asiarcha* Stål, 1870, *A. oblonga* (Dallas, 1851), the shape of which is subquadrangular, not regularly rounded like in most of the species of *Mattiphus*. Concerning the remark about the metasternal elevation as an indication that the median bulge of the third abdominal sternite is not level with the metasternal elevation, I have examined this condition in *Mattiphus* specimens from various collections, listed herein above under "Material examined". In fact, the metasternal elevation is level with the abdominal tubercle in *Eusthenes*, but in *Mattiphus*, it is declivent posteriorly, and not always contiguous with the tubercle of the 2nd abdominal segment. This extreme condition appears in ten to twenty percent of the specimens checked, and it seems to be a matter of individual variation, as it can be present in some specimens, but not in all. The only species which presents this character in all specimens that I have examined is *Mattiphus celebensis*, but I was only able to examine a limited sample (three specimens including the type in RMNH, and two specimens from PMPF).

So, it appears that there is no good evidence to set this species apart from *Mattiphus* which then leads to the conclusion: *Anacanthopus* Montandon, 1894, **n. syn.** of *Mattiphus* Amyot & Audinet-Serville, 1843, which results in the new combination: *Mattiphus flavolimbatus* (Montandon, 1894), **n. comb.**

This brings the number of species included in the genus to 11: *Mattiphus aeruginosus* Stål, 1863 (Sri Lanka), *M. aurifer* Stål, 1870 (Philippines), *M. celebensis* Blöte, 1945 (Indonesia: Sulawesi), *M. flavolimbatus* (Montandon, 1894) (Philippines), *M. hians* Stål, 1871 (Philippines), *M. jaspideus* (Herrich Schäffer, 1851) (India, China, and Southeast Asia), *M. laticollis* (Westwood, 1837) (India and Southeast Asia), *M. minutus* Blöte, 1945 (China), *M. reflexus* (Dallas, 1851) (Philippines), *M. splendidus* Distant, 1921 (China and Southeast Asia) and *M. yunnanensis* Zia, 1957 (China).

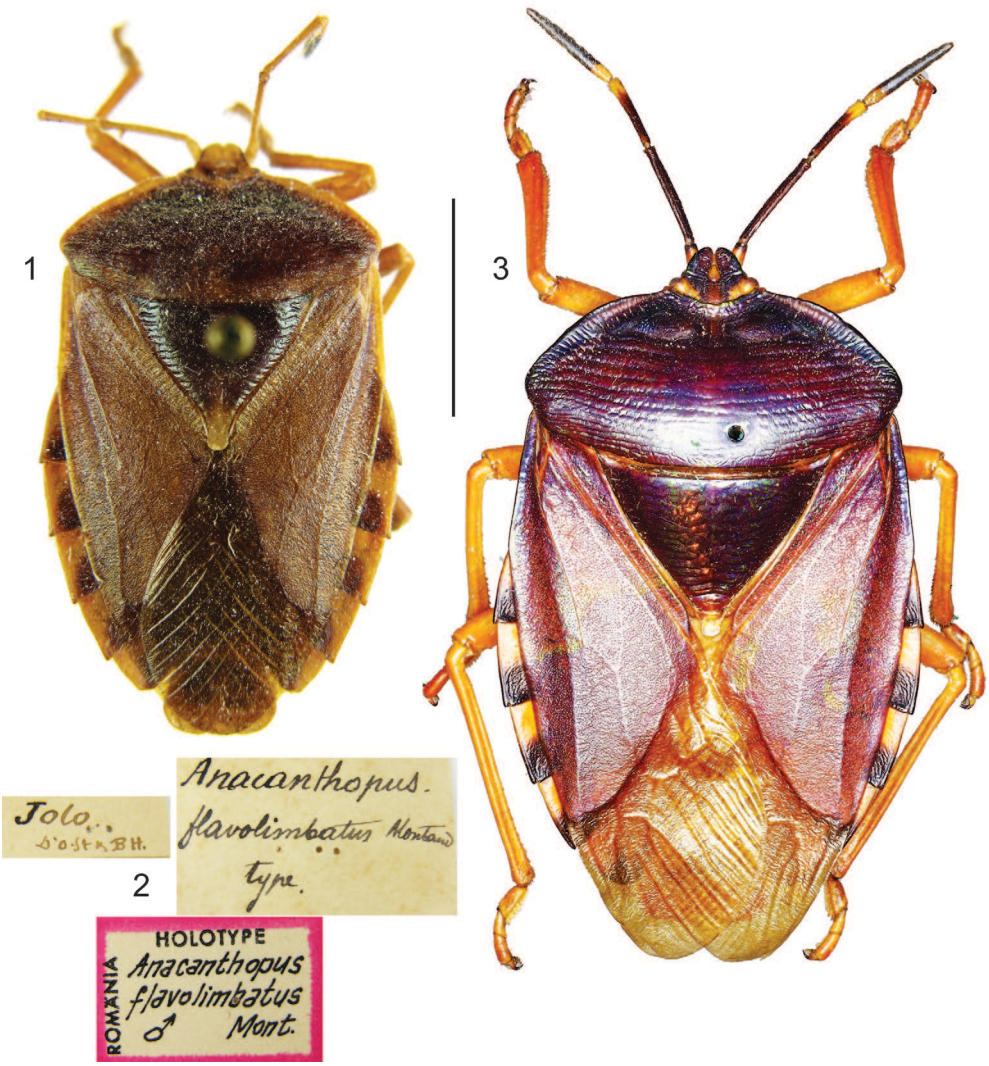

Fig. 1-3. – **1-2**, *Anacanthopus flavolimbatus* Montandon, ♂ holotype *(Photos G. Nazareanu)*: **1**, habitus; **2**, labels. – **3**, *Mattiphus aurifer* Stål, ♂ specimen from Luçon (Philippines) (PMPF). Scale: 10 mm.

The identification of some of the above listed species is relatively easy. For example, *Mattiphus aeruginosus*, *M. flavolimbatus*, *M. hians*, *M. laticollis*, *M. minutus* and *M. reflexus* can be separated by their origin and habitus. Regarding *M. aurifer* and *M. celebensis*, the problem is that in both cases, there are other species still undescribed that are related to either of them, differing mainly by the form of the male genitalia. They belong to at least three groups species. Their precise identification will require the dissection of the types. As for the Chinese species, *M. jaspideus*, *M. splendidus* and *M. yunnanensis*, by the admission of the author of the last, there have not been sufficient studies to be sure that these species are no more than individual or regional variation of other species in the genus.

Mattiphus flavolimbatus (Montandon, 1894), **n. comb.**

Anacanthopus flavolimbatus Montandon, 1894: 640. Rolston *et al*., 1994: 59.

Material examined. – Photograph of the ♂ holotype[1] of *Anacanthopus flavolimbatus* Montandon (fig. 1-2) (MGAB) [from Jolo, an island located South-West of Mindanao, Philippines].

Remark. – The validity of this species requires further investigation; it cannot be easily assigned to any of the three species currently known from the Philippines (i.e., *Mattiphus aurifer*, *M. hians* or *M. reflexus*). Its habitus is very close to that of *M. aurifer*, but the size is smaller (20 mm according to Montandon, while the specimens related to *aurifer* that I have examined are about 25–30 mm long). The flavescent colour of the anterolateral margins of pronotum, and the antennae (except for the apex of the 4th antennomere) set it apart from all specimens from Mindanao which I have studied. Unfortunately, I did not see any other specimens from Jolo Island.

Subtribe **Tessaratomina** Stål, 1865

Tessaratomida Stål, 1865: 33.
Syn. Notopomaria Horváth, 1900: 340, **n. syn.**

Genus ***Siphnus*** Stål, 1863

Siphnus Stål, 1863: 597. Type species: *Siphnus alcides* Stål, 1863, by subsequent designation (Kirkaldy, 1909).

***Siphnus* (*Notopomus*)** Montandon, 1894, **n. stat.**

Notopomus Montandon, 1894: 641. Type species: *Notopomus isidorei* Montandon, 1894, by monotypy.

Material examined. – Photographs of a ♀ syntype[2] of *Notopomus isidorei* Montandon, Pulo Penang (Peninsular Malaysia) (MGAB).

Diagnosis. – Large Tessaratomina (28-35 mm), best characterized by its very large head relative to all other Tessaratomina genera.

Discussion. – Montandon (1894) made his description of *Notopomus isidorei* from two female specimens collected in Pulau Penang, an island near the northwestern coast of Peninsular Malaysia. In his discussion, he stated that these specimens could not fit any of the already known groups of Tessaratomidae. He wrote: "*Ce genre à stigmates du premier segment ventral découverts n'entre dans aucune des sections créées jusqu'à présent dans la s. fam. des Tessaratominae. Il diffère de tous les autres genres connus par sa forte tête assez large, moins atténuée*

[1] Most of the types of Tessaratomidae described in Montandon's paper have been fitted by Dr Aurelian Popescu-Gorj with labels "holotype", "lectotype" or "allolectotype". Dr Melanya Stan has confirmed to me that those designations, which he did on a much larger scale in the Grigore Antipa museum collections, have never been published. So, they remain *in litteris*.

[2] See [1] about type label. Dr M. Stan checked the collection, and she was unable to find the second syntype quoted by Montandon in his paper. It should perhaps be considered to be lost.

en avant. Par son pronotum prolongé en arrière sur la base de l'écusson, comme aussi par la forme anguleuse du sixième segment ventral et des pièces génitales, de même que par les cellules basilaires de la membrane, il se rapproche du genre Tessaratoma *; mais par ses tarses franchement biarticulés il appartiendrait plutôt aux Cyclogastrina*." [= This genus with exposed spiracles of the first ventral segment does not fit in any of the subsections of the subfamily Tessaratominae. It differs from all other known genera by its strong, relatively large head, decreasing less forward. By its pronotum prolonged posteriorly over the scutellum base, by the angular shape of the sixth ventral segment and the genital plates, as well by the basal cells of the membrane, it comes closer to the genus *Tessaratoma*; but by its clearly biarticulate tarsi it would rather fit in the Cyclogastrina].

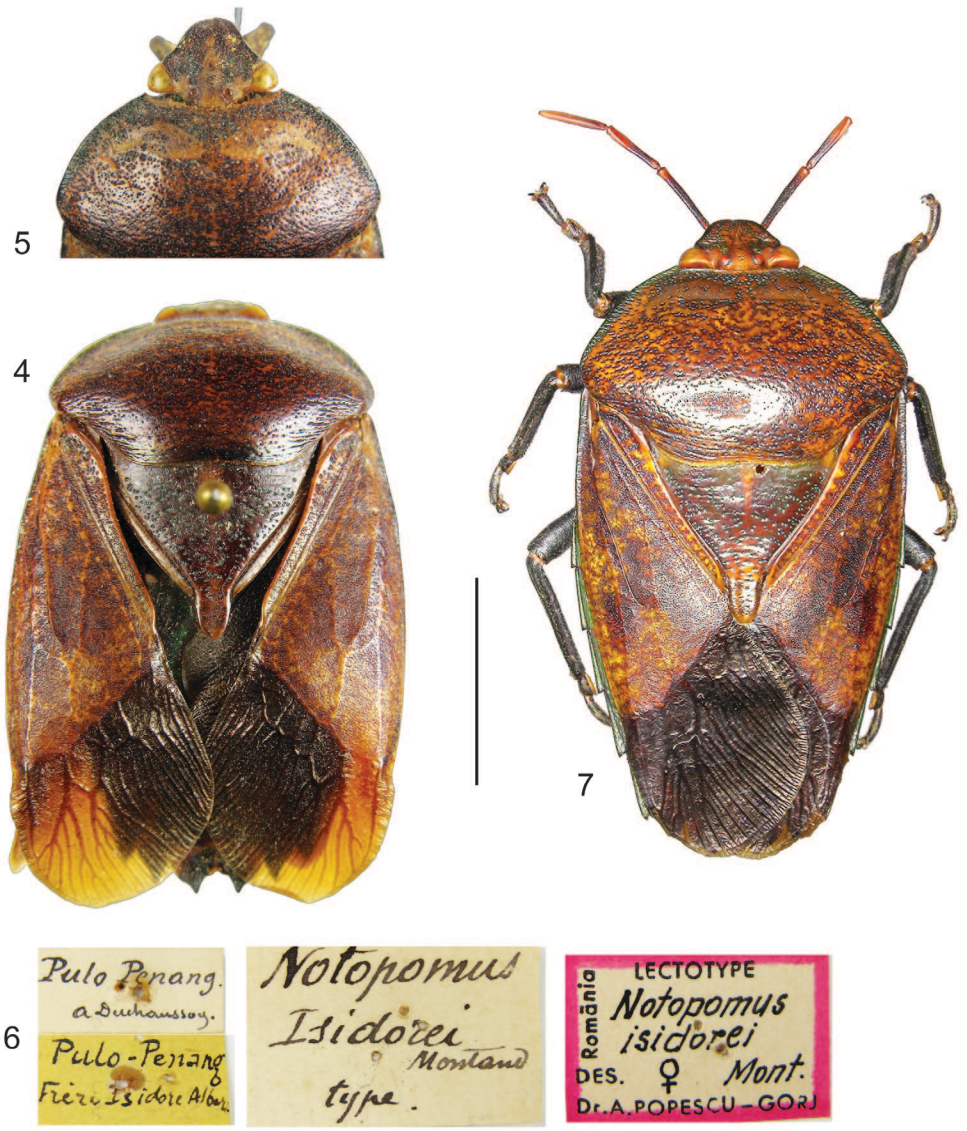

Fig. 4-7. – **4-6**, *Notopomus isidorei* Montandon, ♀ syntype: **4**, habitus; **5**, head and pronotum; **6**, labels *(Photos G. Nazareanu)*. – **7**, *Siphnus sp*., dimerous ♀ specimen from Siem Reap (Cambodia) (MNHN). Scale: 10 mm.

So, his argument was based on the fact that the dimerous state of its tarsi would place them close to Natalicolinae, which covers the division of Tessaratomidae that Montandon called Cyclogastrina, whereas the shape of the pronotum and the membrane venation would incline be more related to the Tessaratominae, and the size of the head was completely unusual inside Tessaratomidae.

Regarding the size of the head, essentially the largest in the Tessaratomidae, it seems that Montandon overlooked the original description of *Siphnus* (Stål, 1863) in which it was stated: "*... Caput sat magnun, obtuse triangulare ...* Tessaratomati *affine genus, capite majore, in hac familia maximo* …" [= … Head rather large, obtusely triangular ... Close to *Tessaratoma*, head bigger, the largest in this family…].

This narrows the discussion to the presence of dimerous tarsi in this species. I have studied numerous specimens of *Siphnus* from the Indochinese Peninsula as well as from Borneo, Palawan and Andaman Islands. I found dimerous specimens in Vietnam (Saigon), Thailand (Chiang Mai), Cambodia (Angkor) (Fig. 7), and India (Andaman Islands). Petr Kment, who checked Walker's type of *S. dilatatus* and other specimens in the BMNH collection, found dimerous specimens mixed in a sample of *S. alcides* specimens as well as among unidentified ones. This demonstrates that dimerous specimens are almost as common as trimerous in the genus. It is quite surprising that, apart from Montandon, no one else noticed this interesting character.

Dimerous tarsi occur in at least in one other species of Tessaratomina, *Pygoplatys* (*Odontoteuchus*) *berendi* Magnien, 2011, a species from Sulawesi which, apart from being dimerous, is completely in line with the diagnosis of the subgenus, not only in its habitus but also in its genitalia structure (Magnien, 2011). So, it appears that this character should not be used as diagnostic at the genus level or higher. One might speculate whether the joint between the second and third tarsomeres are always completely functional in the tessaratomines; this would require further study.

The previously described species of *Siphnus* have been checked in regard to the di- or trimerous state. Gunvi Lindberg (NHRS) provided photographs of the syntypes for both species that were described by Stål's. Petr Kment checked the holotype of Walker's species in BMNH, and I personally studied the holotype of Blöte's species in RMNH. All of them are trimerous, which is in itself remarkable, in view of the frequency of dimerous specimens in collections.

Regarding di- or trimerous *Siphnus*, I found no specific differences in the habitus (fig. 3-6), which explains why they are mixed in the collections, but I discovered one difference in the male genitalia. The parameres have the same overall shape, and the phallus has the same number and organisation of processes, but the shape and development of the later shows some constant differences. Those differences were already presented by Kumar & Ghauri (1970), who illustrated the genitalia of *S. dilatatus* and three different unidentified *Siphnus* species, but apparently, they missed the fact that one of the unidentified species was most probably dimerous (Kumar & Ghauri, 1970: 7, figure 15).

Males of the trimerous species have the dorso-distal process of the phallus biramose, with parts strongly sclerotized, and a uniramose sclerotized lateroventral process (fig. 8), while males of the dimerous species have the dorso-distal process uniramose, digitiform, at most weakly sclerotized, and a biramose sclerotized lateroventral process (fig. 9).

From the specimens I examined during this study, I suspect that there are at least two to three species of dimerous *Siphnus*. Having only studied one of the female syntypes of *Notopomus isidorei* from photographs, I have not been able to assign a male to this species, especially because, except for a specimen of *S. hercules*, I have not seen any specimens from Peninsular Malaysia, which is its type locality. This again, requires further study.

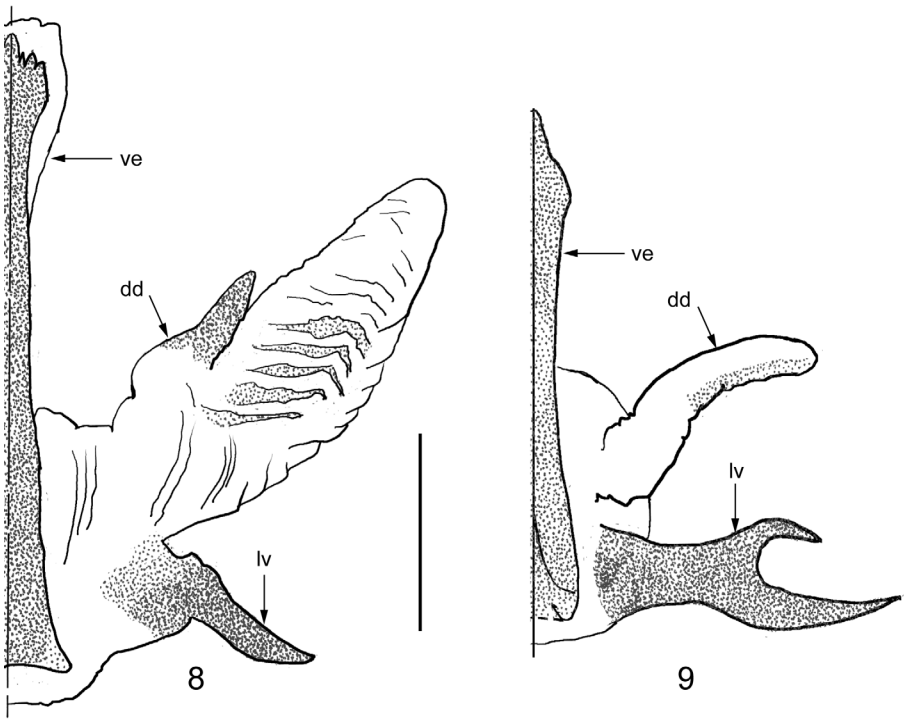

Fig. 8-9. – *Siphnus spp.*, processes of phallus (posterior view). – **8**, *S. alcides* Stål, trimerous specimen from Chiang Mai (Thailand) (PMPF). – **9**, *Siphnus sp*., dimerous specimen from Angkor (Cambodia) (MNHN). Lettering: dd, dorso-distal process; lv, latero-ventral process; ve, vesica. Scale: 1 mm.

The fact that the two groups of species can be separated by more than one character, unlike what was found in *Pygoplatys*, leads to me retain the name *Notopomus*, but it should be downgraded to the subgenus level. The table I summarizes the key characters to separate the two subgenera.

These results can be further summarized by the following list.

Tribe **Tessaratomini** Stål, 1865
Syn. Notopomini Horváth, 1900, **n. syn.**
Genus ***Siphnus*** Stål, 1863
Subgenus ***Siphnus*** Stål, 1863
Siphnus* (*s. str.*) *alcides Stål, 1863
Siphnus* (*s. str.*) *dilatatus Walker, 1868
Siphnus* (*s. str.*) *hector Stål, 1863
Siphnus* (*s. str.*) *hercules Blöte, 1945
Subgenus ***Notopomus*** Montandon, 1894, **n. stat.**
Siphnus* (*Notopomus*) *isidorei (Montandon, 1894), **n. comb.**

Table I. – Key characters to the subgenera of *Siphnus* Stål.

	Siphnus	***Notopomus***
Tarsi	trimerous	dimerous
Dorso-distal process of phallus	biramose, sclerotized	simple, digitiform
Lateroventral process of phallus	uniramose, sclerotized	biramose, sclerotized

Acknowledgements. – My thanks go to Gunvi Lindberg (NHRS) who studied Stål's types for me, and made photographs of the tarsi, to Petr Kment (National Museum, Prague) who took time to study Walker's type for me while he was visiting the BMNH, and then also for checking the manuscript, to Aurora Stanescu and George Nazareanu (MGAB) who provide photographs of the Montandon's tessaratomid types, to Aurelia Stan (MGAB) who answered questions about the types, and to Dominique Pluot-Sigwalt and David Rider for their help to improve this paper.

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