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Noguchiphaea mattii sp. nov. from southern Vietnam (Odonata: Calopterygidae)

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Abstract

Noguchiphaea mattii sp. nov. (Hon Ba Nature Reserve, 12°23'N, 109°08'E, Khanh Hoa Province, southern Vietnam, leg. 29 iv 2006, to be deposited in Zoology Collection, Hanoi University of Science) is described from the male sex and compared with *N. yoshikoae*, a species collected for the first time in Vietnam in Tam Dao, Vinh Phuc Province. Photos of male and female specimens of *N. yoshikoae* taken in nature are provided.

Introduction

Asahina (1976) described a new calopterygid genus *Noguchiphaea* based on two male specimens of *N. yoshikoae* Asahina, 1976 from Doi Inthanon in Chiang Mai Province in the northern part of Thailand. Subsequently Asahina (1981) described the female of this species, which was collected in the same area – Doi Suthep in Chiang Mai – as the type, and provided additional characters for the genus. In a third paper, Asahina (1985) described further characters of both sexes and considered *N. yoshikoae* as endemic to Thailand.

On a trip to southern Vietnam in April 2006 I collected an unknown male calopterygid, close to *N. yoshikoae*, from Hon Ba Mountain, west of Phong Thanh, Nha Trang area, Khanh Hoa Province. Then in September 2007 I discovered *N. yoshikoae* in Tam Dao Mountains, Vinh Phuc Province, northern Vietnam. The characters of my Tam Dao specimens agree well with the descriptions by Asahina (1976, 1981, 1985).

In this paper the new *Noguchiphaea* species is described and compared with *N. yoshikoae*. In addition some generic characters are discussed.

Noguchiphaea mattii sp. nov.
(Figs 1, 2)

Etymology

The species is named after Matti Hämäläinen (Espoo, Finland), who is well known for his many publications on oriental odonates, and who has supported my research on the Vietnamese dragonflies.

Specimens examined

Holotype ♂: Hon Ba Nature Reserve (12°23'N, 109°08'E), Nha Trang area, Khanh Hoa Province, Vietnam, 29 iv 2006, leg. Do Manh C., to be deposited in Zoology Collection, Hanoi University of Science. Female unknown.

Specimens of *N. yoshikoae* studied for comparison: 1 ♂, 3 ♀ from Silver waterfall (800-900 m), Tam Dao, Vinh Phuc Province, Vietnam, 30 ix 2007 leg. Do Manh C., deposited in coll. Do Manh.

Description of holotype male

A slender and long-bodied calopterygid, overall metallic green, with narrow hyaline wings (Fig. 1).

Head: Occiput, vertex, frons, ante- and postclypeus and labrum shining metallic green. Antennae black with the bulbous pedicel yellow on the frontal side. Labium yellowish with movable hook and end hook of labial palp black. Mandibles black with a large yellow spot on the lateral side (Fig. 2a).

Thorax: Prothorax mainly metallic green except the lower part which is yellowish. Posterior lobe relatively simple, with a moderately produced, curved median process (Fig. 2b). Synthorax shining metallic green; in lateral view, mesepisternum entirely metallic green, mesokatepisternum also mainly metallic green, except for the posterior lower part near the coxa; the mesepimeron and metepisternum are both metallic green with a small yellowish area ventrally. Metakatepisternum yellowish with a small dot at the upper edge near metepisternum. Metepimeron yellowish with a metallic green markings in the centre and at the upper edges (Fig. 2c). — Legs black except the coxae and trochanters which are yellowish. — Wings hyaline. Antenodals respectively number 22 in the first row and 21 in the second row of the Fw; and 19 in the first row and 20 in the second row of the Hw. Pterostigma absent in both wings. R2+3 bends upward and is confluent with R1 for a short distance. Quadrangle without cross-veins in both wings. In the cubital space there are 4 cross-veins in Fw and 3 cross-veins in Hw. There is only one row of cells between 1A and wing

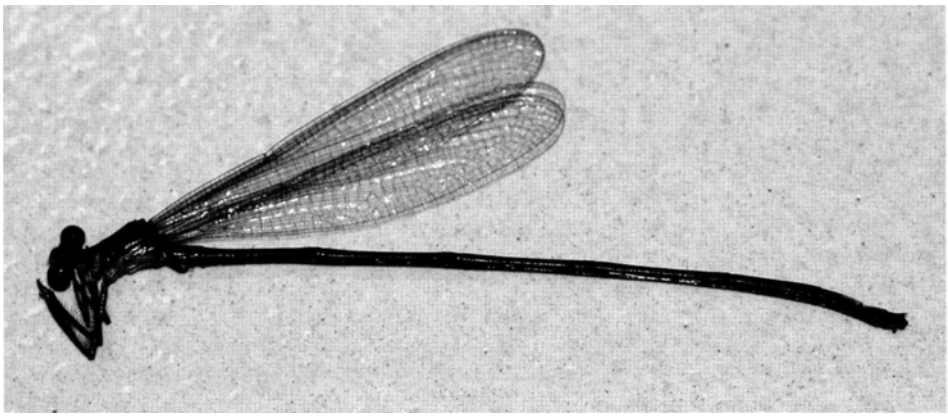

Figure 1: *Noguchiphaea mattii* — photograph of male holotype.

border. Fw petiolated at level of second cross-vein of the cubital space, Hw petiolated before the level of the first cross-vein (Figs 2d, e). This petiolation is however, rather weakly defined.

Abdomen: Conspicuously long. Metallic green except the lower part of S1 which is yellowish; dorsal side of S10 pruinose. Anal appendages black. Superiors unique with the broad basal part bearing a robust dorsal spine, the narrower apical part of superiors with a transverse row of small sharp teeth on the inner surface. A robust and rather complex, attenuated process arises ventrally from the inner side of the base of superiors. Inferiors long and narrow, curled upwards terminally; remarkably slender and simple in contrast to the robust and complex superior structures (Figs 2f, g). Penile organ is of delicate, simple structure, without lateral spine tufts (Fig. 2h).

Measurements [mm]: Hw 38; abdomen (excl. appendages) 65, superior appendages ca 1.

Habitat

The male of the new species was found in deep forest on a mountain in Hon Ba Nature Reserve at the altitude of ca 700-900 m. It flew weakly, and when perched was hidden amongst the twigs and foliage of a bush.

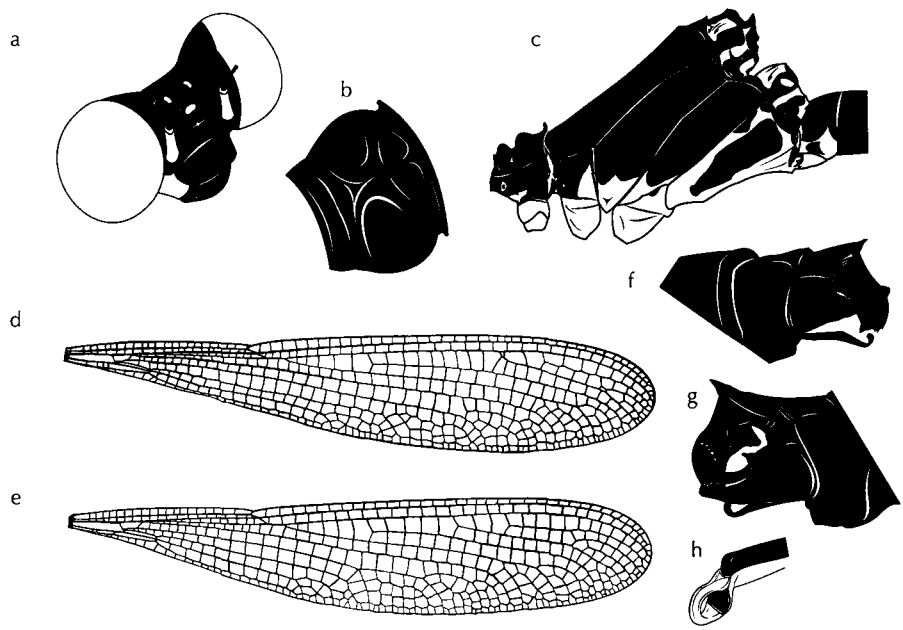

Figure 2: *Noguchiphaea mattii*, male holotype — (a) head; (b) prothorax; (c) thorax, lateral; (d) right fore wing; (e) right hind wing; (f) tip of abdomen with anal appendages, left appendages removed, right appendages seen from an inner lateral but slightly oblique aspect; (g) same, but entire anal appendages seen in lateral view, showing outer view of right appendage; (h) penile organ, in dorsal view. Not to scale.

Discussion

Males of *Noguchiphaea* are small to medium sized calopterygids. Except for the difference in known distribution – *N. yoshikoae* (Figs 3a-f, Plate I) being found both from northern Thailand and northern Vietnam, whereas *N. mattii* is so far recorded only from southern Vietnam – the two species live in very similar habitats. Adults have been found along small streams in well forested mountain biotopes (700-1,500 m a.s.l.). They are rather weak fliers and usually perch inconspicuously on branches of trees and bushes along the streams they frequent; teneral specimens are often found 10-20 m away from the water. Their body is slender, metallic green with yellowish markings and black sutures (Fig. 1, Plate I). The superior anal appendages are of complex and unique structure, but the inferiors are rather simple, either long and thin (Figs 2f, g) or short and stout (Fig. 3c). The penile organ is of simple structure; the vesicle is rather large and bulbous. The wings are hyaline with (Plate I) or without (Figs 1, 2d, e) a darkened spot in the apex of Fw. A pterostigma is lacking in both wings and petiolation starts very near the base of wings. There are no cross-veins in the quadrangle and there is only one cell row between 1A and the wing border. The male of *N. mattii* sp. nov. differs from *N. yoshikoae* in several major characters:

- The metepimeron is yellowish with a large metallic green marking at the centre and upper edges in *N. mattii* (Figs 1, 2c), but entirely yellowish in *N. yoshikoae* (Plate I).
- The prothorax of *N. mattii* is simple with round posterior margin whereas the prothorax of *N. yoshikoae* is more complex with a cleft on middle of posterior margin. Lateral processes at corners of posterior margin of prothorax of *N. mattii* (Fig. 2b) are shorter than in *N. yoshikoae* (Fig. 3a).

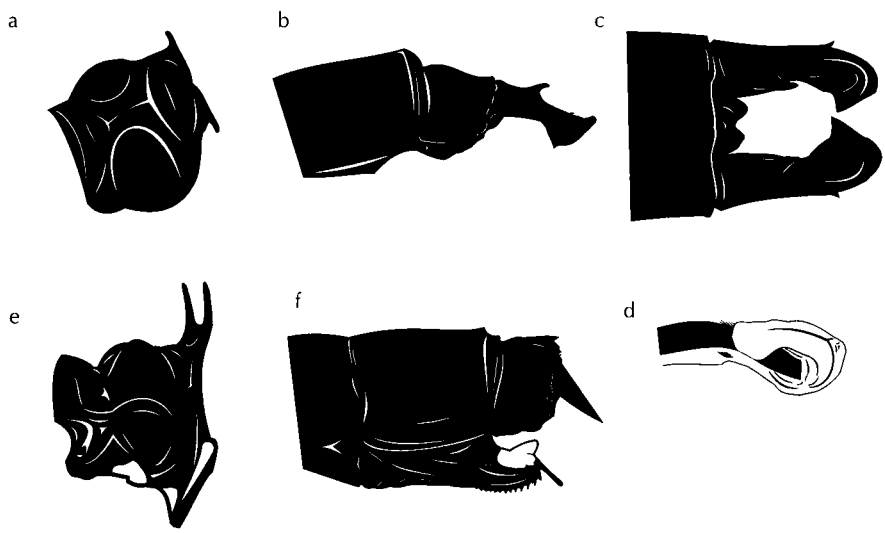

Figure 3: *Noguchiphaea yoshikoae* — (a) prothorax of male ; (b) tip of male abdomen, lateral; (c) anal appendages of male, dorsal; (d) penile organ; (e) prothorax of female, lateral; (f) tip of female abdomen, lateral. Not to scale.

- The abdomen of *N. mattii* is proportionally much longer than in *N. yoshikoae*, the abdomen/hind wing length ratio being about 1.7 in *N. mattii* and 1.4 in *N. yoshikoae*.
- The superior anal appendages of *N. mattii* are very complex (Figs 2f, g); the base is much broader than in *N. yoshikoae*, and the terminal part of the outer lobe is bent downwards sharply; there is also a ventral inner lobe, the narrower apical part bearing with a row of spines on the inner surface. The appendages of *N. yoshikoae* are more simple (Figs 3b, c), bearing a sharp dorsal spine at their midpoint; the apical part is expanded into an axe like form, and not bent strongly downwards. There is no complex inner lobe.
- The inferior anal appendages of *N. mattii* are ⅔ of the length of the superiors, but narrow and simple in structure (Fig. 2f). In *N. yoshikoae* the inferiors are very short (Fig. 3c).
- In *N. mattii* the penile organ is more delicate and lacks the tuft of setae on the penis shaft (Fig. 2h), whereas in *N. yoshikoae* it is more robust and carries a tuft of setae on each side of the penis shaft (Fig. 3d).

Although *N. mattii* sp. nov. can easily be separated from *N. yoshikoae*, both species are undoubtedly closely related. To fully understand their relationship, it would be desirable to discover the female of *N. mattii* to compare it with the female *N. yoshikoae*. The female of *N. yoshikoae*, bears two distinctive vertical horns on hind margin of the prothorax (Fig. 3e). Its final abdominal segments, appendages and ovipositor are also shown (Fig. 3f). It should be noted that although the male of *N. mattii* has an extremely long abdomen, this may not be the case in the female. *Noguchiphaea* adults differ from the related *Caliphaea* Hagen, 1859 in three main characters:

(1) shape of wings, lack of pterostigma and differences in venation;
(2) structure of male anal appendages;
(3) details of the structure of the penile organ in males.

Dumont et al. (2005) analysed the ribosomal DNA sequences of nearly all genera in the family Calopterygidae (s.l.). These studies showed that the Asian genus *Noguchiphaea* is closer to the South American *Iridictyon* Needham & Fisher, 1940 than to the Asian *Caliphaea*. Dumont's conclusions thus moves *Noguchiphaea* out of the subfamily Caliphaeinae, where Asahina (1976) had originally placed it. *Noguchiphaea* and *Iridictyon* are very close in genome type, but separated by a vast distance, suggesting a very ancient lineage. The discovery of two *Noguchiphaea* species from Vietnam shows that the genus is not endemic to Thailand. Perhaps they had been widespread in distant past, considering how far *Noguchiphaea* and *Iridictyon* are separated geographically. Dumont et al. (2005) suggest that *Caliphaea*, *Noguchiphaea* and *Iridictyon* should be put in different subfamilies. However further studies comparing mitochodrial DNA of all members in these genera should be carried out to support this conclusion. Moreover, sequencing a broader section of the genome would be expected to yield a more secure phylogeny. The close molecular relationship of *Noguchiphaea* and *Iridictyon*, based on the results of the sequencing of ITS1, ITS2, and the 5.8 and 18S ribosomes is contradicted by the strong structural dissimilarity. Whereas *Noguchiphaea* with its petiolated narrow wings looks like an 'abnormal' calopterygid (as does also *Caliphaea*); *Iridictyon* has a quite typical calopterygid habitus with broad unpetiolated wings. So their relationship is still somehow difficult to understand.

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