Subgeneric affiliation of *Ropalidia thailandia* Gusenleitner: a case showing ambiguity of the subgenera of *Ropalidia* Guérin-Méneville (Hymenoptera: Vespidae: Polistinae)

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The subgeneric affiliation of *Ropalidia thailandia* Gusenleitner, 1994, is reexamined. Gusenleitner (1994) placed this species in the subgenus *Icarielia*, in particular comparing it with *R. decorata*. Examination of characters not mentioned by Gusenleitner suggests instead that *R. thailandia* belongs to the *R. stigma*-group, which is not included in the subgenus *Icarielia*. The case of *R. thailandia* shows that the subgenera of the genus *Ropalidia* are still ill-defined.

Introduction

Gusenleitner (1994) described *Ropalidia thailandia* based on four females from Phangnga in Thailand. He compared *R. thailandia* to *R. decorata* (Smith, 1858) and placed it in the subgenus *Icarielia* Dalla Torre, 1904, adding a couplet to distinguish *R. thailandia* from *R. decorata* to the key to Oriental species of *Icarielia* by van der Vecht (1962). Gusenleitner did not, however, discuss the characters which define the subgenus *Icarielia*.

The subgenera or divisions of the genus *Ropalidia* are so ill-defined that I hesitate to recognize them as formal taxa at present. Bequaert (1918: 247) tried to define divisions in the genus mainly based on the shape of metasomal segments, but he treated only part of the species. Van der Vecht (1962: 3) dealing with Oriental species recognized three subgenera: *Anthreneida* White, 1841, *Paraicaria* Gribodo, 1892, and *Icarielia*. He also stated that "it appears practically impossible to split up the genus in a satisfactory manner into a number of smaller genera. It is easy to distinguish certain groups ... but such groups appear to be interconnected in various ways by transitional forms." Finally, Richards (1978) recognized six subgenera in the genus, and his subgeneric division is now most widely accepted mainly by behavioural ecologists (e.g. Gadagkar, 1991; Itô, 1993). Yet, it is apparent from his key to subgenera and his diagnoses, that all subgenera except *Paraicaria* are ill-defined.

I had a chance to study a paratype of *R. thailandia*, which Dr Gusenleitner kindly sent to me for examination. If we try to allocate *R. thailandia* to a subgenus, it cannot belong to *"Icarielia"*, as will be discussed below.

Notes on additional specimens

In addition to the paratype, I examined two females of *R. thailandia*, one each from the collections of the Nationaal Natuurhistorisch Museum, Leiden (RMNH) and of the Bernice P. Bishop Museum, Honolulu (BISH). They differ from the paratype in some minor characters, mainly in the colour pattern.

Data and differences from the paratype (as well as from Gusenleitner's description) are as follows:

1♀ (RMNH), labelled "Tenasserim: Malvedaung, 30 km S. of YE, 300 m, 15-25.xi.1934, Malaise", and "*Icarielia*, n. sp. [in the late Prof. Dr van der Vecht's handwriting]": anterior margin of the occipital carina on left gena a little irregularly sinuate (fig. 2; regularly curved on the other side as in the paratype, cf. fig. 1); dark median band on clypeus narrower; black band at the posterior corner of pronotum wider; mesepisternum without a small anterior yellow spot; yellow markings on metapleura reduced to small spots at posterodorsal and posteroventral corners; lateral yellow markings on propodeum reduced to spots separated from the large markings on posterior face.

1♀ (BISH), labelled "Viet Nam; Fyan 900-1000 m, 11.vii-9.viii.1961, N. R. Spencer": median dark band on clypeus narrower; black posteroventral band on pronotum extending anteriorly to form a triangular marking.

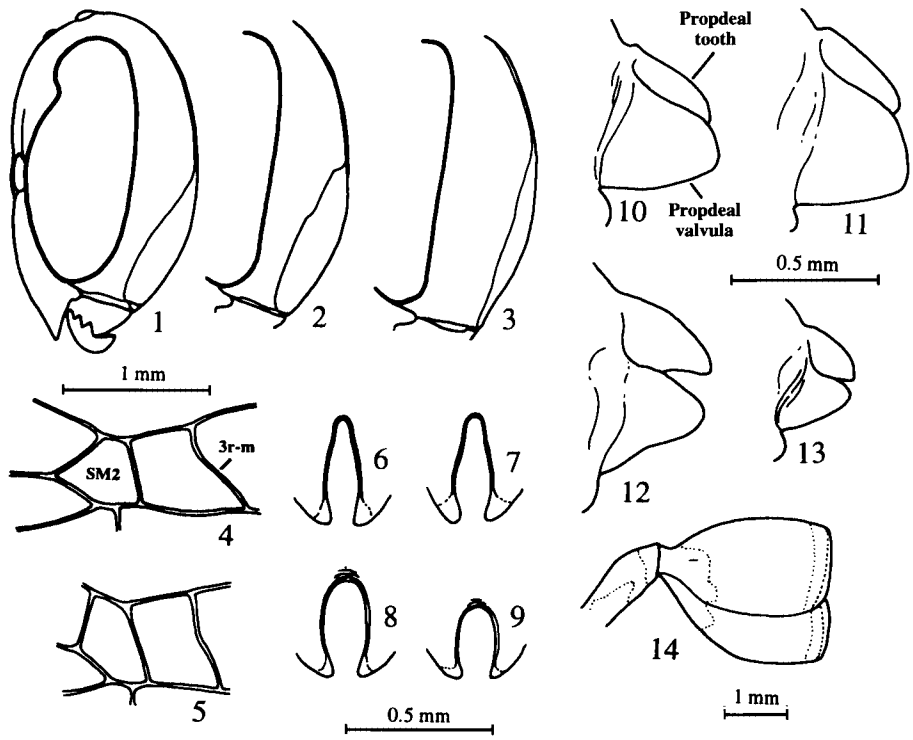
Characters shared by *Ropalidia thailandia* and *R. decorata*

1. Occipital carina

Ropalidia thailandia has a characteristic occipital carina: that is, the occipital carina is strongly widened in its ventral half to occupy more than half the width of the gena (fig. 1). Gusenleitner described this state as "the occipital carina divides and both carinae enclose a smooth and shining area". However, it is better expressed as "widened occipital carina" because the shining area in its entire width is a little higher than the gena but neither its anterior nor posterior margin is carinate. *R. decorata*, though much less wide, has a similar occipital carina (fig. 3), which may have led Gusenleitner to compare *R. thailandia* to *R. decorata*. The shape of the occipital carina in these two species is similar only in the sense of widening; there is no other evidence suggesting their common origin. Ventrally widened occipital carinae are not unique to these two species, but are found, though less prominent, in several other species in more than one of the subgenera sensu Richards (1978). Ventrally evanescent or disappearing occipital carina is a character state also found in more than one subgenus. It suggests that the states of the occipital carina may not have taxonomic value at more than the specific level.

2. Lack of the epicnemial carina

Another character, which may have led Gusenleitner to place *R. thailandia* in the subgenus *Icarielia*, may be the lack of the epicnemial carina on the mesepisternum. Although van der Vecht (1941, 1962) stressed this character to separate the groups or subgenera in the Oriental species of *Ropalidia*, the character itself is not always as well defined as van der Vecht (1941, 1962) maintained. It may be carinate, but the border between the punctured posterodorsal area and unpunctured anteroventral area of the mesepisternum resembles a carina when the punctures are strong. Bequaert (1918: 247) noted that the epicnemial carina "can become more or less obsolete, according to the state of preservation of the specimens." While three of the six subgenera sensu



Figs 1-14, characters in *Ropalidia* species (female). Fig. 1, head in profile; figs 2-3, gena in profile; figs 4-5, second and third submarginal cells of right fore wing; figs 6-9, propodeal orifice; figs 10-13, propodeal teeth and propodeal valvula, in profile; fig. 14, apical part of the first metasomal segment and the second metasomal segment, in profile. Figs 1-2, 4, 6, 10, 14, *Ropalidia thailandia*; figs, 3, 5, 8, 12, *R. decorata*; figs 7, 11, *R. stigma*; figs 9, 13, *R. flavopicta*.

Richards (*Ropalidia*, Guérin-Méneville, 1831, *Polistratus* Cameron, 1906, and *Icarielia*) share the lack of the carina, the character is variable in the remaining three subgenera. Richards (1978: 58) stated that the character is variable in the subgenus *Icariola* Dalla Torre, 1904. The subgenera "*Anthreneida*" and "*Paraiaria*" have a clear line (Richards, 1978: 52), but they are not always raised into carinae. Thus, the character is not reliable enough to define the subgeneric affiliation of a given species.

Characters suggesting close relationship of *Ropalidia thailandia* to *R. stigma*-group

The characters, which were not listed by Gusenleitner but might be important in defining the species-group affiliation of *R. thailandia* are discussed below. The discussions are in general based on comparisons within the genus as a whole as well as in the tribe Ropalidiini (Carpenter, 1993). Special attention is paid to characters of *R. stigma* (Smith) as a representative of the *R. stigma*-group sensu van der Vecht (1941), to which *R. thailandia* seems to belong, *R. decorata*, and *R. flavopicta* (Smith), which is the type species of the subgenus *Icarielia*.

1. Venation of the fore wing

The third radio-medial cross vein (3r-m) is strongly recurved distally in *R. thailandia* (fig. 4) and *R. stigma*. This state might be plesiomorphic in the genus *Ropalidia*, and is found widely in the subgenera "*Icariola*" and "*Anthreneida*" as defined by Richards (1978). The vein is much less sinuate in *R. decorata* (fig. 5) and *R. flavopicta*, as well as in most species of "*Icarielia*" sensu van der Vecht (1962), or the subgenera "*Icarielia*", "*Ropalidia*", and "*Polistratus*" sensu Richards (1978). The state might be apomorphic in the genus.

The character shared by *R. thailandia* and *R. stigma* (and species of the *R. stigma*-group sensu van der Vecht (1941)) is that the basal angle of the second submarginal cell, that is the angle formed by Rs and M, is rather acute, distinctly less than 90°. The state might be one of the synapomorphies for the *R. stigma*-group.

2. Propodeal orifice

The propodeal orifice is narrowed anteriorly in *R. thailandia* (fig. 6) and *R. stigma* (fig. 7) as well as in the species of *R. stigma* group. A similar state is found in various species of the subgenera "*Anthreneida*", "*Icariola*" and "*Ropalidia*" sensu Richards (1978). On the other hand, it has a broadly rounded top in the subgenus "*Icarielia*" sensu Richards (1978) and van der Vecht (1962), including *R. decorata* (fig. 8) and *R. flavopicta* (fig. 9). The anteriorly narrowed propodeal orifice seems to be apomorphic within the genus *Ropalidia*, but this character state shows considerable homoplasies.

3. Propodeal valvula

The propodeal valvula is large and rounded in *R. thailandia* (fig. 10) and *R. stigma* (fig. 11). When the mesosoma is seen in profile, the valvula covers a large part of the posterior projections (or propodeal teeth) forming the propodeal orifice. The valvula, on the other hand, is distinctly smaller in the subgenus "*Icarielia*" sensu van der Vecht (1962) and Richards (1978) (figs 12-13), and most of the posterior projections can be seen in lateral view.

4. Metasoma

An elongate first metasomal segment suggests closer relationship of *R. thailandia* to the *R. stigma* group than to *R. decorata*, although some species of "*Icarielia*" have the first metasomal segment as elongate as in the *R. stigma*-group.

In *R. thailandia*, *R. stigma* and most other species of the *R. stigma*-group, the tergum and sternum of the second metasomal segment are not tightly fused, but slightly overlapping at the posterior margin (fig. 14). On the other hand, in most of the remaining species of *Ropalidia*, including *R. decorata* and *R. flavopicta*, the tergum and sternum of the second segment are tightly fused, leaving at most a suture between them. At the moment, however, I cannot determine if the state in *R. thailandia* and *R. stigma* is a secondary reversal or the plesiomorphic condition.

Concluding remarks

As shown above, the apomorphic characters which *R. thailandia* shares with *R. decorata* are the widened occipital carina and the lack of the epicnemial carina. The former character is similar only in the sense of widening, but there is no further evidence suggesting a common origin. The latter character is too ill-defined in the genus to determine subgeneric affiliation of a given species. On the other hand, *R. thailandia* shares some apomorphic characters with the species of the *R. stigma* group: that is, an acute basal angle of the second submarginal cell of the fore wing, anteriorly narrowed propodeal orifice, and possibly the elongate first metasomal segment.

If *R. thailandia* is to be accommmodated in one of the currently available subgenera, it should be placed in "*Icariola*" sensu Richards (1978) or "*Anthreneida*" sensu van der Vecht (1962) and not "*Icarielia*". Yet, unless the subgenera of *Ropalidia* are defined phylogenetically or supported with well corroborated characters, use of the subgenera in the genus *Ropalidia* may lead to erroneous inferences on evolutionary trends in the genus, and even adds existing taxonomic confusions.

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