

ZOOGEOGRAPHY AND EVOLUTION OF UGYOPINI - A TROPICAL GROUP OF
DELPHACIDAE (FULGOROMORPHA): FIRST RESULTS

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ABSTRACT

The monophyletic Ugyopini belonging to the still paraphyletic Asiracinae and pantropically distributed except for Africa are subject of a cladistic analysis sensu Hennig. The today's 19 genera are shown to be mostly not phylogenetically defined. Evolutionary trends in the modification of the aedeagus expressed by prolongation, development of spines and of a secondary joint in the movable distal part are discussed. A revision of the Ugyopini is on work.

The ugyopine Delphacidae belong to the primitive evolutionary level of Asiracinae, and comprise about 150 species in 19 genera. They are found in tropical parts of the Oriental Region, the Pacific and Latin America, but are completely missing in Africa and Madagascar. Ugyopini do not occur in moderate climates except for New Zealand. In the Holarctic and Africa, however, they seem to be "replaced" by taxa of the paraphyletic rest of Asiracinae. Only in South America both groups occur together.

According to our present knowlegde of Ugyopini mainly based on the work of Muir and Fennah the centre of species density is with more than 45 % of all species the Western Pacific, especially concerned are Micronesia, Melanesia and W-Polynesia. In second priority follows South-East Asia with about 30 %. The faunal resemblance between adjacent regions is extremely low. The species resemblance between the taxa of the Western Pacific and those of South-East Asia, for instance, is about 2 % only, between both regions and Australia 0 %.

The tribe Ugyopini was classificatorically erected by Fennah (1979) for a group of asiracine Delphacid-genera, and later phylogenetically analysed and newly defined by Asche (1985). The group is considered monophyletic by means of uniquely derived characters (the posttibial-spur is quadrangular in cross-section bearing a row of bristles on each edge; the median of the distal spines of the hind-basitarsus is considerably dislocated basad).

The phylogenetic relationships within the Ugyopini as well as the relation to other asiracine taxa are still enigmatic. Own research work on different ugyopine genera re-

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vealed that almost all of them are not based on commonly derived characters, but only on characters which in some cases do not even fulfil diagnostic claims. It could be found that the South-East Asian genus *Punana* which morphologically and phylogenetically is far apart from the Carribean genus *Neopunana* (Asche, 1983) cannot simply be discriminated from others by the presence of a comparatively broad and short frons and compress antenna-joints as these characters seem to be widespread within Ugyopini. After examination of a large unsorted Ugyopini-material (mainly preserved in the Bishop Museum Honolulu) which contains several undescribed taxa and after comparison with the described species which are today included in different genera the limits between *Punana*, *Melanesia*, *Livatiella* and some others are quite unclear.

This insufficient situation concerns especially also the large genus *Ugyops*. Fennah (1964) already discussed the difficulties in establishing a "natural subgeneric classification" for *Ugyops*. Only as a useful tool (not expressing relationships) he proposed a "crude" separation based on the bodily appearance. Large, slender, macropterous species with tectiform tegmina he attached to the *U. kinbergi* Stal-group, smaller, mostly brachypterous species to the *U. annulipes* Stal-group.

The study of the male genitalia, however, supports the idea of polyphyly of several of the present supraspecific taxa, e.g. of the genus *Melanesia* and of the genus *Ugyops* itself. Amongst other genital characters the shape of the aedeagus indicates at least a morphological change within the Ugyopini. It is assumed that the hypothetical ancestor-species of all Ugyopini was equipped with an aedeagus-type similar to that of plesiomorphic "Asiracini", e.g. of *Idiosystatus*, *Equasystatus* or *Tetrasteira*. Basically at this evolutionary level the aedeagus consists of two parts, a solid basal socle and a movable straight distal part with apical phallotrema. In repose the distal part is recurrently bent dorsobasad, and in the plesiomorphic configuration almost approaches the dorsal base of the socle. In Ugyopini a remarkable prolongation of the distal part has been evolved. In most of the species this part is coiled forming a quarter- semi- or even a full circle (fig.1). Within Ugyopini the probably most plesiomorphic configuration can be found in species of the Carribean genus *Neopunana* as discussed by Asche (1983). Despite of complications like extensive development of several spines especially in the apical portion which might be interpreted as autapomorphy of the genus the distal part in general is still almost straight. For now there is no indication that the aedeagus-type of *Neopunana* is derived by reduction from an aedeagus which had already developed the elongate coil. *Neopunana* might not represent the direct ancestor of the advanced Ugyopini, but an early side-track.

The comparison of the aedeagus-configuration in Ugyopini revealed a morphological row possibly starting with a similar simple type as so far has only been found in *Neopunana* (fig. 2). The next stage might be represented by taxa having a simple U-shaped coil as is found in many *Ugyops*-species, e.g. in *Ugyops sulcatus* Muir. From this type two lines might

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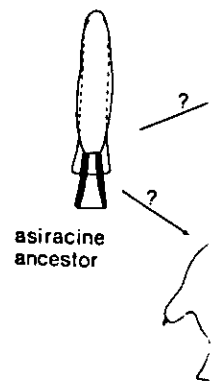


fig. 2
Evolutionary trend
aedeagus

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- 2: development of a
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fig. 1 Aedeagus-types of „Asiracinae”

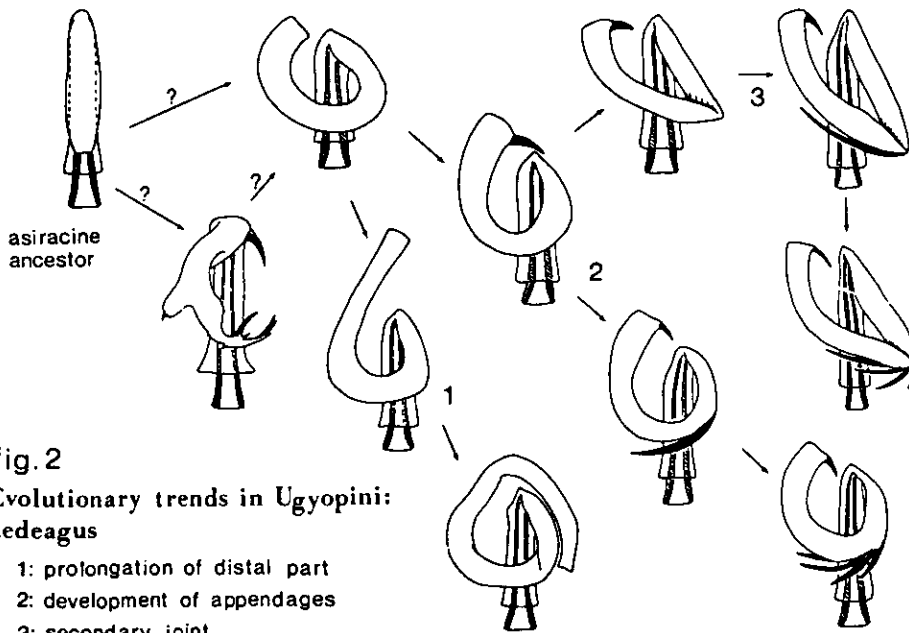
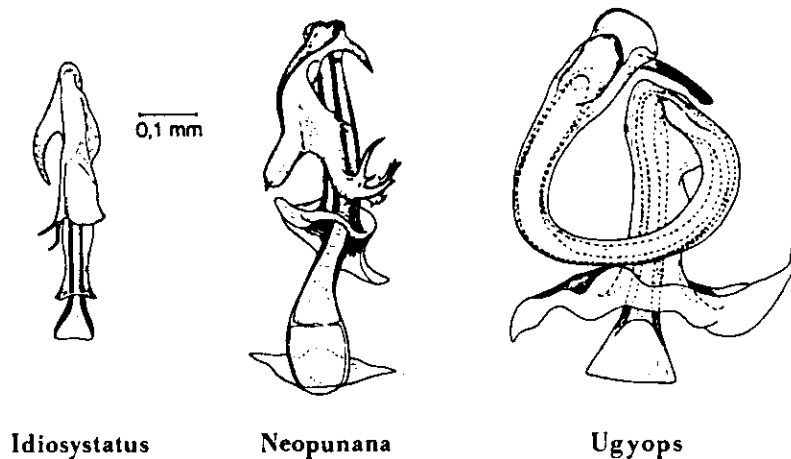


fig. 2
 Evolutionary trends in *Ugyopini*:
 aedeagus

- 1: prolongation of distal part
- 2: development of appendages
- 3: secondary joint

have derived. The first one leads to a remarkable prolongation of the distal-part without developing any processes as is found, for instance, in *Ugyops kellersi* Muir with chimney-like prolongation, or in *Canyra vittifrons* (Walker) with a distal-part-coil formig about a 1 1/4 circle. The other line leads to taxa which possess at least one single apical tooth or spine originating next to the phallotrema, e.g. like in *Ugyops superciliata* Fennah. This configuration could have been the origin for taxa which bear a second spine next to the basal knee of the coil. It is found, for instance, in many *Ugyops*-species, but also in *Punana partim*, in *Ostama*, in *Livatiella* and in *Melanesia partim*. Some of the species placed into *Punana* and *Melanesia*, however, even show a multiplication of the spines originating from this part of the coil.

Another group is characterized by the division of the coil into two movable parts. At the basal part of the recurrent coil a joint is evolved. This configuration is present in some of the *Punana* s.l. - as well as in several *Ugyops*-species. All taxa so far assorted in this group have at least one single apical tooth which could indicate their origin from a *superciliata*-like ancestor rather than from a *sulcatus*-like one. Also here a multiplication of the teeth resp. spines can be found.

For the moment it seems still too early to decide whether the three trends in the aedeagus of Ugyopini (prolongation of the distal part, development of tooth- or spine-like appendages, secondary joint) represent a unique line of evolution each, or whether similar structures have been evolved several times convergently, perhaps even by reduction. Further studies on many more taxa referring also to other characters like those of the female genitalia may lead to more significant ideas on the sequence of evolutionary changes within the Ugyopini. A cladistic analysis sensu Hennig is badly needed. Only on this background a new generic concept is reasonable. It also may lead to better understanding of the today's patterns of geographic distribution of Ugyopini.

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ABSTRACT

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