

TAXONOMY OF HETEROGYNAIDAE (HYMENOPTERA: ACULEATA)

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ABSTRACT

Three species, all previously described in *Heterogyna*, are assigned to *Daycatinca* new genus. A key is provided for the identification of all taxa of Heterogynidae. With the description of the female of *Heterogyna kugleri* new species, the family is recorded from Israel for the first time. Author's view concerning the placement of the family is discussed. **KEY WORDS:** Heterogynidae: Taxonomy, Key, *Daycatinca* n. g., *Heterogyna kugleri* n.sp.

INTRODUCTION

Until recently the genus *Heterogyna* Nagy, 1969 was monobasic, established only on male characters, and one of the taxonomically least understood group of Aculeata. Day (1984) described four additional species in *Heterogyna*, and this work included the first discovery of the female. In my collection there is also a female from Israel. This female is related to, but differs in some important characters from a female of *Heterogyna protea* that was collected by Day together with large number of males in Ixia, Isle of Rhodes (Day, personal communication). Because of these differences, I am describing the Israeli female as a new species.

About 500 specimens of heterogynids are deposited in collections today, including 3 species from Madagascar. As a result of this study, I have concluded that the three Madagascan species described in *Heterogyna* by Day (1984) represent a new genus, which I describe below.

Daycatinca Argaman new genus

Type-species: *Heterogyna fantsilotra* Day, 1984

Etymology: The genus is named in honour of Dr. M.C. Day, with Latin *catena* = chain, and *incalo* = to call, gender feminine; meaning that our present knowledge on this family is due largely to Day's successive invocations.

The genus is diagnosed by the following combination of characters: The endophragmal pit situated very high in males, on the same level with the mesopleural and propodeal spiracles, so that an imaginary line connecting them is straight; the distance between endophragmal pit and propodeal spiracle nearly or quite half of the

distance between the former and metapleural pit. Antennae with twelve or thirteen segments, with terminal four or five flagellomeres distinctly shorter than preceding segments. Posterior aspect of mesopleuron without carinules. Female with spiracles situated in same position as in male; with mesoscutum longer than broad, scutellum twice as broad as long in midline, clypeus with anteromedian acute lobe. .

The new genus may be distinguished from *Heterogyna* Nagy, the only other genus of Heterogynidae, by the characters given in the key below.

This genus contains three species, all from Madagascar: *fantsilotra* Day, 1984, *madecassa* Day, 1984 and *ravenala* Day, 1984.

Heterogyna Nagy

Heterogyna Nagy, 1969:8. Type-species: *Heterogyna protea* Nagy, 1969, by monotypy and original designation. Day, 1984:302.

Heterogyna kugleri Argaman, n. sp.

Fig. 1

Description of holotype female. — Length 4.5 mm; length of forewing 1.1. mm. General appearance somewhat resembling ♀ *Methocha* (Tiphidae). Head and abdomen black. Mandibles except infuscated apex, entire thorax, coxae, femora and tibiae red. Clypeal lobe and pygidium reddish-brown. First three segments of antennae, palpi and all tarsi yellow, basal half of scape and apical one-fourth of first flagellomere tinged with brown. Head, antennae, body and legs with rather fine, proclinate, sparse whitish pubescence. Scape, pedicellus and clypeal disc with fine setulae about half as long as width of pedicellus. Anterior border of labrum and marginal groove at lower edge of

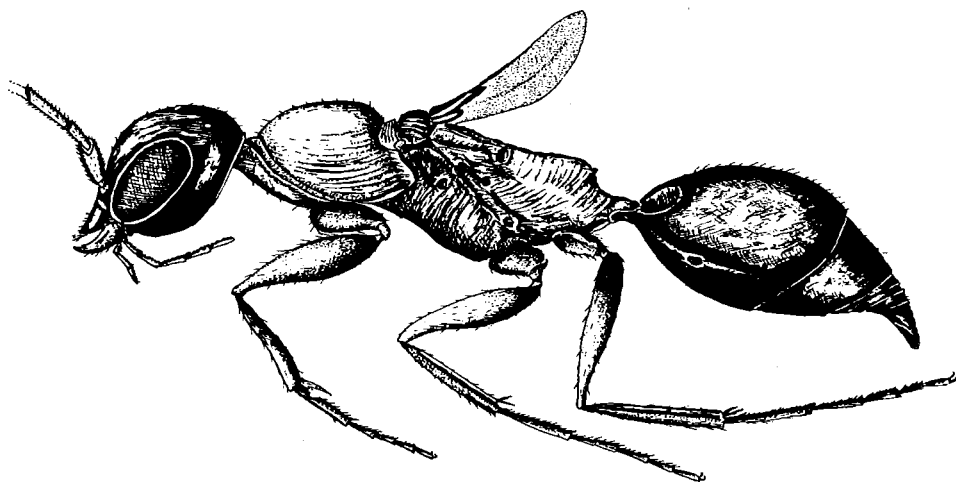


Fig. 1. *Heterogyna kugleri* Argaman, holotype female.

mandibles with strong hairs about as long as width of mandibles at base. Head, including eyes, 1.2 times as broad as long, inner orbits strongly converging above. Clypeus as long as length of antennal fossa and a little more than four times as broad as long; its sides broadly rounded, its median half weakly emarginate ventrally and sides of median area on disc impressed, forming a trapezoidal, conspicuously humped area; surface of clypeus polished and shining in apical half, finely articulated in basal half; median lobe with complete subapical row of setiferous punctures. Frontoclypeal suture strong, subantennal triangle polished, separated from the front by a fine impression. Antennal sockets a little closer one to another than to eyes. Surface of head finely rugose in vicinity of base of antennae, delicately alutaceous in rest, and uniformly punctate with small punctures, separated by 3-5 times their own diameter. Middle of front with scarcely visible papilla-like tubercle. Occipital carina strongly developed dorsally. Ocellar triangle slightly acute, posterior ocelli separated from the anterior one as from the eyes. Occiput strongly convergent behind. Eyes glabrous (no fine setulae can be detected in 100x magnification). Mandibles bidentate. Palpal formula 6-4. Scape 1.5 times as long as thick, pedicel 2.4 times, first flagellomere 5.0 times as long as thick (remainder of flagellum absent); all segments obliquely truncate at apex. Thorax about 2.6 times as long as broad. Pronotum, mesoscutum, scutellum and metanotum together as long as propodeum. Pronotum polished and shining, laterally with oblique carinules, its lateral lobes touching tegulae; basal pronotal margin with a foveolate transverse sulcus; at apex, as in the males of this genus, with two complete sulci on lobe of collar. Mesoscutum hexagonal, 2.4 times as broad as long, depressed, with five transverse carinae from side to side. Scutellum prominent, about as long as broad, its anterior half shagreened, posterior half with six longitudinal carinae. Metanotum a transverse strip, half as long as scutellum, with deep median-longitudinal sulcus margined on each side with a fine crest. Propodeum flat, not depressed; disc with three longitudinal carinae at base, each as long as length of scutellum, rest of the disc with irregular longitudinal rugae. Declivity of propodeum with triangular, spinelike process in upper third; sides of propodeum and mesopleura with oblique carinules which are contiguous on the declivity. Petiolar socket with a circular lamella covering its dorsal fenestra. Petiolus as long as broad. Abdomen about twice as long as broad, surface polished and shining, setiferous punctures and the rather fine alutaceous sculpture present but nearly indistinct. Pygidium shining, with few moderately large punctures at the base, its apex triangularly produced in a delicate, downwardly curved spine. Tergites entirely embrace side of the abdomen, laterotergites not discernable; first terga laterally with spiracle. Forewing shortened, reaching only the petiolus; basal two-fifths with three enclosed cells: subcostal, medial and submedial; length of medial cell with pterostigmal spot together about twice as long as basal cell; apex of stigmal spot acute, the spot uniformly subhyaline and with no proximal wall separating a stigmal cell from the rest of the membrane; costal vein strongly developed; relict vein corresponding to Rs-a faintly indicated as a dark stripe up to the apical third of the wing; lamina of wing membrane weakly infuscated. Hindwing partly damaged, the remainder of it fibre-like, with a long, strong costal fibre, and three short, mesal, reclinate rami; without distinct lamina between them. Fore coxa large, hind coxa small, the mid coxa intermediate. Fore femur and tibia thick, hind femur and tibia thin, mid femur and tibia intermediate; fore leg short, hind leg longest, mid leg of intermediate size. Inner side of tarsal segments with a row of

fine spinules. Inner aspect of mid tibiae with complete longitudinal groove, as in *Embolemus* (Embolemidae) and in *Miscophus* (Sphecidae). One hind tibia absent, another partly damaged, inner side with fine depression, which is not so deep as depression of the mid leg. Outer aspect of mid tibiae with fine spinules.

Male unknown.

MATERIAL EXAMINED. Holotype ♀ Israel, Nazareth (Nazerat), no data on label. Holotype deposited in the author's collection (No. 051).

ETYMOLOGY. The new species is named in honour of my friend, Professor Dr. Jehoshua Kugler, Department of Zoology, Tel Aviv University, on the occasion of his 70th birthday.

KEY TO GENERA AND SPECIES OF HETEROGYNAIDAE

- 1. Wings normally developed, attaining apex of abdomen; males 2
- Wings reduced, not surpassing apex of propodeum, females 6
- 2. Endophragmal pit situated low, nearly or quite halfway between propodeal and metapleural pits; posterior aspect of mesopleuron with distinct carinules; terminal antennal segments not shorter than preceding ones. (Mediterranean area and continental Africa.) *Heterogyna* Nagy, 1969 3
- Endophragmal pit situated high, nearly or quite twice as far from metapleural pit as from the propodeal one; posterior aspect of mesopleuron without carinules; terminal five or four antennal segments distinctly shorter than preceding ones. (Malagasy region) *Daycatinca* new genus 4
- 3. Hindwing with two closed cells; subgenital plate deeply incised medially. Length: 4.0-6.0 mm. (Isle of Rhodes) *Heterogyna protea* Nagy, 1969
- Hindwing with no closed cells; subgenital plate simple, rounded at apex. Length: 2.3-3.0 mm. (Botswana) *Heterogyna botswana* Day, 1984
- 4. Antennae twelve segmented; occipital carina absent; hindwing with no closed cells; propodeal dorsum as long as broad. Length: 1.7-2.6 mm. (South and west Madagascar) *Daycatinca fantsilotra* Day, 1984
- Antennae thirteen segmented; occipital carina present; hindwing with two closed cells; propodeal dorsum longer than broad. Length: 2.0-3.5 mm 5
- 5. Occipital carina strongly developed; mandible bidentate; antenna elongate, thin; forewing with discoidal cell weakly indicated but complete; relict of putative vein 3r very weak; forewing apically infusate, tegulae dark. Length: 2.5-3.4 mm (Eastern Madagascar) *Daycatinca ravenala* Day, 1984
- Occipital carina only faintly indicated; mandible tridentate; antenna short, thick; forewing with discoidal cell incomplete; relict of putative vein 3r clearly discernable; wings hyaline, tegula yellow. Length: 2.0-3.5 mm (South and west Madagascar) *Daycatinca madecassa* Day, 1984
- 6. Endophragmal pit situated relatively low, and about twice as far from the metapleural pit as from propodeal pit; mandibles bidentate; median clypeal lobe emarginate; mesoscutum broader than long (about 2.4 times in *H. kugleri*); scutellum about as broad as long; forewing with three or four closed cells. *Heterogyna* 7
- Endophragmal pit situated relatively high, about three times as far from

- metapleural pit as from propodeal pit; mandibles tridentate; median clypeal lobe acutely produced; mesoscutum longer than broad; scutellum twice as broad as long; forewing with no closed cell. *Daycatinca* 8
7. Eyes distinctly haired; mesoscutum beset with irregular rugosities; forewing with four closed cells; propodeum with enclosed median-longitudinal area. Length: 5.4 mm (Isle of Rhodes) *Heterogyna protea* Nagy, 1969
- Eyes glabrous; mesoscutum with five, shining, well differentiated transverse carinae and with no rugosities; forewing with three enclosed cells; propodeum with fine, short longitudinal carinae at the base but without enclosed area on disc. Length: 4.5 mm (Israel) *Heterogyna kugleri* Argaman, n.sp.
8. First flagellomere 4 times, and second 5 times as long as broad; metapostnotum broadly rugulose posteriorly, surface hardly depressed below propodeal rim. Length: 5.7 mm (Madagascar) *Daycatinca madecassa* Day, 1984
- First flagellomere 3 times, and second 4 times as long as broad; metapostnotum mesally rugulose posteriorly, surface distinctly depressed below propodeal rim. Length: 5.0 mm (Madagascar) *Daycatinca fantsilotra* Day, 1984

REMARKS. Day (1985) suggests that *D. madecassa* and *D. fantsilotra* females may be conspecific, however, further collecting is needed to clarify their status.

DISCUSSION

Based on a single male collected on the Isle of Rhodes, I (Nagy, 1969) described the new genus and species, *Heterogyna protea*. Because this was possessed some unusual structural features, I placed it in a new family, Heterogynidae, which, to avoid homonymy, should be emended to Heterogynaidae. Day (1984), based on some characters, lowered the Heterogynaidae to a subfamily within the Sphecidae. Although Day is justified in some respects, I would prefer to keep the Heterogynaidae as a separate family for the reasons discussed below.

The modern taxonomy emphasizes that in Aculeata plesiomorphic and apomorphic characters appear side by side, and may be mixed with each other. It is quite probable that there is not even a single group of genera which would either show only comparatively recent or comparatively ancient morphological features. This assumption receives strong support from the *Heterogyna* male forewing venation, which is particularly plesiomorphic and unique in the Aculeata. It has an external, laminal, weakly sclerotized enrichment of relict veins, divided marginal cell on the forewing, and loss of the costal cell and jugal lobe of the hindwing. Somewhat similar structures are exhibited only by *Plumarius*, *Myrmecopterina* and *Plumaroides* (Plumariidae), *Embolemus* (Embolemidae) and, rather surprisingly, by the ponerine males of *Amblyopone* (Formicidae). The respective females of these taxa have, in most cases, diverged considerably in structure, being micropterous or apterous, while the males are very similar to each other.

Heterogynaidae appear to be very close to Embolemidae, especially in their plesiomorphic characters, such as the fine sculpture of the body, shape of pronotum and metapostnotum, venation of forewing, the absence of laterotergites on the

abdomen, and the development of legs (including modification of the larger hind tibial spur as a calcar, presence of longitudinal groove on the mid tibiae, and the fore legs being the strongest pair in the female). The similarities between Heterogynidae and miscophine-like species (*Miscophus* Jurine, *Nitela* Latreille) are numerous and important, but concern apomorphic rather than plesiomorphic characters. They are, for example, the following: antennal sockets situated low on the face, forewing reduced in size and the same type of modification in the female venation.

In both *Heterogyna* and *Miscophus* a distinct dorsal lobe of the petiolar socket and an inner longitudinal groove on the tibiae are present. Both genera also share a jumping habit on the soil surface and a general resemblance to ants. The differences between *Heterogyna* and *Miscophus* are fundamental and of plesiomorphic features. The two genera differ chiefly by the lateral pronotal lobes which are separated from the tegulae in all sphecids, and which touch the tegulae in *Heterogyna*. *Miscophus* further differs from *Heterogyna* by the strongly developed precoxal sulcus and metasternal lobes, well differentiated laterotergites on first and second gastral segments, and presence of transverse basal crest on the second sternite, all of which are absent in *Heterogyna*. Of these, the reduced pronotal lobes are the foremost character separating Sphecoidea from other superfamilies of Aculeata, and this character alone justifies regarding Heterogynidae as an independent family in the Chrysidoidea. Conversely, the inclusion of Heterogynidae in the Sphecoidea would necessitate a redefinition of this superfamily, and this would make its distinction from the other superfamilies difficult.

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