

Rocetelion, a new Holarctic genus of the Keroplatidae (Diptera, Mycetophiloidea): Description, phylogenetic and biogeographic notes

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The genus *Rocetelion* is proposed for the three nearctic species *Cerotelion fasciatum* Garrett, *Keroplatus fasciolus* Coquillett and *K. fenestralis* Fisher, and for the palaearctic *K. humeralis* Zetterstedt. The new genus is mainly distinguished by its male gonostyle, which suggests a sister-group relationship with the afrotropical genus *Paracerotelion* Matile, rather than with *Cerotelion* Rondani or *Euceroptatus* Edwards. The main characters of the genus and a key to the species are given. The phylogenetic relationships established, and the biogeographic conclusions which may be drawn from them, assign to the species of the genus a minimum age of 40 million years.

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In my thesis (Matile, 1986), I proposed the erection of a new genus, *Rocetelion*, for four species previously described in, or attributed to, the genera (or subgenera according to some authors), *Keroplatus* Bosc, *Cerotelion* Rondani or *Euceroptatus* Edwards. Of these species, three are nearctic, *Cerotelion fasciatum* Garrett, *Keroplatus fasciolus* Coquillett and *K. fenestralis* Fisher, and one Northern European, *Keroplatus humeralis* Zetterstedt.

As regards nomenclature, this monograph does not constitute a publication [International Code of zoological Nomenclature, 1985, art. 9 (11)], although the data other than nomenclatural should be considered to have been published, as is usual for the French *Doctorat d'Etat* theses (see Hewitt & Rousset, 1985). The main purpose of the present paper is to make the new generic name and description available; a key to the species, not included in my thesis, is given as well and a short account of the phylogenetic and biogeographical data.

Described in *Keroplatus* by Zetterstedt (1850) from Scandinavia ("Jemtlandia"), *R. humerale* has

been attributed to *Cerotelion* by Johannsen (1909). Lundström (1914), who was the first to illustrate the male genitalia of the species, did not accept the separation of *Keroplatus* and *Cerotelion*, and therefore kept it in *Keroplatus*. Edwards recognized this division in his generic revision of 1925, and placed *humerale* with *C. lineatum*, while he noted the importance of differences between the genitalia of the two species. The British specialist may have had later doubts about the generic position of *R. humerale*, since this species is not cited in his paper of 1929, where the only European species of *Cerotelion* mentioned is *C. lineatum*. Hutson, Ackland and Kidd (1980) and Hackman (1980) nevertheless kept the species in *Cerotelion*. Its distribution is Northern European, extending from Great Britain to the European USSR.

Keroplatus fasciolus was described by Coquillett (1894) from the state of Washington; the author later (1895) placed the species in "*Platyura*" (= *Orfelina*), a course which was followed by Johannsen (1910). It was assigned to *Keroplatus*, subgenus *Euceroptatus*, by Fisher (1941), who cites a specimen from

"Mapewate", Arkansas. Laffoon (1965) did not retain this locality (see below) and added California to the distribution of the species. No other records are given, but the distribution of the known specimens is typically western, a fact which makes me very doubtful about either the identification or the locality of the specimen of *R. fasciolum* cited by Fisher from Arkansas. She was unable to find Mapewate on any map and as the label is badly written, she suggests that it could be Maplevale, Pulaski Co. There are several Pulaskis in the U.S., but I suggest that the real locality of the specimen might be Maple Valley, in the State of Washington.

Cerotelion "fasciatus" was described by Garrett from British Columbia. Fisher, in her thesis (1937), left the species in *Cerotelion*, but later (1941) placed it in *Keroplatus (Euceroplatus)*, adding to this distribution two localities from the States of Washington and California.

Fisher (1937) had been unable to place *Cerotelion fasciatus* in any of the subgenera of her "*Ceroplatus*", a group which she recognized as polyphyletic. In 1938, she described *Keroplatus fenestralis* from Michigan and placed it in the subgenus *Euceroplatus*. In 1941, having been able to study a male of *C. fasciatus*, she considered her *fenestralis* to be a "variety" of Garrett's species (but nomenclatorially treated it as a subspecies). Moreover, she put forward the hypothesis that both *fasciatus* and *fenestralis* might be only varieties of *K. fasciolus*, the male of which was then, and still is, unknown. She placed these taxa in *Euceroplatus* on the basis of the arrangement of the tibial setulae in regular rows.

The genitalia of the two North American species for which males are known, and of the European species *K. humeralis*, are very different from those of *Euceroplatus*, *Cerotelion* and a new genus erected for the species-group "*Euceroplatus*" *bellulus* Williston, as defined in Matile, 1986. I propose to erect the new genus *Rocetelion* for these species. The new taxon is characterized by the dorsoventral flattening of the male gonostyles, which also bear an internal sclerotised plate, by the small cerci, and the presence of a large membranous area ventrally dividing the gonocoxal synsclerite. Moreover, it can be distinguished from *Euceroplatus* and *Cerotelion* by the scutellum bearing several rows of short apical setae, and by the elongate foretarsus.

Like Fisher, I was able to study the type of *R. fasciolum*, some of the metatypes of *R. fasciatus*, and a specimen of *R. fenestrale* (from Alaska), which agrees perfectly with the original description and the drawing of the hypopygium given by Fisher (1938).

The male genitalia of *R. fasciatus* and *R. fenestrale* are distinctive (cf. Figs. 11–12 and 13–14). As regards *R. fasciolum*, it differs from the other species of *Rocetelion* in the presence of a distinct antennal apicule, and several other characters, and cannot therefore be conspecific with any of them.

Rocetelion gen. n.

Type-species: *Cerotelion fasciatus* Garrett.

Derivatio nominis: anagram of *Cerotelion*. Gender: neutral.

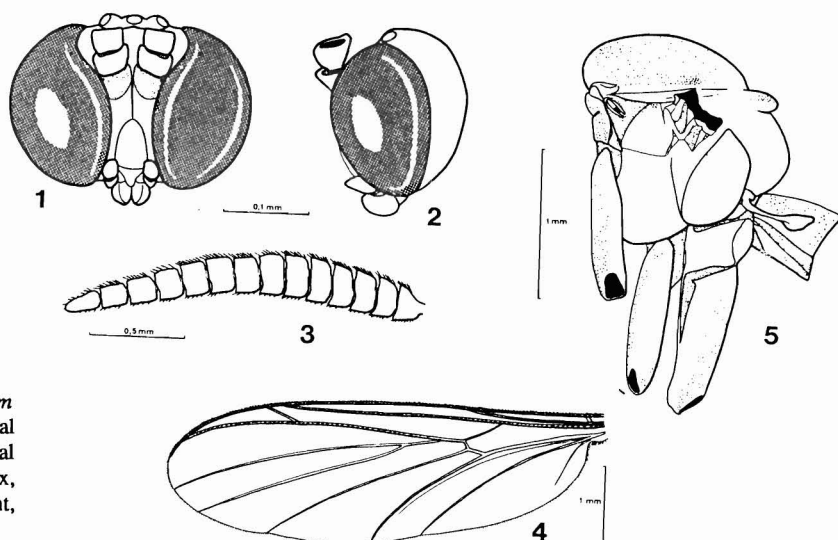
Species: *R. fasciatus*, comb. n. (*Cerotelion fasciatus* Garrett, 1925:12); *R. fasciolum*, comb. n. (*Ceroplatus fasciolus* Coquillett, 1894:126); *R. fenestrale*, comb. n. (*Ceroplatus fenestralis* Fisher, 1938:197); *R. humerale*, comb. n. (*Ceroplatus humeralis* Zetterstedt, 1850:3445).

While not formally named, the genus was described and illustrated in detail in Matile, 1986. A shorter diagnosis is given here.

Head (Figs. 1–2) wider than high. Three ocelli, the median one smaller, the lateral large, their distance from the eye margin 1.5 times their own diameter (*R. fasciatus*, *R. fasciolum*) or almost twice their diameter (*R. fenestrale*, *R. humerale*). Eyes deeply emarginated, pilosity short. Antennae: scape and pedicel short and cylindrical. Fourteen flagellomeres, widened and flattened (Fig. 3). Last flagellomere much longer than wide, without terminal apicule, except in *R. fasciolum*, in which it is small and rounded. Face wide, bare and weakly sclerotised, except in *R. fasciolum*, in which it is more strongly sclerotised, and bears a few ventral setae. Labella short, membranous on the inside. Palpifer small and well sclerotised. First palpomere very small, second large and porrect.

Thorax (Fig. 5): scutum weakly arched, evenly covered with short setae, the lateral and prescutellar setae longer. Scutellum bare on disc, except in *R. fenestrale* and *R. humerale*, where it bears one or two pairs of discal setae, marginal setae numerous, short, in several rows. Mediotergite strongly jutting out from scutellum, rounded at apex, bare. Pleurae bare except proepisternum and antepronotum, and mesanepisternum, which bears a group of short dorsal setae.

Coxae with posterior apical setae, except II–III in *R. fasciatus* and *R. fasciolum*. Tibial setulae regularly and irregularly arranged. Tibia I with regular rows except at base in *R. humerale* and *R. fenestrale*, on the apical half of the anterior face and almost all of the

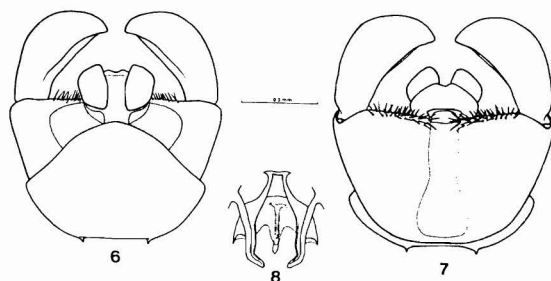


Figs. 1–5. *Rocetelion fasciatum* (Garrett). 1–2) head, frontal and lateral view; 3) antennal flagellum, lateral view; 4) wing, dorsal view; 5) thorax, coxae and first abdominal segment, lateral view.

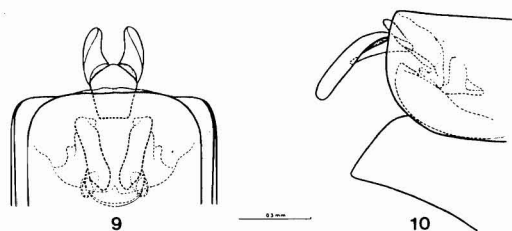
outer face in *R. fasciolum*, and on almost all the anterior and outer faces in *R. fasciatum*. T II almost entirely with regular rows, some of them more closely set, appearing as conspicuous black lines under weak magnification, in *R. fasciatum* and *R. humerale*; regular rows, also with black lines, on the apical half of the anterior face and almost all the outer face in *R. fasciolum* (tibiae and tarsi II broken on the only available specimen of *R. fenestrata*). T III with regular rows, some closely set, on apical third of all faces, in all species. Spurs 1 : 2 : 2, the inner II–III about twice the length of the outer. T I with a well-developed comb; T II with a reduced inner comb and a very small comb between spurs, outer comb lost. T III also without outer comb, a small comb between spurs, and inner comb large, but made of isolated setae. Tarsi long and thin, protarsus I 2.3 the length of tibia in the type-species, from 1.6 to 1.7 in the other. Male claws thick and serrulated, with basal spines, female claws less thick.

Wing (Fig. 4) narrow, shorter than abdomen, anal lobe reduced; more or less smoky at apex (especially in *R. fasciolum* and *R. humerale*), sometimes a spot at the anterior margin (*R. fenestrata*). Sc short, ending before (*R. fasciatum*) or at the level of apex of basal cell. Sc2 weak, situated before middle of Sc. R4 short and oblique (a little longer in *R. fasciolum*). All veins reaching wing margin. Dorsal side of veins C, R1, R4+5, R5 and An with setae; all veins bare on ventral side.

Male abdomen: segments I–II long, cylindrical, the following progressively flattened and shortened, the

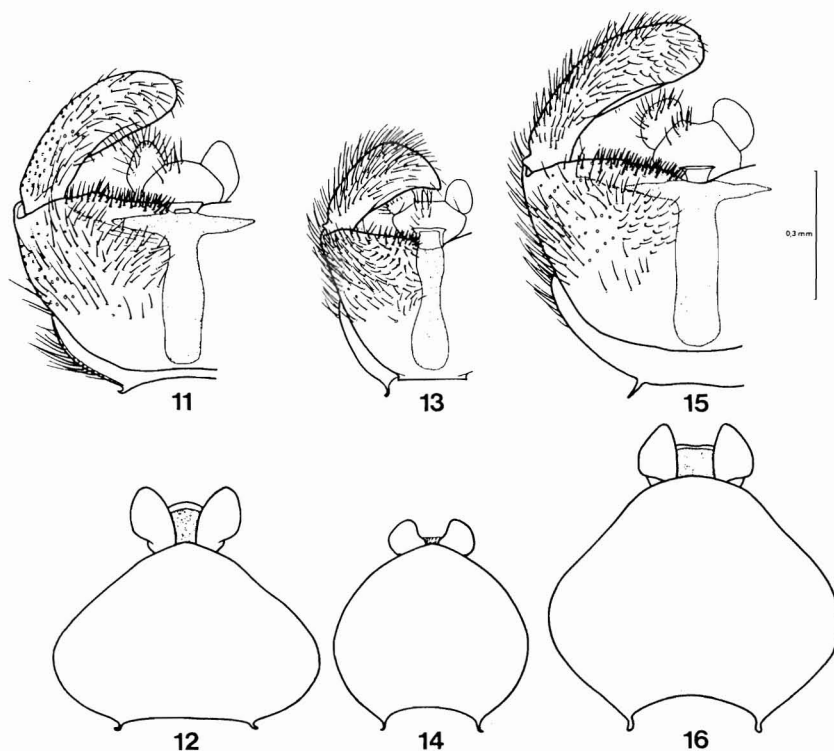


Figs. 6–8. *Rocetelion fasciatum* (Garrett), structure of male genitalia (ordinary setae not figured). 6) dorsal view; 7) ventral view; 8) phallosome. — Scale line 0.3 mm.



Figs. 9–10. *Rocetelion fasciatum* (Garrett), structure of female genitalia (setae not figured). 9) ventral view; 10) lateral view. — Scale line 0.3 mm.

apical wider than the middle ones. Female: abdomen widened from the second segment on, then strongly narrowed at the seventh.



Figs. 11–16. Male genitalia (ventral view) and tergite IX and proctiger (dorsal view, setae not figured) of *Rocetelion*. 11–12) *R. fenestrale* (Fisher); 13–14) *R. fasciatum* (Garrett); 15–16) *R. humerale* (Zetterstedt). — Scale line 0.3 mm.

Male genitalia (Figs. 6–8, 11–16): tergite IX large, more or less rounded at apex. Cerci small, rounded. Gonocoxopodites almost entirely divided ventrally by a longitudinal membranous area, extended on each side along apical margin in *R. fenestrale* and *R. humerale* (Figs. 11, 15). Ventral face of the synsclerite attached to the dorsal face by a narrow bridge, sclerotised and bearing setae, the gonocoxal tube being therefore very short, its internal side almost transverse; at this level, some rows of dark, conspicuous spinules.

Gonostyles dorsoventrally flattened, simple, laterally inserted, without apical or preapical teeth, but with a thicker internal plate. Pointed at apex in *R. fasciatum*, rounded in *R. fenestrale* and *R. humerale*. No modified setae; in *R. fenestrale*, the ciliation is sparser and shorter (Fig. 11).

Phallosome of medium size. Gonocoxal apodemes long, narrow and well sclerotised. Phallosome almost entirely membranous dorsally and ventrally: only a narrow apical plate connecting the parameres (Fig. 8). Dorsal and ventral parameres connected by a large

sclerotised plate in the type-species, the plate smaller in *R. fenestrale* and *R. humerale*. Ejaculatory apodeme short and well sclerotised.

Female genitalia (Figs. 9–10, *R. fasciatum*) almost completely invaginate in seventh segment, from which project, laterally and ventrally, only the apex of tergite X, two-thirds of sternite X and the cerci. Tergite VIII and IX entirely invaginate and membranous. Sternite VIII entirely divided into two halves, all the apical margin ciliate. Sternite IX entirely internal, sclerotised, with hollow laterodorsal expansions. Cerci very long and narrow. Sternite X forming a well-developed plate.

Larva and biology unknown.

Key to the Holarctic species of *Rocetelion*

1. Distance of ocelli from eye margin at most 1.5 their own diameter; basisternite and scutellum without discal bristles; metepisternite strongly darkened; hind coxae without posterior bristles; radiomedian fusion as long as stem of anterior fork 2

- Distance of ocelli from eye margin almost twice their own diameter; basisternite and scutellum with discal bristles; metepisternite of the same colour as rest of pleurites; hind coxae with posterior bristles; radiomedian fusion shorter than stem of anterior fork..... 3
- 2. Scutum brown, without distinct longitudinal stripes; posterior coxae faintly infuscated on basal third; radiomedian fusion slightly shorter than stem of anterior fork. Male genitalia: Figs. 11–12..... *fenestratale* (Fish.)
- Scutum yellow with three distinct longitudinal stripes, the median sometimes fainter; posterior coxae strongly infuscated on almost basal half; radiomedian fusion much shorter than stem of median fork. Male genitalia: Figs. 15–16 *humerales* (Zett.)
- 3. Antennal flagellum light brown, last flagellomere with a distinct, rounded apicule; mid coxae entirely yellow; wing strongly darkened at apex; Sc long, reaching the level of apex of basal cell. Male unknown *fasciolum* (Coq.)
- Antennal flagellum dark brown, last flagellomere without apicule; mid coxae with a dark basal spot; wing faintly darkened at apex; Sc short, ending distinctly before apex of basal cell. Male genitalia: Figs. 13–14 *fasciatum* (Garr.)

Discussion

The phylogeny and biogeography of *Rocetelion* and related genera have been studied in Matile's (1986) monograph. This includes a detailed analysis of the characters, to which the reader is referred.

Rocetelion shows only two autapomorphies, the loss of the inner tibial combs II–III and the reduction of the posterior combs of the tibiae; these characters are unique among the *Keroplattini*.

At the species level, and notwithstanding the fact that the male genitalia of *R. fasciolum* are unknown, it is easy to distinguish two couples of sister species in the genus. The first is formed by *R. fenestratale* and *humerales*, who share four synapomorphies; metepisternite strongly coloured, male membranous gonocoxal area widened at apex, gonocoxal spinules numerous and closely set and gonostyles rounded at apex. The second consists of *R. fasciatum* and *fasciolum*, with five synapomorphies: situation of the outer ocelli, farther from middle of head, basisternite bare on disc, loss of discal scutellar setae and of posterior coxal setae, and length of radiomedian fusion. The discovery of the male of *R. fasciolum* will of course test this hypothesis.

At the generic level, *Rocetelion* was inferred to be more closely allied to *Paracerotelion* Matile, an afro-tropical genus, than to any other genus of *Keroplattini*, on the basis of three synapomorphies which appear

nowhere else in the tribe, and relate to the male gonostyles: dorsoventrally flattened, with the inner side modified into a thin sclerotised blade, and without apical teeth (this last character has been hypothesized to be a loss, the teeth being present in the three other genera of the group, *Tolletia*, *Mallochinus* and *Cerotelion*).

The sister-group relationship inferred between the eastern nearctic *R. fenestratale* and the western palaeartic *R. humerales* implies that the separation of the two species has a *terminus post quem* non situated at the definitive break of terrestrial connexions between Europe and North America. This event has been dated to the Upper Cretaceous (Dietz & Holden, 1970), to the Palaeocene (Smith & Briden, 1977), to the Lower Eocene (McKenna, 1975) or even to the Upper Eocene (Talwani & Heldom, 1977; Hallam, 1981). This gives the couple and its sister-group an age ranging from about 40 to about 60 million years.

Other Keroplattidae following the North Atlantic track are the *Macrocera* of the *nobilis* group (Vockeroth, 1976), the two species (one fossil) of *Hesperodes* (Matile, 1980), the three *Cerotelion* species of the *johannseni* group, the couple formed by *Keroplatus clausus* Coquillett and *K. reaumurii* Dufour, the *Orfelia* of the *discoloria* group, the *Isoneuromyia* of the *semirufa* group and the genera *Platyura*, *Macrorrhyncha*, *Asindulum* and *Urytalpa* (Matile, 1986).

Many other Mycetophiloidea follow the same track: all the Bolitophilidae, the Diadocidiidae (but with one or two neotropical species and a probably introduced Tasmanian species), the Ditomyiidae of the subgenus *Symmerus* s. str., the Mycetophilidae of the genera *Paratinia*, *Baeopterogyna*, *Sytemna*, *Anaclileia*, *Ectrepesthoneura*, *Speolepta*, *Gnoriste*, *Novakia* and *Tarnania* (Matile, 1986). The same has been noted for species of *Mycetophila* by Laffoon (1957) and Lastovka (1972), *Phronia* and *Trichonta* by Gagné (1975, 1981), *Pseudexechia* and *Epicrypta* by Chandler (1978, 1981), *Acnemia*, *Monoclona* and *Allodia* of the subgenus *Brachycampta* by Zaitsev (1982a, 1982b; 1983; 1984), *Sciophila* by Zaitsev (1982c) and Matile (1983), and *Mycomya* by Väisänen (1984).

The North Atlantic track is therefore one of the most common among the Mycetophiloidea; its antiquity has been confirmed by Baltic amber fossils (Upper Eocene to Lower Oligocene) of the genera *Hesperodes*, *Sytemna* and *Symmerus*.

On the suprageneric level, the sister-group relationship existing between the holarctic *Rocetelion* and

the afro-tropical *Paracerotelion* implies that the common ancestor of the couple cannot be posterior to the Late Cretaceous.

According to current plate tectonics, the separation of North America and Africa goes back to the Upper Triassic, an age which seems far too great for a couple of present-day genera. If the geographic distribution of these taxa is to be interpreted in the light of current tectonics*, one must then suppose that the ancestral stock was located in Africa and western Laurasia. The ancestral population was split when Europe was separated from Africa in the Palaeocene (and North America from South America), the African stock giving *Paracerotelion*, the Laurasian stock being at the origin of the cool-adapted *Rocetelion*.

This scenario is consistent with the estimated age, Palaeocene or Eocene, of the species-groups.

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* In my 1986 monograph, I have noted that "classic tectonics" were refuted, as regards the Keroplatidae, by some transpacific tracks, while the expansion hypotheses, especially Shields' (1979, 1983), were not. This is the case with the *Rocetelion* – *Paracerotelion* group, since Shields' maps leave Africa and Western Laurasia in contact as far back as the Middle Jurassic. I have also noted that transatlantic tracks cannot test the rival theories.

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