

The first fossil Ephutini (Hymenoptera: Mutillidae), a new species of *Ephuta* SAY from Dominican amber

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Abstract. Very few species of fossils properly attributed to Mutillidae have been described: several Myrmosinae (*Protomutilla* BISCHOFF) from Late Eocene Baltic amber and two Sphaerophthalminae (*Dasymutilla* ASHMEAD) from Early Miocene Dominican amber. This paper describes the first fossil species of Mutillinae (*Ephuta clavigera* sp. nov.), also from Dominican amber. It differs from all modern species, most strikingly in its possession of thickened clavate setae on the head, body and legs.

Key words: *Ephuta clavigera*, Oligo-Miocene, taxonomy, classification, phylogeny

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INTRODUCTION

The family Mutillidae comprises about 4000 described species worldwide and is primarily tropical or subtropical in distribution. There are seven subfamilies, the probable phylogenetic relationships of which have been analysed by BROTHERS (1975, 1999) and MITCHELL & BROTHERS (in press), as shown in Fig. 1. (LELEJ & NEMKOV (1997) presented a somewhat different phylogeny, but I consider their analysis problematic in several respects (BROTHERS 1999).)

The fossil record of the family is poor, with only about ten species described. The oldest named fossil yet attributed to the family (RASNITSYN 1975: 109) is *Cretavus sibiricus* SHAROV 1957, based on an almost complete forewing from Cretaceous deposits, but there are doubts as to its family assignment (RASNITSYN 1980: 126) and I prefer to exclude it from Mutillidae. A specimen from the Upper Cretaceous amber of New Jersey, questionably attributed to Mutillidae by GRIMALDI et al. (2000), is actually a member of the Bethyridae (BROTHERS, pers. obs.). The figure and description of the Palaeocene (RASNITSYN, pers. comm.) *Myrmosa brunnea* PITON 1940 are too poor to be sure of the family attribution, but the general body form is that of a female myrmosine mutillid (although apparently with too many metasomal segments) (PITON 1940: 221). Similarly, the figure of *Mutilla tenera* FÖRSTER 1891, from the late Eocene or earliest Oligocene of Alsace, is poor (FÖRSTER 1891), but it indicates a probable ant and not a mutillid. None of the above species can properly be attributed to the Mutillidae.

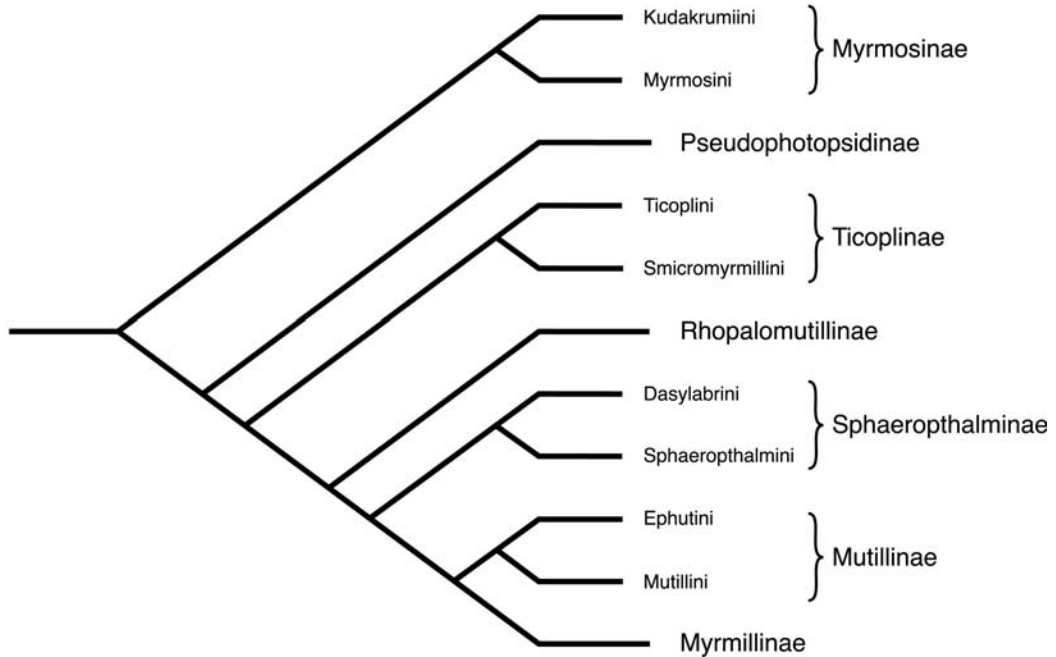


Fig. 1. Phylogeny of subfamilies and tribes of Mutillidae (adapted from BROTHERS 1999, MITCHELL & BROTHERS in press).

The richest source of fossil mutillids is the Late Eocene Baltic amber, from which about nine species of *Protomutilla* BISCHOFF, representing both sexes, have been described (BISCHOFF 1916; BRUES 1933; LELEJ 1986). Some of these are probably not Mutillidae (KROMBEIN 1979), but several, including the males, definitely are; they belong to the tribe Kudakrumiini of the Myrmosinae, the most basal subfamily (Fig. 1). The only other fossil mutillids yet described are two different species of *Dasymutilla* ASHMEAD (males) from the Early Miocene Dominican amber (MANLEY & POINAR 1991, 1999); these are members of the tribe Sphaerophthalmini (subfamily Sphaerophthalminae), one of the most derived groups (Fig. 1). Recently, a female specimen that also appears to be a sphaerophthalmine has been discovered in Baltic amber (JANSEN, pers. comm.), but this needs to be confirmed by detailed study. In the above context, it is of considerable interest that a female of another of the most derived groups in the family, the tribe Ephutini of the Mutillinae (Fig. 1), has also been found in a beautiful piece of Dominican amber (Fig. 2).

The Ephutini comprises four genera and is restricted to the New World. The genus *Ephuta* SAY is the richest, with about 240 described modern species (NONVEILLER 1990; SCHUSTER 1951), and ranges from Canada to Argentina. It is the only ephutine genus for which females are known. (However, I strongly suspect that when females are associated with the males currently separated into *Ephuamelia* CASAL, *Ephuchaya* CASAL and *Ephusuaresia* CASAL on the basis of a few idiosyncrasies, they will be found to be indistinguishable from *Ephuta*.) All species have a cylindrical first metasomal segment and females have an ovate mesosoma; the body is usually very deeply and coarsely punctured and there are often regions that are densely covered with short fine decumbent pubescence which obscures the surface. These characteristics are evident in the fossil specimen also. The classification and recognition of specimens of *Ephuta*, specially females, is not easy since

many species are rather variable and yet differ from others in rather subtle characters that are often difficult to see (SCHUSTER 1951). It was thus with some trepidation that I embarked on the specific identification of the fossil (Figs 3-7, 9, 10, 12-15). My concerns soon proved exaggerated, however, since it became obvious that it was unlike any known species in various respects. Most remarkably, many areas of the head, body and legs have peculiar blunt clavate setae (Fig. 15) of a type not found in other mutillids, and certainly not in any other *Ephuta* species (BROTHERS, pers. obs., QUINTERO pers. comm.). The pattern of appressed pubescence on the second metasomal tergum is unique, being almost the negative of that found in several other species (Fig. 11), and the mid and hind tibiae (Fig. 9) also lack the dorsal spines that are generally found in mutillids, including almost all *Ephuta* (Fig. 8). The profile of the mesosoma is also unusual, with the propodeum relatively long and gradually sloping (Figs 7, 15). It thus appears that the fossil species is not closely related to any modern species. In contrast, the two fossil *Dasymutilla* species are both clearly members of the modern *bioculata* group of that genus (MANLEY & POINAR 1991, 1999).

The genus *Ephuta* currently comprises four subgenera, *Ephuta* SAY and *Ephutopsis* ASHMEAD known from both sexes, and *Ephuseabra* CASAL and *Xenochile* SCHUSTER known only from males. According to the characteristics given by QUINTERO & CAMBRA (1996), females of *Ephutopsis* have a longitudinal carina on the vertex, and a spine near the posterior margin of the hypopygium and/or apicoventrally on the fore coxa. None of these features is present in the fossil. It may be that it should be placed in a new subgenus because of its peculiarities, but I prefer not to do so at this time; there are already enough dubiously valid generic and subgeneric names for slightly atypical ephutines and it would be a disservice to clutter the literature further.

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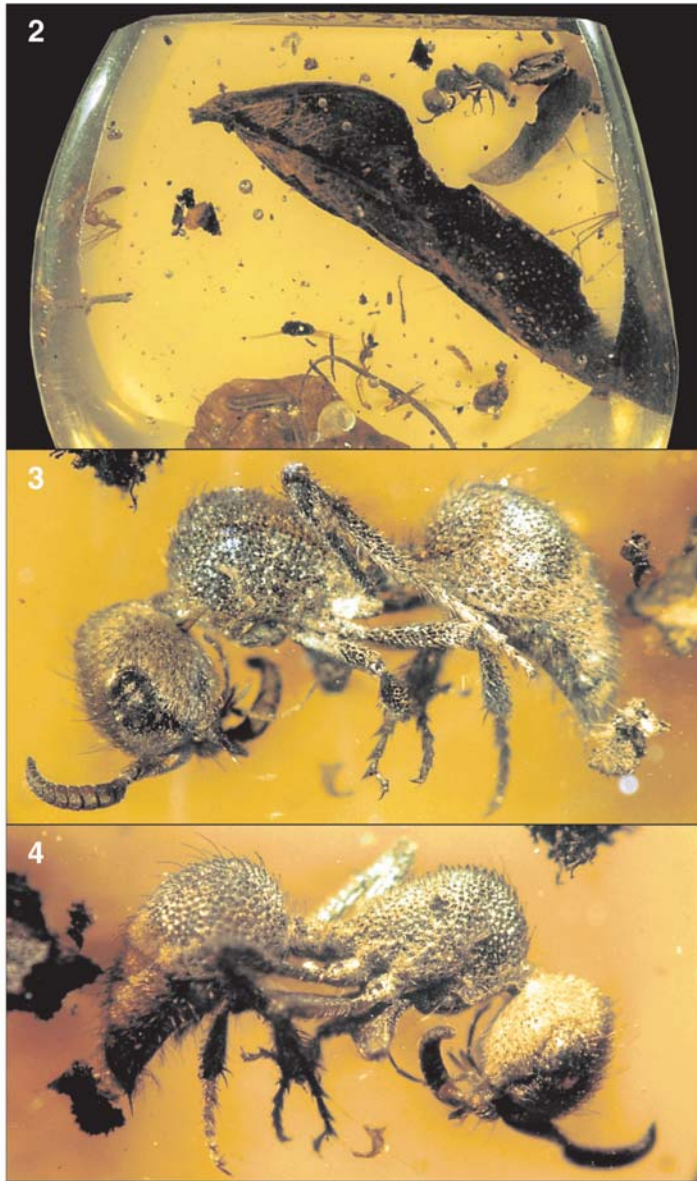
Ephuta clavigera sp. nov.

(Figs 2-4, 3-7, 9, 10, 12-15)

D i a g n o s i s. Female differs from all other known species of the genus in having the head, body and legs with many blunt clavate semi-erect setae, and the second metasomal tergum mostly covered with pale appressed pubescence except for four large oval non-pubescent spots. The posteriorly gradually tapering mesosoma, and the lack of dorsal spines on the meso- and meta-tibiae are highly unusual in the genus.

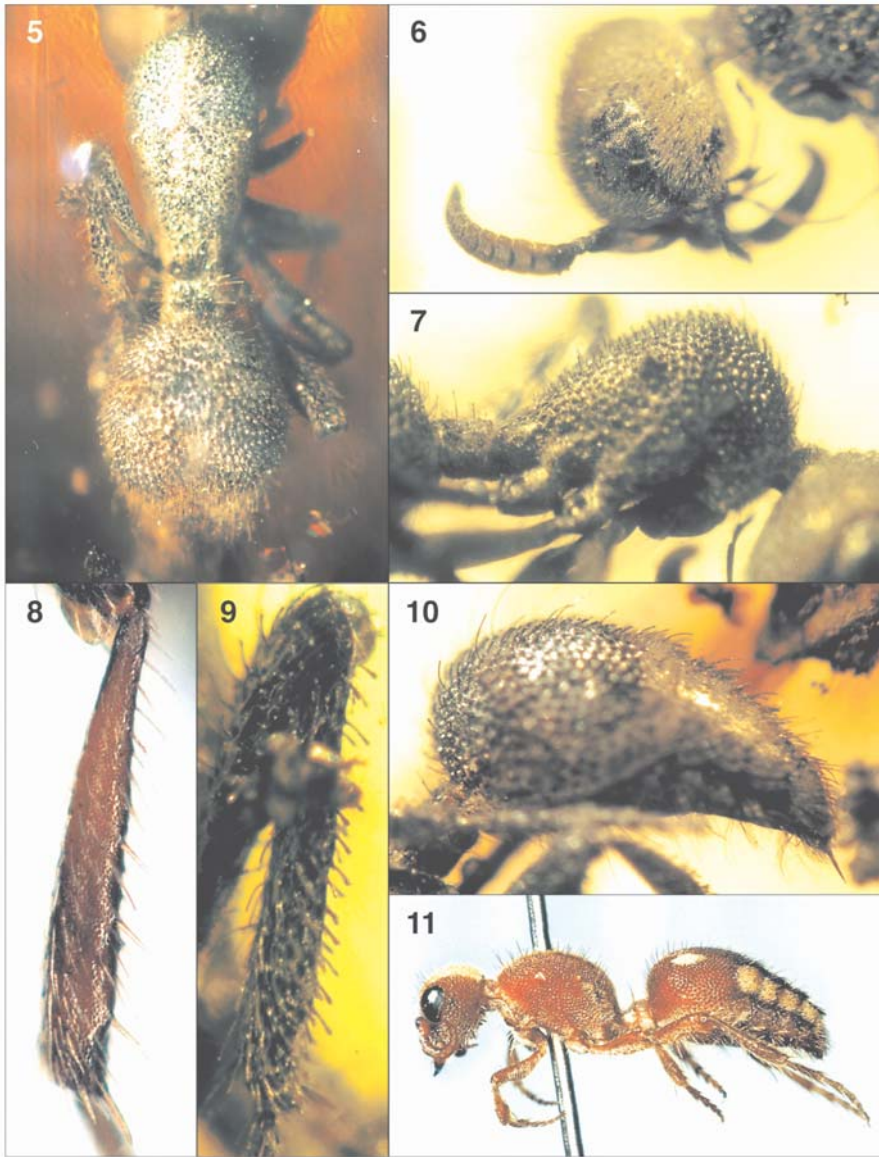
H o l o t y p e. Female, Oligo-Miocene Amber, Dominican Republic (American Museum of Natural History, AMNH No. DR-10-1847). The amber piece has been split into two parts: the major part (Fig. 2) is 25 x 25 x 8 mm in size, pale yellow in colour, and contains several plant and animal specimens in addition to the mutillid; the other part is a thin sliver, 14 x 13 x 2 mm in size and contains a slightly damaged dipteran. The mutillid has its dorsal surface fairly close to one straight edge and its left side at about one-quarter the thickness of the amber, between two parallel flat surfaces. It is thus well positioned for viewing of both sides and much of the dorsal surface; the front of the head and the ventral surface are not visible, however.

D e s c r i p t i o n. Length (adjusted to correct for non-alignment of tagmata): 3.9 mm. Entire body and appendages black with faint bronze reflections, except for very dark brown palpi, antennal flagellum and tibial spurs. Dense fine recumbent yellowish pubescence obscuring surface of entire head (except for a narrow strip between eye and base of mandible, and posteroventral surface), anterior collar of pronotum, broad apical band on T2, and entire T3-T6; similar but less dense recumbent pubescence lateroventrally on mesosoma, forming a more or less cross-shaped mark on



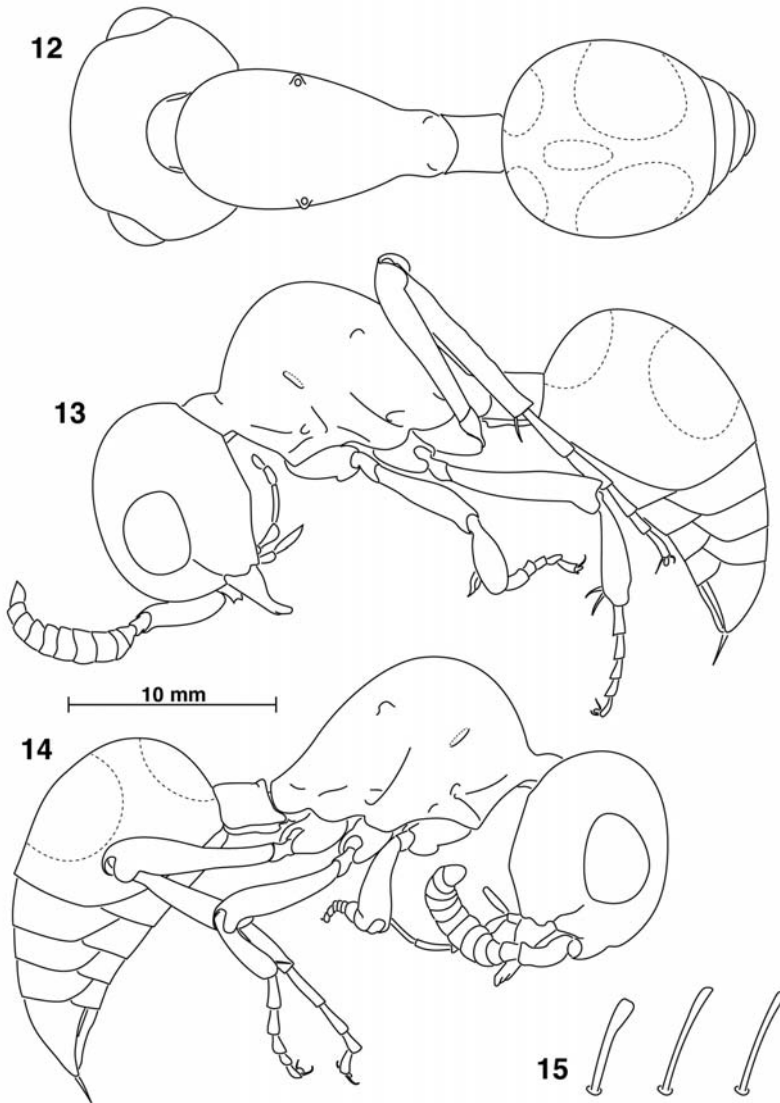
Figs 2-4. *Ephuta clavigera* sp. nov. 2. Amber piece containing holotype (above right) and several other inclusions. 3-4. Holotype female, lateral views (corrected length 3.9 mm).

T2 (T2 thus with 4 large ill-defined dark non-pubescent cuticular spots, 2 anteriorly and 2 postero-laterally, and also a small median oval non-pubescent spot), and on hypopygium. Long fine erect curved darkish setae scattered on most regions, denser on front of head, clypeus, mandible, legs, and apical metasomal terga and sterna. Shorter and thicker semi-erect blunt dark setae (usually clavate, broadened apically and often with tip lobed) densely arrayed on front and dorsum of head, dorsum of mesosoma, dorsum of T2, and dorsally on meso- and meta-tibiae; sparser on dorsum of T1, T3-T6 and a few other regions. Entire body densely covered with deep fairly coarse punctures, except for smoother and finely punctate posteroventral surface of head and metasomal sterna.



Figs 5-11. *Ephuta* spp. 5-7, 9-10 *Ephuta clavigera* sp. nov., holotype female. 5. Meso- and metasoma, dorsal view. 6. Head, lateral view, showing dense decumbent pubescence and stout antenna. 7. Mesosoma and metasomal petiole, lateral view, showing clavate setae and punctuation. 9. Left hind tibia, lateral view, showing clavate setae and absence of spines. 10. Metasoma, lateral view, showing clavate setae and distribution of pubescence. 8. *Ephuta* sp., female (Costa Rica), left hind tibia, lateral view, showing lack of clavate setae and presence of typical spines. 11. *Ephuta* sp. near *malbala* CASAL, female (length 7 mm, Argentina), lateral view, showing typical body form and pubescent patterns.

Head transverse, 1.04 x as wide as high, 1.40 x as high as deep (long); vertex evenly convex. Eye prominent, oval, 1.38 x as high as long, separated from posterior margin of head by 1.09 x eye length in lateral view. Head width across eyes 1.08 x head width immediately behind eyes; sides of head parallel behind eyes for a short distance then broadly curved and merging with straightish hind margin of head. Malar space 0.52 x eye height. Clypeus apparently with 4 apical teeth. Mandible slen-



Figs 12-15. *Ephuta clavigera* sp. nov., female. 12. Dorsal view. 13-14. Lateral views. 15. Clavate setae from hind tibia, 2nd metasomal tergum and head (left to right) at higher magnification. Dashed lines on 2nd tergum delimit areas without appressed pubescence. Scale = 1 mm.

der with ventral margin evenly concave; apex acute with very weak dorsal pre-apical tooth. Antenna with scape stout and strongly sigmoid; pedicel about as long as wide, slightly constricted apically; flagellum short and stout, broadest at 3rd flagellomere and gradually tapering to apex, most flagellomeres about 2 x as broad as long.

Mesosoma strongly arched dorsally and tapering posteriorly, elongate oval in dorsal view, 0.60 x as wide as head, 1.71 x as long (excluding anterior collar) as wide, 0.71 x as high as long (excluding anterior collar); propodeal spiracles prominent, width across spiracles 0.93 x width of mesosoma.

Procoxa with preapical transverse groove anteroventrally. Meso- and meta-tibiae apparently without dorsal spines.

Metasoma (including petiole) 1.96 x as long as wide. Petiole cylindrical, 0.90 x as long as wide, 1.09 x as long as high, 0.29 x length of T2. Second metasomal segment 1.19 x as wide as high, T2 strongly arched anteriorly, 0.99 x as long as wide. Pygidium apparently bare medially (whether laterally carinate indeterminable). Hypopygium simple, merely weakly convex on apical half.

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