



TWO NEW FUNGUS GNATS (INSECTA, DIPTERA, MYCETOPHILIDAE) FROM THE LOWER CRETACEOUS OF SPAIN

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ABSTRACT - Two new species of Diptera Mycetophilidae are described based on two imagos found in the Lower Cretaceous La Cabrua fossil-site (Montsec Range, Lleida Province, Spain). One belongs to the genus *Palaeodocosia* described from Baltic amber and known from Recent Fauna, and the other, to a recent genus *Synapha*. *Palaeodocosia cabruae* sp. nov. and *Synapha rubiesensis* sp. nov. are the first described and named dipteran adult specimens from the Mesozoic compression fossil-sites of Spain. © Éditions scientifiques et médicales Elsevier SAS

KEYWORDS: INSECTA, DIPTERA, MYCETOPHILIDAE, NEW SPECIES, LOWER CRETACEOUS, SPAIN.

RÉSUMÉ - Deux nouvelles espèces de Diptera Mycetophilidae sont décrites, à partir de deux adultes trouvés dans le gisement du Crétacé inférieur de La Cabrua, ou Montsec (Province de Lleida, Espagne). Une appartient au genre *Palaeodocosia*, de l'ambre balte et l'autre au genre actuel *Synapha*. *Palaeodocosia cabruae* sp. nov. et *Synapha rubiesensis* sp. nov. sont les premiers diptères adultes décrits et nommés dans les gisements lacustres du Mésozoïque d'Espagne. © Éditions scientifiques et médicales Elsevier SAS

MOTS-CLÉS: INSECTA, DIPTERA, MYCETOPHILIDAE, NOUVELLES ESPÈCES, CRÉTACÉ INFÉRIEUR, ESPAGNE.

Imagos of Diptera are uncommon in the Mesozoic compression fossil-sites from Spain. This is not the case with both pupal and larval stages that are frequently found in the lithographic limestones of the Montsec Range (Lleida Province) and Las Hoyas (Cuenca Province) (Whalley & Jarzembowski 1985; Martínez-Delclós 1989, 1991). Here we describe two imagos of Diptera Mycetophilidae found in the La Cabrua outcrop (Montsec, Lleida Province).

The insects from the lithographic limestones of Montsec are known since the beginning of the century (Vidal 1902). In 1902, Zeiller published a monographic work about the plants found in these limestones; his work plates included a photograph of the first dipteran specimen known from the Montsec outcrops (Fig. 2.4), that was an eruciform larva. In 1951 Ferrer figured another dipteran larva, bigger than Zeiller's one. This individual was figured later by Bataller et al. (1953) in the memoirs of the geological map of Isona.

Some dipteran larvae, housed in the British Museum of Natural History in London, have been studied by Whalley & Jarzembowski (1985) and placed in five morphotypes; three of them attributed to the families Stratiomyidae and Sciomyzidae.

The first reference to a dipteran imago in the Lower Cretaceous of Spain was published by Lacasa & Martínez-Delclós (1986). In this study the authors

figured three individuals, one belonging to Mycetophilidae (Fig. 2.3), another to Tipulidae (Fig. 2.2), and the third one to Nemestrinidae (Fig. 2.4). In 1991 Martínez-Delclós cited and figured another adult specimen belonging to Mycetophilidae (photo 16), which is here named *Palaeodocosia cabruae* nov. sp.

It is interesting that both species described here belong to recent genera which are rather scarce in fossil record. The only fossil species of *Synapha* is described from Eocene-Oligocene Baltic amber (Evenhuis 1994). Besides of four species of *Palaeodocosia* from Baltic amber, one specimen of a new species has been found in Upper Cretaceous, probably Cenomanian (Samylina 1988) Far East deposits (Magadan region, Obestchayustchiy locality). The Cretaceous age of a recent genus itself is not an unique situation neither for insects, nor for Diptera (for example, a species of Trichocera was described from the Middle Jurassic of Siberia (Kalugina & Kovalev 1985). Much more unusual is the high ratio of extant genera of fungus gnats in Lower Cretaceous assemblages. Thus, from 17 mycetophilid genera found in different Lower Cretaceous localities of Siberia and Mongolia (Blagoderov 1995, 1997, 1998a, b) 6 are still living and contain 11 species from 43 known. So, the age of many recent genera of fungus gnats is almost equal the age of the family. This fact may be very

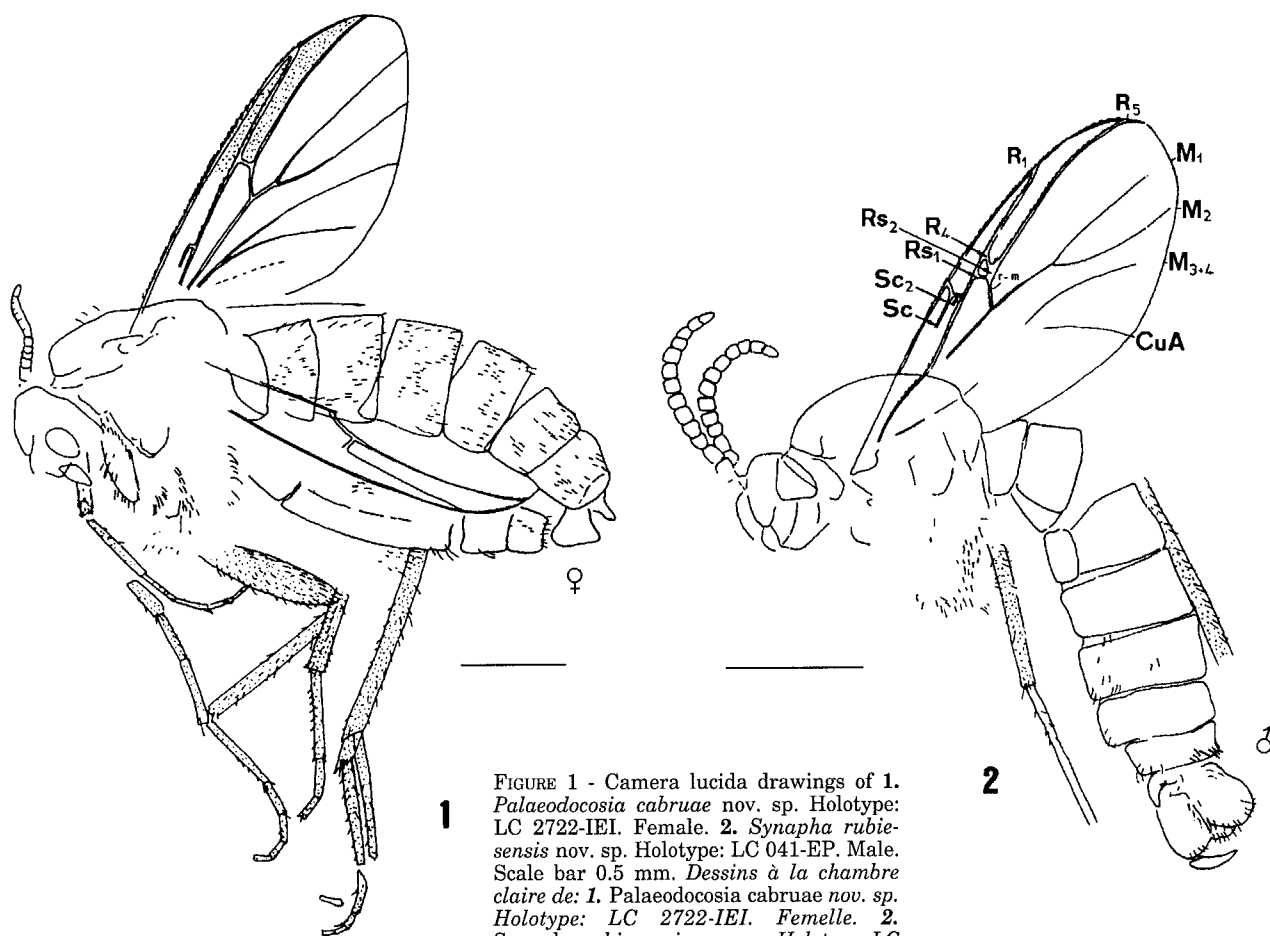


FIGURE 1 - Camera lucida drawings of 1. *Palaeodocasia cabruae* nov. sp. Holotype: LC 2722-IEI. Female. 2. *Synapha rubiesensis* nov. sp. Holotype: LC 041-EP. Male. Scale bar 0.5 mm. Dessins à la chambre claire de: 1. *Palaeodocasia cabruae* nov. sp. Holotype: LC 2722-IEI. Femelle. 2. *Synapha rubiesensis* nov. sp. Holotype: LC 041-EP. Male. Échelle: 0,5 mm.

important for the reconstruction of the phylogeny of the family Mycetophilidae. Unfortunately, Montsec fungus gnats, due to insufficiency, may be hardly compared with the others Mesozoic mycetophilids complexes.

The phylogenetic studies of Mycetophilidae is at the beginning (Soli 1997). Unfortunately, not every group of fungus gnats is supported by apomorphies. Moreover, most of the characters used in recent mycetophilid taxonomy are invisible or unpreserved in fossils. In fact, only the characters of wing venation and, partially, body chaetotaxy are available for study. The demonstration of the monophyly of genera and reconstruction of family phylogeny is out of scope of the study. Therefore we limit the study to the traditional methods of character comparison for identification of fossil taxa, leaving the cladistics methods for following studies.

The adult morphology of fungus gnats is given after Zaitzev (1994) and Blagoderov (1993).

SYSTEMATIC PALAEONTOLOGY

Class INSECTA Linné, 1758
 Order DIPTERA Linné, 1758
 Suborder NEMATOCERA Latreille, 1825
 Superfamily MYCETOPHILOIDEA Newman, 1834
 Family MYCETOPHILIDAE Newman, 1834

Palaeodocasia MEUNIER, 1904

Type-species - *Palaeodocasia brachycamptites* MEUNIER, 1904, from the Oligocene Baltic amber. Except Baltic amber, the genus is known from the Lower Cretaceous of Mongolia, and recent Holarctic fauna.

Palaeodocasia cabruae nov. sp.

Fig. 1.1; Fig. 2.1,4

1991 Dípter de la familia Mycetophilidae, Martínez-Delclós, p 110, phot. 16.

Derivation of name - Named after La Cabrua outcrop (Montsec Range), the fossil-site where the holotype of this species was found.

Holotype - LC 2722 IEI, part and counterpart of a well-preserved female. It is housed in the Institut d'Estudis Ilerdencs (Lleida, Spain).

Locality - La Cabrua fossil-site in the Montsec Range (Lleida, Spain).

Stratigraphic position - Berriasian-Valanginian after Brenner et al. (1974); possibly Uppermost Hauterivian - Lower Barremian in age (Martín-Closas & López-Morón 1995).

Diagnosis - R_1 short, much shorter than basal part of R , laterotergites are bare.

Description - Head rounded, covered with numerous small hairs. Flagellum consists of 13 barrel like flagellomeres, its length slightly less than thorax length. Length of most of flagellomeres is nearly equal their width. Mesoscutum is moderately flat, carries rather long dark setae. Pronotum car-

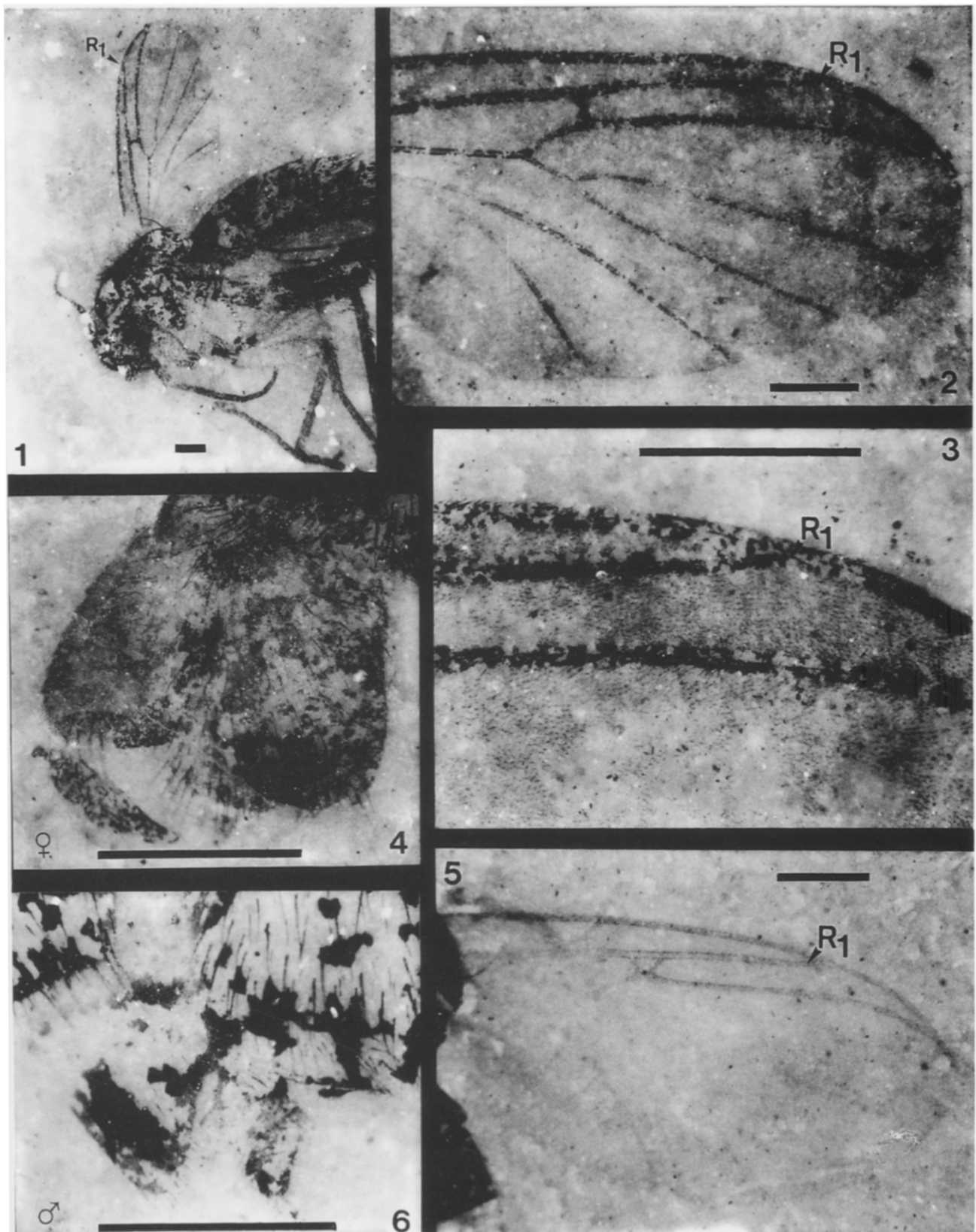


FIGURE 2 - 1. Anterior part of *Palaeodocosa cabruae* nov. sp. Holotype: LC 2722-IEI. 2. Forewing of *Palaeodocosa cabruae* nov. sp. 3. Detail of the forewing costal margin and R1, showing the microtrichia in the membrane wing, and two rows of setae in veins. 4. Female terminalia in lateral view of *Palaeodocosa cabruae* nov. sp. 5. Forewing of *Synapha rubiesensis* nov. sp. 6. Male terminalia in ventral view of *Synapha rubiesensis* nov. sp. Scale bar 0.5 mm. 1. Partie antérieure de *Palaeodocosa cabruae* nov. sp. Holotype: LC 2722-IEI. 2. Aile antérieure de *Palaeodocosa cabruae* nov. sp. 3. Détail de la marge costale de l'aile antérieure et R1, montrant les microtrichia dans la membrane alaire, et deux rangées de soies dans les veines. 4. Femelle terminalia en vision latérale de *Palaeodocosa cabruae* nov. sp. 5. Aile antérieure de *Synapha rubiesensis* nov. sp. 6. Mâle terminalia en vision ventrale de *Synapha rubiesensis* nov. sp. Échelle: 0.5 mm.

ries several short hairs. Mediotergite and laterotergites are bare. Coxae covered with long thin hairs, besides they carry more short and thick black setae. Abdomen is dark, covered with numerous hairs. Apical segment of cercus is cylindrical, longer than basal ones. Wing membrane is transparent, with microtrichia only. Apex of C is only slightly beyond R_5 tip. Sc converges with R. Basal part of R length is 1.5 times of R_1 length. Crossvein r-m length is 2 times that of RS1 section length and 1.3 times of M_3 section length. M_1 and M_2 fork length 6 times of M_3 length. Base of M_{3+4} and CuA fork is at the level of Sc end. Measurements: total length 6.5 mm, wing length 3.8 mm, wing width 1.8 mm, thorax length 2 mm, abdomen length 4.16 mm.

Discussion - The complex of such characters as Sc ended at R, R_1 short, r-m oblique, R_4 absent, show that the most plausible genus for attribution of the specimen is *Palaeodocosia*. The bare laterotergites (if it is not due to imperfect preservation) makes this species very distinct from other species of *Palaeodocosia*, which have a hairy laterotergite. The species could have been related with Australian genus *Pseudalysiinia* TONNOIR but the latter is unique among the Mycetophilidae by the complete absence of bristles on legs and body (Tonnoir 1929). Short R_1 might suggest that the species belongs to *Docosia* WINNERTZ, but more or less transverse r-m vein and long R_5 that reach wing apex rather suggest an attribution to *Palaeodocosia*. The combination of characters indicated in Diagnosis, distinct *P. cabruae* nov. sp. from all recent and fossil species.

Synapha MEIGEN, 1818

Type-species - *Synapha fasciata* MEIGEN, Recent species from Europe. Except Holarctic, *Synapha* is known also from South America, Australia and New Zealand as well as from Baltic amber.

Synapha rubiesensis nov. sp.

Fig 1.2, 2.5; Fig. 2.6

Derivation of name - Named after Rúbies village, in the Montsec Range, close to the La Cabrua fossil-site.

Holotype - LC 041-EP, part and counterpart of an adult well preserved male. It is housed in the Department of Estratigraphy and Palaeontology, Faculty of Geology, University of Barcelona (Barcelona, Spain).

Locality - La Cabrua fossil-site in the Montsec Range (Lleida, Spain).

Stratigraphic position - Berriasian-Valanginian after Brenner et al. (1974); possibly Uppermost Hauterivian - Lower Barremian in age (Martín-Closas & López-Morón 1995).

Diagnosis - This new species differs from other species of the same genus in proximal position of base of fork M_{3+4} and CuA, proximal of base of fork M_1 and M_2 at the level of M_3 base.

Description - Head is rounded. Flagellum consists of 14 rounded flagellomeres, its length is nearly equal the thorax length. Mesoscutum and scutellum carry dark setae. Mesoscutum is rather flat. Body is brown, legs are yellow. Mediotergite and laterotergites are bare. Abdomen and terminalia carry numerous thin hairs. The 8th abdominal segment is very small and retracted. Male terminalia is heart shaped. The 9th tergite is parallel sided,

with rather shallow excision apical side, its length is 1.3 times more than its width. Gonocoxite is rather massive, gonostylus is slightly curved and pointed at tip. Tibiae and tarsi carry several rows of small dark setae. Wing membrane is transparent, with microtrichia only. Vein C bears two rows of setae, ends slightly beyond R_5 tip, though not reaching wing apex. Sc converges with C slightly beyond M_3 base, Sc_2 is situated slightly before M_3 base. R, R_1 and R_5 have one row of setae. Crossvein r-m length is 2.2 times that of RS1 length. R_1 length is 3.3 times that of r-m length. Small cell is trapezoidal. RS1 length is 2 times that of RS2 length. M^3 length is 2 times that of r-m length. M_1 - M_2 fork length 2.5 times of M^3 length. Base of M_{3+4} and CuA fork is proximal of M^3 base, at the level of Sc_2 . Measurements: total length 6 mm, wing length 3.3 mm, wing width 1.43 mm, thorax length 1.5 mm, abdomen length 3.83 mm.

Discussion - The combination of such characters as Sc ended at C, short trapeziform small radial cell, vein R_5 ended before wing apex, base of fork M_{3+4} and CuA well before the base of fork M_1 - M_2 , suggest that the new species belongs to genus *Synapha*.

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