

Cixius (Ceratoxicius) pallipes Fieber, 1876 (Hemiptera: Auchenorrhyncha: Fulgoromorpha: Cixiidae): first record for Spain

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A preliminary study on the terrestrial fauna from Cova des Coll (Felanitx, Mallorca), a cave located at the east of Mallorca (Balearic Islands, Spain), was published in 2004. In that study some specimens of the planthopper family Cixiidae remained unidentified. In this paper we report the first record of the epigeal *Cixius (Ceratoxicius) pallipes* Fieber, 1876 for Spain. A diagnosis of the morphological characteristics of the species as well as information on its geographical distribution and ecology are given.

Paraules clau: *nova cita, Cixius pallipes, Hemiptera, Cixiidae, Balears.*

CIXIUS (CERATOXICIUS) PALLIPES FIEBER, 1876 (HEMIPTERA: AUCHENORRHYNCHA: FULGOROMORPHA: CIXIIDAE): PRIMERA CITA PER A ESPANYA. Durant l'any 2004 es va realitzar i posteriorment publicar un estudi preliminar de la fauna terrestre de la Cova des Coll (Felanitx, Mallorca), cavitat situada en el llevant de la illa de Mallorca (Illes Balears). En aquest estudi varen quedar pendents d'estudi i determinació distints exemplars d'hemipters (fulgoromorfs), pertanyents a la família Cixiidae. A aquest treball se dona a conèixer per primera vegada a Espanya l'espècie epigea *Cixius (Ceratoxicius) pallipes* Fieber, 1876 i es comenten les característiques dels exemplars recol·lectats, així com la seva informació biogeogràfica i ecologia.

Keywords: *new record, Cixius pallipes, Hemiptera, Cixiidae, Balears.*

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Introduction

The knowledge of the Cixiidae found in caves from the Balearic Islands is very scarce. The only available data are specimens collected in Coves del Drac from Mallorca by Racovitza (1907). This author reported the capture of several specimens (both larvae and adults) of *Cixius*, sug-

gesting that they should be considered as true troglobitic species because they displayed marked depigmentation, red eyes and they were collected very far from the entrance of the cave. No additional data are available, and this species obviously was never described (Hoch, 1994).

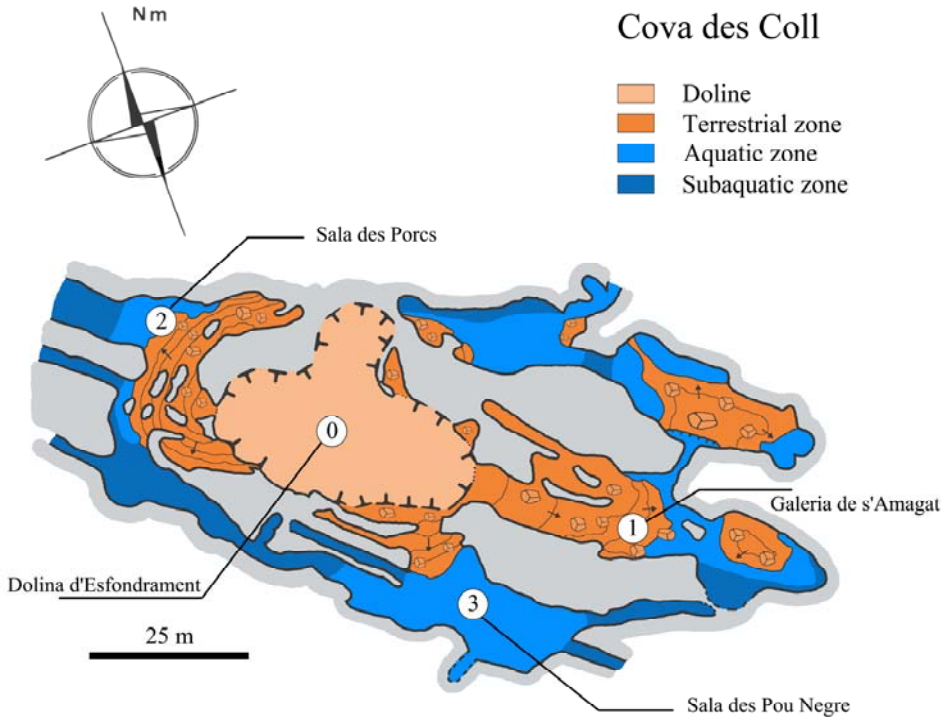


Fig. 1. Location of the sampling sites. Cave survey modified from Gràcia *et al.* (1997).
Fig. 1. Localització de les zones de mostreig. Cartografia modificada de Gràcia *et al.* (1997).

Subsequently, some more Cixiidae specimens were collected in other caves from Mallorca, such as Cova des Coll (Felanitx) (Vadell & Zaragoza, 2005), which are presented here, as well as from Coves del Pirata (Manacor) (Vadell *et al.*, 2006) and Cova del Pas de Vallgornera (Llucmajor) (Vadell *et al.*, 2007), which are currently under study.

The Cova des Coll is a cave located at the Mallorcan east locality of Portocolom in the municipality of Felanitx. Currently, the cave has a length of 7.020 m of which 5.529 are underwater galleries and is excavated in Miocene limestones and calcarenites. The cave has two natural entrances, one of them

contacting the sea and the other one located near the village. The latter is accessible through a collapse doline adjacent to the village. There are also two artificial pits, which connect to the cave (Gràcia *et al.*, 1997; 2005).

In 2003 and 2004 a preliminary study was carried out on the terrestrial fauna of the cave in the collapse doline area (Vadell & Zaragoza, 2005) (Fig.1). This doline initially allows the entrance to three halls of the cave: at SE, the Galeria de s'Amagat, at NW the Sala des Porcs and at S the Sala des Pou Negre, all of them mostly dry and of easy access; this first paper reported the occurrence of 7 araneid species, 2 pseudos-

corpions, 5 isopods, 1 centipede, 1 millipede, 2 psocopterans, 1 de orthopteran, 2 dipterans, 1 coleopteran and 1 hemipteran (Auchenorrhyncha) (Vadell & Zaragoza, 2005).

The Auchenorrhyncha were captured 35 m inside the Galeria de s'Amagat on roots and in complete darkness. Several specimens (a male, three females and four nymphs) were submitted to the University of Madeira. Other specimens (a male and two nymphs) are included in the Mateo Vadell collection (CMV) and they are curated at the Museu Balear de Ciències Naturals (MBCN).

Taxonomy

Cixius (Ceratoxicius) pallipes Fieber, 1876
Cixius pallipes Fieber, 1876: 191 [type locality: Italy]

Cixius pallipes notaticollis Rey, 1894: 14 [France]

Cixius pallipes fumipennis Horváth, 1897: 620 [Croatia]

Cixius (Ceratoxicius) intermedius pallipes: Wagner 1939: 103, misinterpretation of *C. intermedius* Scott sec China 1942: 87-88.

Cova des Coll (Felanitx) U.T.M 522770 / 4364500-11: 1 ♂ 2-X-2004, M Vadell leg.,



Fig. 2. Male of *Cixius pallipes*.

Fig. 2. *Masclle de Cixius pallipes*.

(Reg. CMV nº 021004-CI2). The body size of the collected specimen in male is 5.5 mm (Fig. 2).

Diagnosis

Genus *Cixius* Latreille: mesonotum tricarinate; apical margins of tegmen without distinct bases of setae between apical veins, those only on veins themselves; pterostigma without scattered bases of setae.

For a key to the subgenera of *Cixius* see China (1942).

Specific characters in the male genitalia of *C. pallipes*: anal tube distally with two comparatively small processes, aedeagus (male copulatory organ) with one movable spine-like appendage on each side of flagellum base and left dorsal lobe of phallosome only weakly developed. The male genitalia are figured in Holzinger *et al.* (2003). The adult specimens display well developed compound eyes as well as tegmina and wings. As no obvious troglomorphy is observed, it is unlikely that the cavernicolous cixiid species reported from Coves del Drach by Racovitza (1907) are identical with *C. pallipes*.

Distribution

In the Iberian Peninsula the subgenus *Ceratocixius* are represented by *Cixius simplex* (Herrich-Schäffer, 1835), *Cixius cunicularius* (Linnaeus, 1767), both widely distributed in Europe, and *Cixius trirhacoides* only found in the Spanish provinces of Cádiz and Granada (Remane & Holzinger, 1998).

The species *Cixius pallipes* has been recorded in Afghanistan, Armenia,

Azerbaijan, Bulgaria, Corsica, Cyprus, France, Georgia, Greece, Hungary, Iraq, Israel, Italy (type locality), Moldova, Romania, Sardinia, Serbia, Slovakia, Switzerland, Tadzhikistan, Turkey, former Yugoslavia (Nast, 1972; 1987; Lodos & Kalkandelen, 1980; Kalkandelen, 1987; Dlabola, 1977; Drosopoulos, 1980; Demir, 2008).

Records of *C. pallipes* from the Eastern Mediterranean region, Near- and Middle East are doubtful and probably refer to different species, e.g. those from Eastern Europe are likely to concern *C. wagneri* China (M. Asche, Berlin, pers. comm., used with permission).

Ecology

Although the specimens reported here were found inside a cave, *Cixius pallipes* displays no obvious troglomorphy, and thus is an epigeal (surface dwelling) species.

Even though the collecting site in Cova des Coll is in complete darkness, the adults were found only 35 m away from the entrance suggesting that the physical conditions comply with those of the entrance/transition zone (Howarth, 1983).

Evolutionary implications

Although little is known about their phenology and habitat requirements of *C. pallipes* elsewhere (Holzinger *et al.*, 2003), it is not unusual for adult Cixiidae to seek dark, humid spaces for shelter from hot and dry conditions in surface environments. In doing so, they may incidentally end up in caves or underground galleries, and there may oviposit on penetrating roots of surface vegetation. The nymphs eventually hatch,

and –as the nymphs of all Cixiidae live in leaf litter or inside the soil– may even occasionally complete their larval development underground. Yet, only if adults manage to locate and recognize potential mating partners under cave conditions (i.e., complete darkness, constant temperature, and constant relative humidity), the evolutionary step from a facultative cavernicolous (troglophilic) to an obligatory cavernicolous (troglobitic) way of life can be realized (Hoch, 1994). Nevertheless, numerous lineages within the Cixiidae and other Fulgoromorpha taxa, have evolved troglobitic and highly troglomorphic species (Hoch, 2002). Therefore, the troglophilic behavior displayed by *C. pallipes* on Mallorca may represent an early stage of troglobite evolution. As Mallorca is rich in caves and apparently offers adequate subterranean habitat for cavernicolous Cixiidae, further exploration and inventory of the cave fauna should yield exciting discoveries.

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