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## Intra- and inter-population polymorphism in *Coletinia maggii* (Grassi, 1887) (Zygentoma: Nicoletiidae), an inhabitant of soil, mesovoid shallow substratum (MSS) and caves—A challenge for the strict classification of subterranean fauna?

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### Abstract

New locations of *Coletinia maggii* (Grassi, 1887) have been discovered in the center of the Iberian Peninsula in different types of subterranean environments, such as a stony layer in the subsoil of an alluvial plain, an alluvial Mesovoid Shallow Substratum or *Milieu Souterrain Superficiel* (MSS) and a gypsum cave. This is the first record of both an alluvial MSS in the center of the Iberian Peninsula and of a subterranean species living in it. The high number of specimens captured allowed the first detailed study of the morphological intra- and inter-population variations of this species. The implications of its presence in these different environments, its wide distribution area across Europe, and the relevance of the morphological variation in the characters for the taxonomy of this species are discussed. Based on the results, *Coletinia hernandoi* Molero, Bach & Gaju, 2013 is proposed as a **new synonym** of *C. maggii*.

**Key words:** Alluvial MSS, cave fauna, edaphic, endogean, hypogean, Nicoletiidae

### Introduction

The genus *Coletinia* Wygodzinsky, 1980 (Nicoletiidae, Zygentoma) includes 21 known species, 14 of which are present in the Iberian Peninsula (Molero *et al.* 2013). They are usually found in subterranean environments, mostly in caves, but a few are also (or only) found in edaphic environments, such as *C. tinauti* Molero-Baltanás, Gaju-Ricart & Bach de Roca, 1997 and *C. hernandoi* Molero, Bach & Gaju, 2013. Some are found under stones or decomposed wood, such as *C. mendesi* Wygodzinsky, 1980, and others in ant nests, such as *C. maggii* (Grassi, 1887).

The latter species, *C. maggii*, was briefly described as found in Sicily and then redescribed by Wygodzinsky (1980) based on specimens found in three localities: two in Italy (Lagonegro and Monte Maggiore) and one in Croatia (Dalmatia in the Ombla Valley). This species has also been reported in edaphic environments in Malta, Central and Western Italy, Austria (Mendes 1992; Christian 1993), Hungary (Paclt & Christian 1996), and recently in the Atapuerca Cave in central Spain (Molero *et al.* 2013).

Recent samplings were conducted in three sites: a superficial subterranean habitat (also called Mesovoid Shallow Substratum or *Milieu Souterrain Superficiel*, but usually MSS) of alluvial origin in Spain (Ortuño *et al.* 2013), a stony layer under the soil of an alluvial plain and in a gypsum cave. They revealed the presence of *C. maggii* in new areas in the centre of the Iberian Peninsula. A relevant goal of this study was to provide the first record of a subterranean species in an alluvial MSS in a region different from that studied by Ortuño *et al.* (2013). In two of the localities, this species was so abundant that it allowed the study of intra-population variations in their morphology. The implications of its morphological variation and different environments are discussed in relation to their assignment as a single species and their possible ecological preferences.

Subterranean fauna has been classified in several ways. For example, species found in caves have been classified as troglobionts, eutroglophiles, subtroglophiles or troglonexes according to their dependency on the

accurate to consider that population as hypogean, endogean or edaphic. In this sense, species whose populations are all either hypogean or endogean can be considered either hypogean or endogean, respectively. However, facultative (troglophile) species may have strictly hypogean populations of individuals that are truly hypogean (troglóbionts), even if other populations of that same species are not. According to this approach, Iberian populations of *C. maggii* with endogean and hypogean populations can still be considered subterranean (*sensu* Ortuño *et al.* 2014).

The discovery of *C. maggii* in the interstices of a stony layer of an alluvial plain suggests that these landscapes should not be neglected as suitable sampling areas for subterranean species. In addition, the presence of this species in the first alluvial MSS sampled in the center of the Iberian Peninsula highlights the ecological and faunistic value of this kind of habitat, and encourages further research of this environment in new areas.

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