

## Present status of mountain cicadas *Cicadetta montana* (sensu lato) in Europe

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### Abstract

During the last ten years it became clear that *Cicadetta montana* (Scopoli 1772) is not a single species but a complex of closely related, morphologically similar species of singing cicadas. The best differential characters are the diverse, species specific song patterns. Till now, in the Palaearctic, on the basis of songs at least ten species of this complex have been discovered, but a half of them have not been described yet. According to calling song characteristics 3 main groups of species are proposed which with one exception correspond to three clades based on DNA analyses. Song characteristics of one new species do not fit in any of the proposed groups.

**Key words:** *Cicadetta montana* (sensu lato), mountain cicadas, complex of species, calling songs, bioacoustics.

### Introduction

During recent years, bioacoustic investigations of Mountain cicadas [*Cicadetta montana* (sensu lato)] have shown that this taxon is actually a complex of closely related species, which can be best distinguished by their calling song structures (Gogala and Trilar, 2004). Recent work of Sueur and Puissant (2007) added to the known list another *Cicadetta* species, differing in the song characteristics from the *Cicadetta cerdaniensis* Puissant and Boulard, 2000. We discovered in Greece another species, similar in song characteristics to *Cicadetta macedonica* Schedl 1999, and our recent investigations show that this is not the end of the list. On the other hand, recent results of a biological expedition in Iran have shown, that the typical *C. montana*, known from Europe, has a geographic distribution from Great Britain and at least to the Golestan in Iran. And the *Cicadetta brevipennis* Fieber 1876 is distributed at least from France to Romania (Trilar *et al.*, 2006).

### Materials and methods

We used for our field work the acoustic equipment including a modified ultrasound detector Pettersson D200 and a classical directional microphone Telinga Pro 6 in combination with a Marantz PM 660 and 670 solid state recorders. For analysis of the sound we used Amadeus Pro V1 and a Raven 1.2 software.

### Results and discussion

Considering the recent papers and our new data on *C. montana* (sensu lato) (Gogala and Trilar, 2004; Seur and Puissant, 2007; Trilar and Hertach, 2008) it is evident that this complex of species is more complicated than had been suspected. Description of one new species

*Cicadetta hannekeae* Gogala *et al.*, 2008 has been published recently (Gogala *et al.*, 2008). Other four species were discovered in Southeast Europe and have to be described by the authors of this paper. On the basis of song patterns three groups of species are proposed: *C. montana* (sensu stricto) group (*C. montana*, *C. brevipennis* and one new species from Greece), *C. cerdaniensis* group (*C. cerdaniensis*, *C. cantilatrix*) and *C. macedonica* group (*C. macedonica*, *C. podolica* and 3 new species from Greece). Another new undescribed species has basically different song does not belong to any of these groups. Clades, based on molecular investigations in Chris Simon's lab in Storrs, USA on our acoustically determined material support our groupings with the exception of *C. brevipennis*, which according to molecular data belongs to *C. cerdaniensis* group (C. Simon, personal communication). We have to map the European species of this complex based mainly on acoustic data again. Some postulated species have to be closely investigated, using not only morphology and acoustics but also molecular data.

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