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Molecular systematics and morphological identification of the cryptic species of the genus *Acalles* Schoenherr, 1825, with descriptions of new species (Coleoptera: Curculionidae: Cryptorhynchinae)

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Abstract

Molecular systematics and morphological study of the monophyletic weevil genus *Acalles* Schoenherr, 1825 are presented. Based on the mitochondrial CO1 barcoding gene and 16S ribosomal RNA gene, we discuss three difficult species complexes in the framework of a molecular phylogenetic reconstruction of 37 of 47 Western Palaearctic *Acalles* species or subspecies: the *A. echinatus, A. maraoensis and A. sierrae* complexes. Two results are given: 1. An exclusive focus on morphological, exoskeletal methods reach their limits in the case of many cryptic Cryptorhynchinae. In these cases molecular analysis is indispensable to resolve species level questions. 2. By using a combination of phenotypic and genotypic characters it is not only possible to ascertain phylogenetic relationships, but also to uncover new morphological, non-intraspecifical characteristics. Digital photography with image stacking makes this possible: for the first time we present photo key for *Acalles* species, a reliable, less costly and quick method for identification alongside DNA barcoding. The following taxonomic changes are given: *Coloracalles edoughensis* Desbrochers, 1892 **comb. nov.** (formerly *Acalles edoughensis*) from North Africa and Spain change to *Coloracalles* Astrin & Stüben, 2008 and *Pseudodichromacalles xe-*

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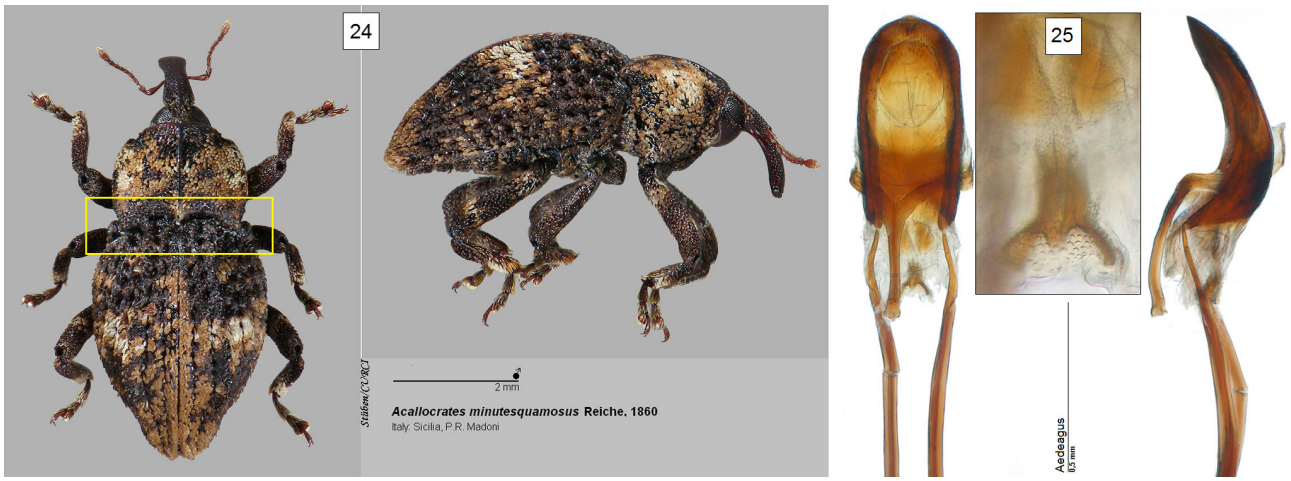
structure of the aedeagus which is characteristic of *Acallocrates* (compare with fig. 24, 25 and Bahr 2003). The above mentioned suspicion based on morphological characters has now been confirmed by molecular analysis.

However, these first impressions and results that we have stated here we hope to expand upon in the upcoming years in the M.W.I. Project (Molecular Weevil Identification). For this task, we ask colleagues to send us determinated specimens in ethanol from all over the world, from as many Cryptorhynchinae genera as possible.



FIGURES 24–25. *Acallocrates minutesquamosus* from Europe, *habitus* and *aedeagus*.

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