



Chromosomal similarities and differences among three sibling species of the *Acalles echinatus* group (Coleoptera, Curculionidae, Cryptorhynchinae)

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Abstract

In order to clarify the taxonomic position of three sibling species of weevils from the *Acalles echinatus* group, *A. echinatus*, *A. fallax* and *A. petryszaki*, cytogenetic relationships are investigated by studying the mitotic and meiotic chromosomes, including the localisation of heterochromatin by C-banding, as well as the localisation of NORs by silver impregnation. These sources of data are congruent and strongly support that the examined species are closely related. All examined species are characterised by a karyotype of the same chromosome number and sex determination system but with different morphology of chromosomes. All the analysed features, such as the centromeric index, relative length, C-bands and NORs, show that the structure of the karyotype of *A. echinatus* is more similar to that of *A. petryszaki*, whereas the karyotype of *A. fallax* is divergent. The higher chromosome number ($2n = 30$) in relation to the modal formula in Curculionidae ($2n = 22$) suggests that karyotype evolution in these species could have occurred by centric fissions of metacentric elements leading to acrocentry.

Key words: *Acalles*, C-bands, Coleoptera, Curculionidae, karyotype, NORs, sibling species

Introduction

The genus *Acalles* Schoenherr, 1825 of the tribe Cryptorhynchini includes more than 300 species distributed in the Palaearctic, Nearctic, Neotropic, Australian and Oceanic regions (Alonso-Zarazaga & Lyal 1999). Up to the present, ninety taxa are known from Europe (Stüben *et al.* 2003). All Central European *Acalles* species are bisexual, apterous and largely characterised by their nocturnal activity (Smreczyński 1972, Dieckmann 1982). Due to their flightlessness and low vagility, they often live in isolated populations. The *Acalles echinatus* group (*sensu* Solari & Solari 1907) comprises 10 species, grouped together because of their triangular aedeagus but difficult to distinguish from each other (Stüben *et al.* 2003). Three of these, the close relatives - *Acalles echinatus* (Germar, 1824), *A. fallax* Boheman, 1844 (= *commutatus* Dieckmann, 1982) and *A. petryszaki* Dieckmann, 1982, live in Central Europe. The distribution ranges of *A. echinatus* and *A. fallax* are large and include Central, Western and the northern parts of Southern Europe, southern Scandinavia, the Balkan Peninsula and Eastern Europe (including the Caucasus), whereas that of *A. petryszaki* is limited to the Polish and Slovak Carpathians and Bulgarian mountains (Stara planina). The species are associated with deciduous and mixed forests and often occur together in the same locality - *A. echinatus* and *A. fallax* in the western part of Central Europe and *A. petryszaki* and *A. fallax* in the eastern part. Sympatry of *A. echinatus* and *A. petryszaki* has, however, not been recorded. These closely related species differ in the structure of their male genitalia and also in their ecology (microhabitat preference), *A. echinatus* and *A. petryszaki* being more thermophilous whereas *A. fallax* tolerates colder conditions and often occurs at higher altitudes. The first two species prefer forest of the oak–hornbeam vegetation tier, while *A. fallax* is more abundant in beech and fire–beech forests.