



Stüben, Peter E.: Weevils of Macaronesia Book Review

by
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Stüben, Peter E.: Weevils of Macaronesia. - Canary Islands, Madeira, Azores (Coleoptera: Curculionoidea), first edition: 1 January 2022, published by the Curculio Institute, **784** pages, format: Din A4, coloured, 98,- € (order: Curculio@t-online.de).

- For members of the Curculio Institute 10% discount. -

This is a monumental publication in many respects, not least because it stands as testament to the dedicated study the author has committed to these island groups for more than 20 years. Its 784 pages are copiously illustrated with high quality images of the majority of the 733 species/sub-species recorded from the islands up to the end of 2020. The bulk of this major work is devoted to comprehensive identification keys that relate to over 5000 images, mainly generated by focus-stacking, on 1268 photographic plates. A brief introduction to each family, subfamily or genus is followed by the taxonomic keys. Each species is illustrated by images of the habitus and aedeagus, distribution maps, biotope, host plant and sometimes the larva and pupa. Similar species are displayed on double pages to facilitate direct comparison and all diagnostic characteristics utilised in the keys are clearly highlighted in the images. It should be noted that the Anthribidae, Scolytidae and Platypodidae are not covered here in view of uncertainty regarding their inclusion in the Curculionoidea. Accompanying this publication is a DVD that includes high resolution images of all taxa along with details of all known localities for each species and the COI barcodes for those taxa that have been sampled to date. The author has also supplied a digital copy of all of his published papers over the last four years.



The fieldwork which underpins so much of the research presented here involved 37 separate trips to twenty-two of the islands in the Azores, the Canaries and the Madeiran archipelago, lasting from a couple of weeks to three months between 1998 and 2020. During this period the number of weevil taxa known from the Lauri-Macaronesian area has increased by over 50%, the majority of them as a result of the author's own discoveries. All but a handful of the smaller islands were visited and a wide range of collecting techniques were employed, from pipe traps to sample the hypogean fauna of lava tubes to fogging and conventional beating for saproxylic and phytophagous species in native forests and plantations. The subsequent laboratory studies employed the integrative taxonomic approach that is a cornerstone of the author's research. This included a comprehensive examination of museum material and critical assessment of taxonomic studies on the weevils of the region in the current literature. The molecular investigations involved 1388 DNA samples from 468 of the Macaronesian taxa, enabling the development of a Bayesian COI 50% consensus tree to explore the relationships between species and genera. Twenty-three species/sub-species are newly-described in the text and barcodes are provided to enable these taxa to be identified molecularly.

Barcoding of Life 2022 Islands of Lauri-Macaronesia

Curculio Institute



Barcoding European Curculionidae

M.W.I.

The Molecular Weevil
Identification Project



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Integrative Alpha Taxonomy as we understand and implement it makes, inter alia, use of two approaches: the molecular and the morphological methods. This is not only a question of comparison and alignment of two different methods. It is important to keep history of science in mind: Whenever we generate DNA barcodes from known species, we have to be certain that we connect to the binomial names from the taxonomic literature.

Methods, aims and perspectives



• The focus of our research was the explicit comparison with the existing type material for almost all 750 weevil species from the subtropical islands of Macaronesia. This also includes the acquisition of specimens from the respective type locality.

Stüben, Astrin & Schütte 2021: Barcoding and interspecific relationships of Macaronesian Weevils – *Weevil News*, No. 94: 13 pp.

• Equally important is the deposition of the sequenced morpho-preparations for validation purposes in the research institutions mentioned here (see foot note), in order to exclude misidentification in the follow-up.

• Apart from this rather retrospective and more methodological view, and based on the now standardised sequence of the mitochondrial CO1 barcoding gene (Folmer region) the identification of species will always be easier for the future. It remains to be seen whether we will actually become largely independent of our starting point in the end, the type material.

• At least we may critically note and cannot overlook that the downsizing of staff in our museums around the world, the lack of political willingness to maintain elaborate morphological collections, the increasingly difficult loaning of type material and - perhaps the most important argument - the difficulties of building up comprehensive morphological comparative collections in the face of rampant collection bans, are playing into the hands of this development (which of course must be prevented).

• Simultaneously with the extinction of species, a worldwide "extinction" of taxonomists has set in. One can watch this development inactively or work effectively against it with the integrative taxonomic approach. Barcoding used correctly does not imply a break with morphologically based taxonomy!

• Similarly, the Macaronesian project has shown that the discovery of new species on our doorstep is far from over. Above all, the focus is on cryptic species that cannot be distinguished morphologically. Furthermore, we are dealing with the molecular reconstruction of parallel cladogeneses of weevils and their host plants during radiation on islands (see figure top right).

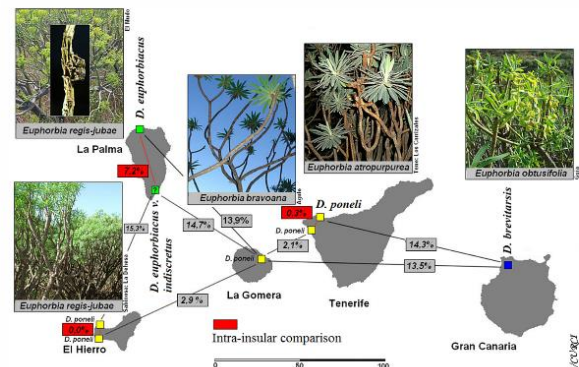
• Another focus: It has long been known that - very similar to our morphological differential diagnoses - there can be no molecular standardizable distances between species. However, that does not mean that they do not exist for specific groups! From subfamily to subfamily, from genus to genus, from islander to mainland, there seem to be such relatively reliable barcoding gaps.

• This is not surprising if one looks at low-dispersal subterranean, terrestrial-flightless or over great distances 'genetically communicating', flying weevils of a common gene pool. A project we are currently working on that may be helpful in describing new species.

Conclusion:

We can only protect what we know - morphologically and molecularly!

Canary Islands



Parallel cladogenesis: Weevils and their host plants.

Some new Macaronesian species based on 'molecular access' in recent years.



COI barcodes and identification keys based on image comparisons for all weevils from the Macaronesian islands are provided in the new book:

Peter E. Stüben (2022): Weevils of Macaronesia. – Canary Islands, Madeira, Azores – Curculio Institute, Mönchengladbach, 784 pp.

Order: Curculio@t-online.de / P.Stueben@t-online.de



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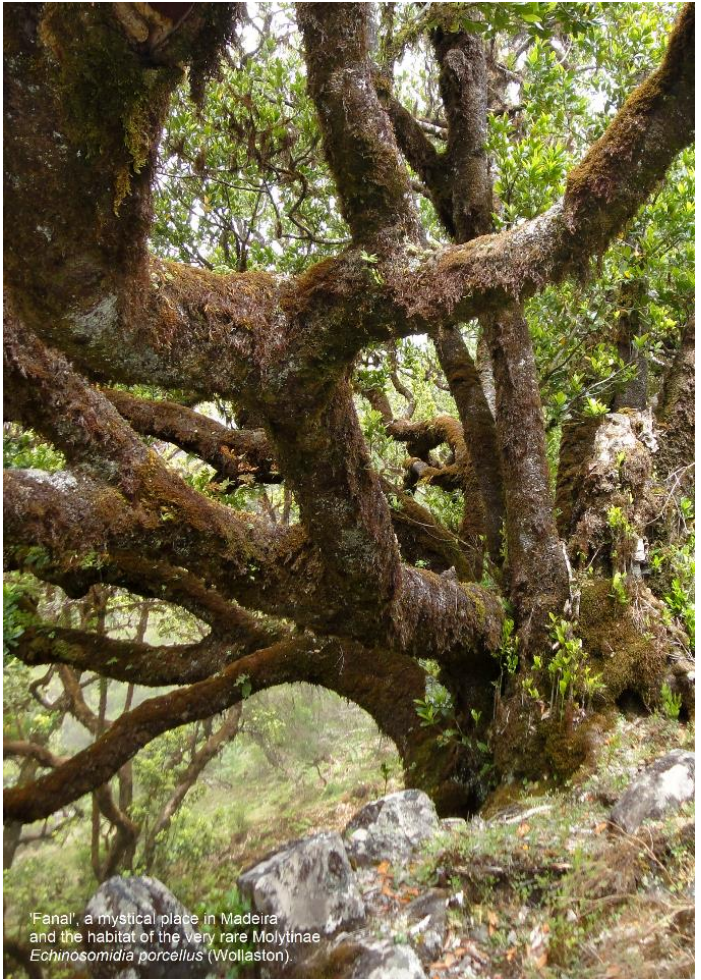
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The isolated nature of islands is the principal driver behind the evolutionary processes that give rise to their new species and in the mid-nineteenth century surveys undertaken by T.V. Wollaston on the Canaries and Madeira demonstrated the high level of endemism amongst the Coleoptera. But isolation isn't the only factor behind the appearance of new species and a feature of this book is the detailed analysis of other influences that have given rise to speciation. As the author explains, volcanic eruptions and landslides over millions of years have created their own barriers to genetic exchange between populations on islands, as well as forming vacant niches that encourage species-rich radiation. The islands of Lauri-Macaronesia are unique natural laboratories that allow us to investigate the effects of geology, vulcanology, pedology, ecology, topography, etc. on evolution and weevils, with their high rate of endemism in this region, are ideally suited to such studies. However, species composition on the Macaronesian islands is also changing due to our own impact. Habitat loss and deterioration, the introduction of non-native species, and climate change bring pressures on the specialised native fauna and flora of the islands. Inevitably there are numerous examples of such impacts on pristine habitats throughout the text, including examples of the adaptations some native species have made to take advantage of the new opportunities provided.



For well over a hundred years little attention was paid to the Curculionoidea of these islands and entomologists had little more than Wollaston's Catalogues to refer to for information on the island faunas. Towards the end of the twentieth century this began to change as more survey work was carried out and taxonomic reviews of some species groups were undertaken. The current work comprehensively draws together the advances that have been made in recent decades in a ground-breaking format that is without parallel in publications on weevil faunas. The author bemoans the destruction of habitat and inevitable species loss that he has witnessed on these islands, regretting that he leaves behind only this book and his collection for the next generation, whose experience of these wonderful islands will be diminished. However, although he is a committed advocate of digital media for the presentation of taxonomic research, he also recognises that „books, especially illustrated books, still inspire many of us“. With this most marvelously illustrated compendium to the **Weevils of Macaronesia**, Peter Stüben will undoubtedly inspire naturalists and entomologists for generations to come to follow in his footsteps across the lava fields and through the laurel forests of these enchanting islands. Peter has gathered together all that is currently known about the weevils of the Azores, the Canaries and the Madeiran archipelago, but he is also certain that there is much more to be discovered to help us to admire and understand the workings of these natural laboratories.



'Fanal', a mystical place in Madeira and the habitat of the very rare Molytinae *Echinosomidia porcellus* (Wollaston).



The author on a successful search for *Amaurorhinus monizianus* in the root zone of *Astydamia latifolia* near Pozo de la Salud on El Hierro in 2007.