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New insights into the taxonomy of the subgenus *Suandrena* and the *Andrena tiaretta*/*A. wollastoni* aggregate (subgenus *Micrandrena*) (Hymenoptera: Anthophila)

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Through analyses of newly collected specimens and museum material, it was possible to elaborate new insights into the taxonomy of the following taxa: *Suandrena*: *A. cyanomicans* agg. (122 females, 80 males); *Micrandrena*: *A. tiaretta* agg. (20 females, 23 males); and *A. wollastoni* agg. (435 females, 203 males).

The studies are based on the following methodical approaches (Kratochwil 2015, 2020, 2021; Kratochwil et al. 2021; Kratochwil n. p.):

- Study of type specimens: holotypes, paratypes; in the case of syntypes, designation of lecto- and paralectotypes.
- Analysis of at least 40 qualitative (non-meristic) morphological characters.
- Analysis of at least 20 morphometric parameters with univariate and multivariate methods. The calculation of Pearson product-moment correlation coefficients, multivariate ratio analysis, principal component analysis, linear discriminant analysis and the allometry ratio spectrum follow Baur & Leuenberger (2011).
- Integration of molecular analyses (143 individuals) in the case of the A. wollastoni group (Husemann & Paxton in Kratochwil et al. 2021).

1. Subgenus *Suandrena*

The subgenus *Suandrena* Warncke, 1968 comprises a small group of about 15 species distributed in Palaearctic and Palaeotropic regions. Species status has been proved for a group of five taxa. The studied taxa are: *Andrena mirna* Warncke, 1969 (Egypt, Israel, south-eastern Turkey, Iran, Lebanon); *A. fratella* Warncke, 1968 (Morocco, Algeria, Tunisia, Libya); *A. cyanomicans* Pérez, 1895 (northern Spain, northern Portugal); *A. notata* Warncke, 1968 (Canary Islands), *A. maderensis* Cockerell, 1922 (Madeira Island); and *A. portosanctana* Cockerell, 1922 (Porto Santo). In the absence of molecular studies, there is no information on phylogenetic relationships. However, a phylogeographic east-west migration has been assumed. The three island-endemic species of the Madeira Archipelago and the Canary Islands have a North African origin, and probably descended from *A. fratella* or its ancestor. *Andrena mirna* or its ancestor seems to be the phylogenetically oldest taxon of this species group. *A. cyanomicans* represents a species with a distribution in the north of the Iberian Peninsula. Multivariate analyses have shown that the separation of the clusters of *A. cyanomicans* and *A. mirna* is lower than that between *A. cyanomicans* and *A. fratella*. Hypothetically, there is the possibility that *A. cyanomicans* originated from a migration north of the Mediterranean Sea.

Another *Suandrena* group with a remarkable distribution is the aggregate of *A. savignyi* Spinola, 1838, which has an east-west distribution from the Indian subcontinent to the Canary Islands (including *A. ilerda* Cameron, 1907). Several taxa can be separated in the *A.*

savignyi complex. A speciation of at least two species is supposed for the Canary Islands (Kratochwil n. p.).

2. Subgenus *Micrandrena*: *Andrena tiaretta*/*A. wollastoni* aggregate

The aggregate of *A. tiaretta* Warncke, 1974 comprises three species: *Andrena tiaretta* (Spain, Morocco, Algeria); *A. cyrenaica* Kratochwil, 2015 (Lybia); and *A. orientalis* Kratochwil, 2015 (Israel, Libanon, Syria). *Andrena tiaretta* is possibly the ancestor of the *A. wollastoni* aggregate.

All taxa of the *A. wollastoni* aggregate (former species and subspecies of *A. wollastoni* Cockerell, 1922, including *A. lineolata* Warncke, 1968) are endemic to islands of the Madeira Archipelago or the Canary Islands. *Andrena wollastoni* (Madeira Island) and *A. dourada* (Porto Santo) are species endemic to the Madeira Archipelago. Three former subspecies of *A. wollastoni* from the Canary Islands were upgraded to species rank: *A. catula* Warncke, 1968 (formerly *A. wollastoni catula*; Gran Canaria); *A. gomerensis* Warncke, 1993 (formerly *A. w. gomerensis*; La Gomera) and *A. acuta* Warncke, 1968 (formerly *A. w. acuta*; Tenerife). The specimens from La Palma (formerly *A. w. acuta*) were assigned to *A. gomerensis*. Because of morphological and morphometric differences, specimens of La Palma were assigned to a separate subspecies (*A. g. palmae* Kratochwil, 2020) with partially overlapping morphological and morphometric features. Morphological and morphometric differentiation of *A. acuta* Warncke, 1968, led to a differentiation into three subspecies for Tenerife: *A. a. acuta* Warncke, 1968 (Anaga region); *A. a. tenoensis* Kratochwil, 2020 (Teno region); and *A. a. wildpreti* Kratochwil, 2020 (Dorsal Rift region). Mitochondrial COI sequences support monophyly of the four species of the Canary Islands and the two species of the Madeira Archipelago, and suggest the relatively young age of all taxa (Husemann & Paxton in Kratochwil et al. 2021).

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