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Echinodera (Ruteria) soumasi sp. n. from Greece (Coleoptera, Curculionidae)

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Echinodera (Ruteria) soumasi sp. n. is described from Epirus and the Peloponnese (Greece) based on morphology and molecular data. The new species is the third species of the *E. (Ruteria) major* species group and is morphologically most similar to *E. (Ruteria) major* (A. & F. Solari, 1907) from Dalmatia.

Keywords: Cryptorhynchinae, *Echinodera*, *Ruteria*, new species, CO1, taxonomy, Greece, Epirus, Peloponnese

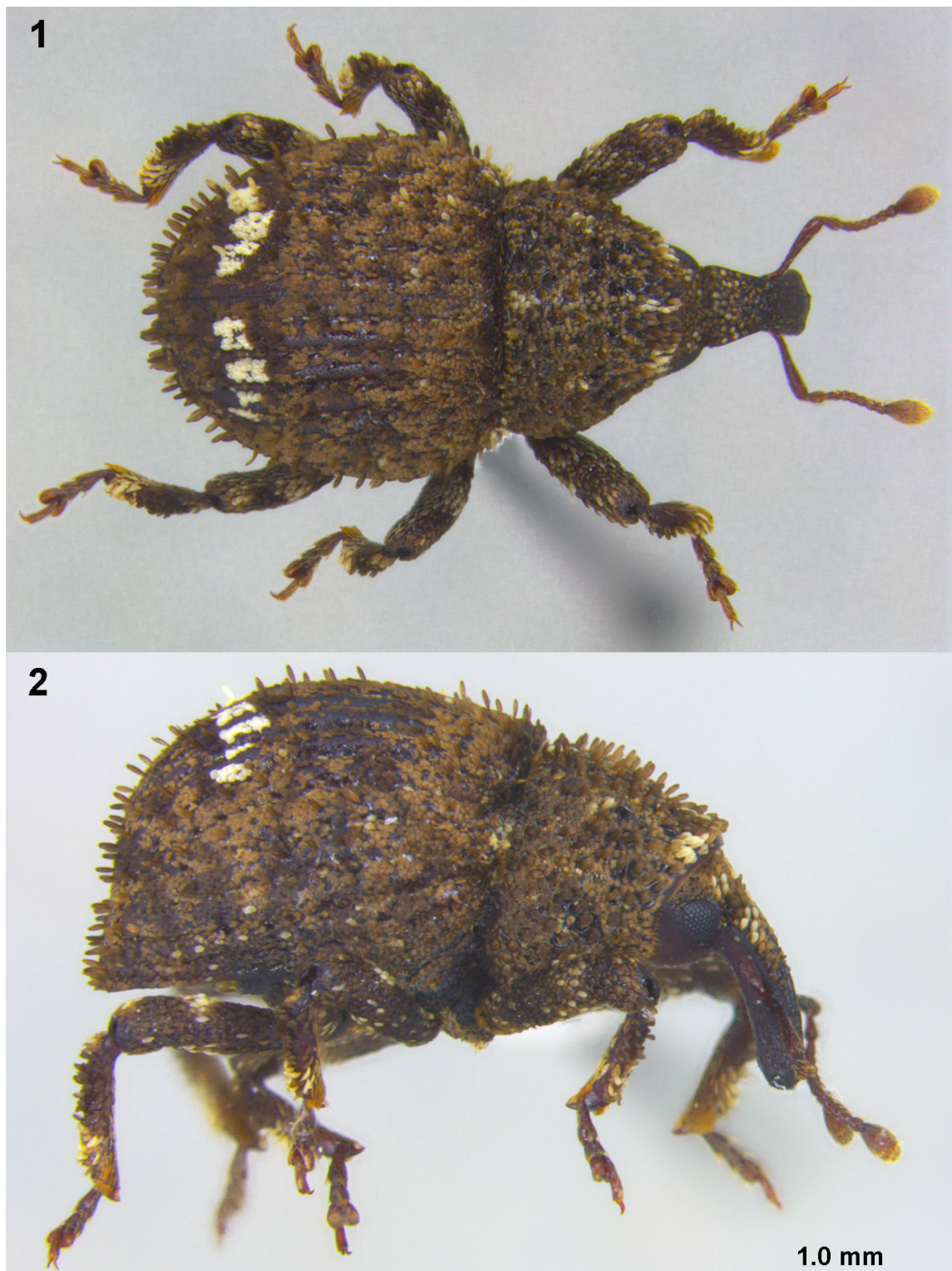
INTRODUCTION

Within Cryptorhynchinae, the genus *Echinodera* Wollaston, 1863 sensu Astrin & Stüben (2010) actually comprises, according to the catalogue by Stüben (2015), 86 valid taxa within the main distribution area in the western Palaearctic. Two subgenera are at present accepted: *Echinodera* s. str. and *Ruteria* Roudier, 1954. Every couple of years new species of *Echinodera* are discovered and described, more recently also from Greece (Wolf 2002; Behne 2005; Bahr & Bayer 2005; Germann 2012). The only species originally described from the Peloponnese by Wolf (2002), and restricted to this area, was *Echinodera* (s. str.) *brachati*. Furthermore, *E. (Ruteria) graeca* Caldara, 1973 and the widely distributed *E. (Ruteria) hypocrita* (Boheman, 1837) are recorded from Epirus and the Peloponnese until now.

Below we describe a new species in the subgenus *Ruteria*. 20 valid species of *Ruteria* are known so far (Stüben 2008). Species of *Ruteria* differ from those of *Echinodera* in i) their larger appearance, ii) their mainly black colour, and iii) in their large eyes that can be easily seen in dorsal view and that clearly reach beyond the upper margin of the antennal groove. Based on molecular evidence by Astrin & Stüben (2010) with mitochondrial markers COI and 16S, *Ruteria* is nested as a monophyletic clade within *Echinodera*.

MATERIAL AND METHODS

For sifting litter, a beetle sifter after Reitter-Winkler with grid width of 7 mm was used. For the extraction of the beetles from the sifted litter, the method described in Germann (2014) was applied.



Figs 1–2. Habitus of *Echinodera (Ruteria) soumasi* sp. n., holotype; — 1, dorsal view. —2 lateral view.

The molecular procedures follow Astrin & Stüben (2008), whereas those for *E. (Ruteria) soumasi* sp. n. follow Schütte *et al.* (2013). The COI-markers used are based on the classical region provided in Folmer *et al.* (1994) but have been adapted to Cryptorhynchinae weevils: LCO1490-JJ (COI forward): 5'-CHACWAAYCA-

TAAAGATATYGG-3', HCO2198-JJ (COI reverse): 5'-AWACTTCVGGRTGVC-CAAARAATCA-3'. The obtained sequences can be used for DNA barcoding and alpha taxonomic research as well. For the new species the tissue for DNA extraction was taken from the holotype specimen itself to ensure the conformity between holotype and derived COI sequence. While the DNA voucher is conserved at the ZFMK, the holotype is deposited at the NMBE. With this procedure the reliability of the sequence can be confirmed by inspecting the type specimen at any time. The neighbour-joining tree was calculated using MEGA (Molecular Evolutionary Genetics Analysis version 6.0: Tamura *et al.* 2013). The respective accession numbers to the sequence data are given in Fig. 10. The DNA sample was taken from the holotype specimen and is conserved in the ZFMK.

Photographs were taken with a 5-megapixel digital camera (Leica DFC 420), the apex of the penis was photographed in glycerine. Series of images were captured through a binocular (Leica MZ16) and processed by an Auto-Montage software (Imagic Image Access, Version 8). All measurements were taken digitally with the measurement-tool of the above mentioned Auto-Montage software. Body length was measured from the anterior margin of the eye to the apex of the elytra. The drawings by Olena Domschke were made using a camera lucida attached to a stereomicroscope (Olympus BH-2). Faunistical records of all species were taken from Bahr *et al.* (2015) and Stüben (2015).

Additional comments to literally reported label data are added in rectangular brackets [].

Abbreviations:

NMBE - Naturhistorisches Museum der Burggemeinde Bern

ZFMK - Zoologisches Forschungsmuseum Alexander Koenig, Bonn

WOLF - Collection Ingo Wolf, Bad Endorf, Germany

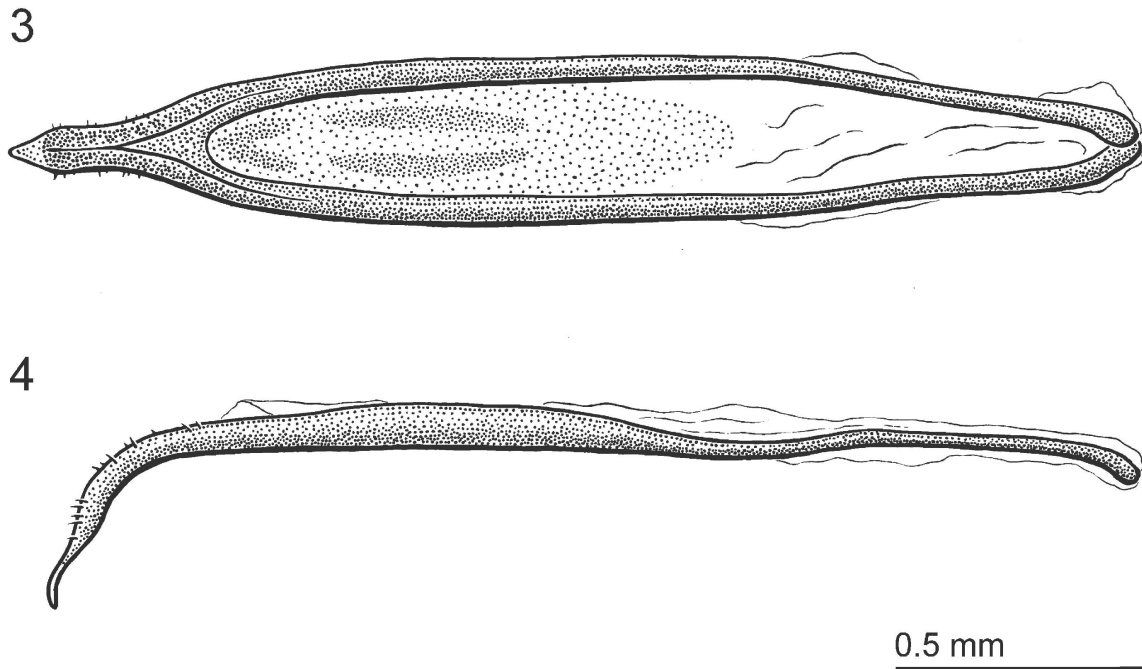
SYSTEMATICS

Echinodera soumasi sp. n.

(Figs 1–6)

Type material. **Holotype** ♂: «242_14.11 [collection number] GREECE, Peloponnes, NE Pilos, S Kazama, Polilimnos, Bachtal [creek valley], 26.9.2014, N36°59'00" E21°51'16", 300 m a.s.l., leg. C. Germann». Red label: «Holotype *Echinodera (Rutera) soumasi* sp. n. Germann, Wolf & Schütte des. 2015» (NMBE). DNA type: same as Holotype, collector's no: 2798-PST (corresponding collection number of ZFMK); DNA voucher: ZFMK-DNA-0169166944, GenBank accession number for COI: KT289402

Paratypes: 22 specimens: 2 ♂♂, 1 ♀♀ «Griechenland, Region Epirus, 5 km südl. Mesopotamo, I. Wolf leg. 27.4.1995». 1 ♂ «Graecia – Peloponnes, Region Lakonien, Bez. Parta, südl. Mistras, bei Anavriti, 850 m, 23.9.2012, leg. I. Wolf» [sifting *Quercus coccifera*, *Castanea*]. 1 ♂, 1 ♀ «Graecia – Epirus, Bez. Preveza, ca. 5 km südl. Mesopotamo Str. -> Preveza, V. Brachat [leg.] 17.5.1994». 1 ♂ «Graecia – Epirus südlich Igoumenitsa, 5 km östl. Parga 100 m, Osthang am Campingplatz Enjoy-Lichnos, 11.9.2002, leg. I. Wolf» [sifting *Quercus* and *Arbutus*]. 1 ♂ «Graecia – Epirus Parga I. Wolf leg. 27.5.1997». 4 ♂♂, 1 ♀ «Graecia – Peloponnes Region Arkadia, Taygetos Gebirge, 12 km südl. Sparta, Anavriti 750 m, I. Wolf leg.



Figs 3–4. Penis of *Echinodera (Ruteria) soumasi* sp. n. — 3: ventral view. — 4: lateral view (Illustrations by Olena Domschke).

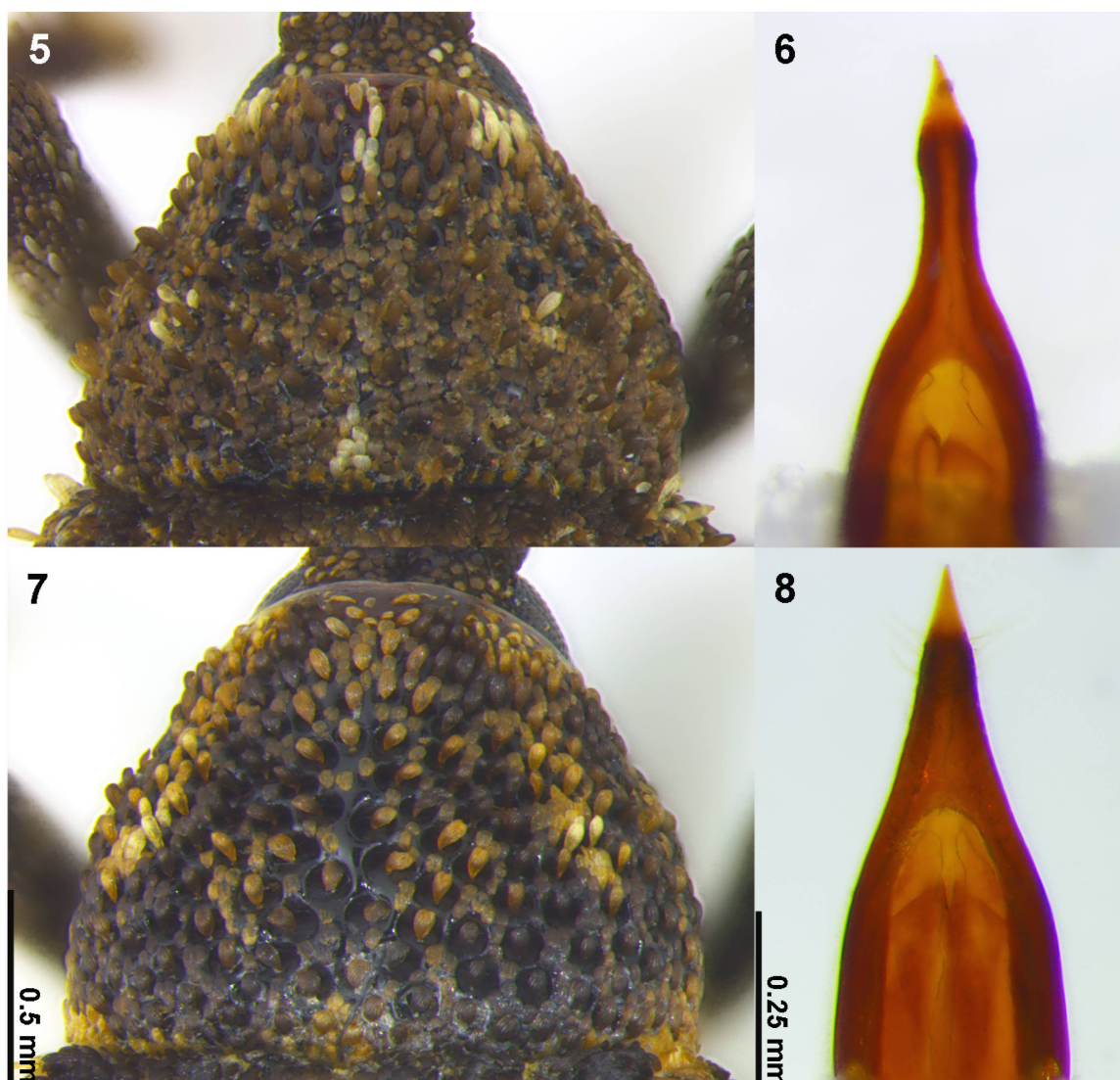
29.4.1999» [sifting *Quercus cerris*, *Q. ilex* and bushes]. 2 ♂♂ «Griechenland, Peloponnes, 5 km n. Kalavrita Flussau, I. Wolf leg. 22.4.1995» [creek valley, sifting *Platanus*]. 4 ♂♂, 3 ♀♀ «Graecia – Peloponnes Region Ilia, Bez. Pirgos bei Kastro, 5–20 m, 17.9.–20.9.2002, leg. I. Wolf» [sifting *Quercus ilex* and *Olea europaea*]. All additionally labelled with red labels: «Paratype *Echinodera (Ruteria) soumasi* sp. n. Germann, Wolf & Schütte des. 2015» (NMBE, WOLF).

Description. Size (without rostrum): 3.4 – 5.0 mm. Body colour dark brown to blackish.

Head: eyes flattened, large and oval, upper margin above rostral groove, visible from above. Rostrum deeply punctate-striate; covered with small oval scales and hairs towards rostral apex. Antennae reddish brown, antennal scape: 4.5 x longer than wide, segments of antennal funiculus: 1st thicker than the following, 1st and 2nd: 2 x longer than wide, 3rd to 7th: as long as wide, club oval, 3 x thicker than the last segments of funiculus.

Pronotum: transverse (length/width: around 0.7); maximal width before base in the first third, slightly rounded towards base; strongly narrowed to front margin (Fig. 5).

Integument and vestiture: colour patterns varying with darker and lighter brown scales; spottily placed white scales along the middle of pronotum, on both sides of the disc, and symmetrically just behind the eyes. Surface deeply and coarsely punctate. The integument consists of dense, adjacent, overlapping, almost circular scales. Long (3 to 4 x longer than wide), scale-like, clubbed and vertically raised bristles arise from punctures.



Figs 5-8. *Echinodera (Rutera) soumasi* sp. n. — 5: Disc of pronotum. — 6: Tip of penis, ventral view. — *E. (Rutera) major* (A. & F. Solari, 1907). — 7: Disc of pronotum. — 8: Tip of penis, ventral view.

Elytra: globular (length/width: 0.97–1.1); widest in first fourth; without shoulders; base straight, elytral decline in lateral view rounded, vertical towards apex.

Integument and vestiture: colour patterns varying with darker and lighter brown scales; spottily placed white scales left and right of the base, and forming a band just above elytral decline between first and third interval. Consisting of roundish, almost circular, overlapping scales almost completely covering the intervals. Striae narrow, about half the span of intervals; punctures with adjacent oval scale-like bristles. On intervals very long (4 to 5 x longer than wide), scale-like, clubbed, vertically raised bristles.

Legs: brown, strong, densely covered with elongated dark and light brown scales, white scales loosely intermixed.



Fig. 9. Habitat aspect in the creek valley of Polilimnos near Kazama, Messinia (photo: C. Germann).

Penis: tip of medianlobus S-shaped waved, first turn strong, with fine, short sensillae just before second turn (Figs 3 & 4). Apex conspicuously bottleneck shaped (Fig. 6) in ventral/dorsal view.

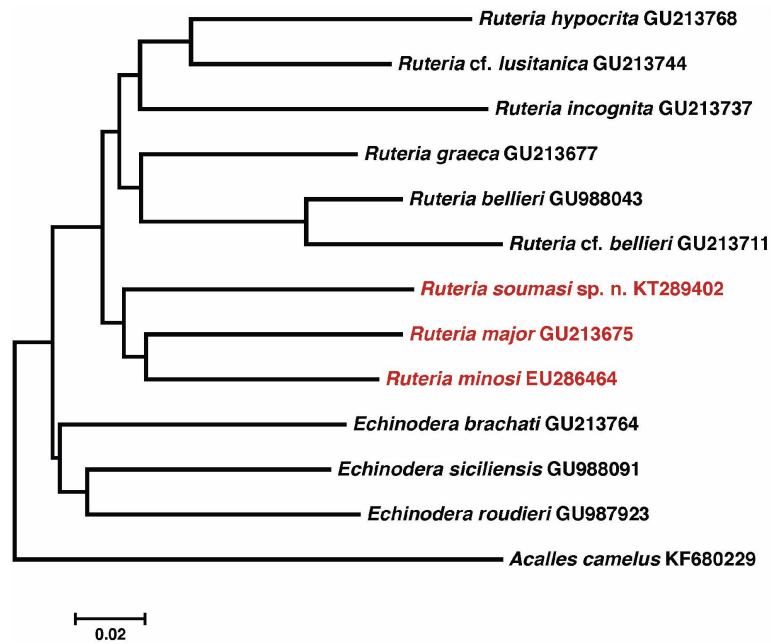


Fig. 10. Neighbour-joining tree (the scale gives base substitutions per site) of COI sequences from 13 selected samples of Cryptorhynchinae with focus on the subgenera *Echinodera* (3 taxa) and *Ruteria* (9 taxa), with outgroup species *Acalles camelus*. The members of the *major* species group are highlighted in red color; all GenBank accession numbers are given.

Etymology: The new species *Echinodera (Ruteria) soumasi* is dedicated to Nicole and Janis Soumas (Mesohori). They produce organic olive oil fully respecting, enjoying and protecting the marvellous landscape of Messinia, which harbours a unique and not yet fully explored biodiversity.

Differential diagnosis: *Echinodera (Ruteria) soumasi* sp. n. belongs to the *E. major*-species group within the subgenus *Ruteria*. This group is particular within *Ruteria* based on the S-shaped, long and slender apex of the penis similar to *Echinodera* s. str. *Echinodera (Ruteria) soumasi* sp. n. is most similar to *E. major* (A. & F. Solari, 1907) from Dalmatia based on its external morphology and shares with *E. major* the raised bristles on elytra as well as its very short, globular shape. It differs however by the following characters: i) conspicuously bottleneck-shaped apex of the penis (Figs 6 & 8), similar in turn to *E. (Ruteria) minosi* Bahr & Bayer 2005 from Crete, ii) the much longer, narrow and raised scales on the pronotum (in *E. major* these are broadly clubbed and bowed); iii) the surface of the pronotum is densely covered with adjacent circular scales (in *E. major* the surface is almost bare) (Figs 5 & 7); iv) narrower raised scales on elytra 4 to 5 x longer than wide (in *E. major* these are shorter, 3 to 4 x longer than wide).

Bionomy: The new species was sifted from leaf litter in humid places under *Arbutus*, *Castanea*, *Olea*, *Platanus* and different *Quercus* species.

DISCUSSION

The discovery of *Echinodera (Ruteria) soumasi* sp. n. on Epirus and the Peloponnese fits well in the line of sister taxa, drawn from Dalmatia with *E. (Ruteria) major* to Crete with *E. (Ruteria) minosi* (Fig. 11). The investigated molecular COI-

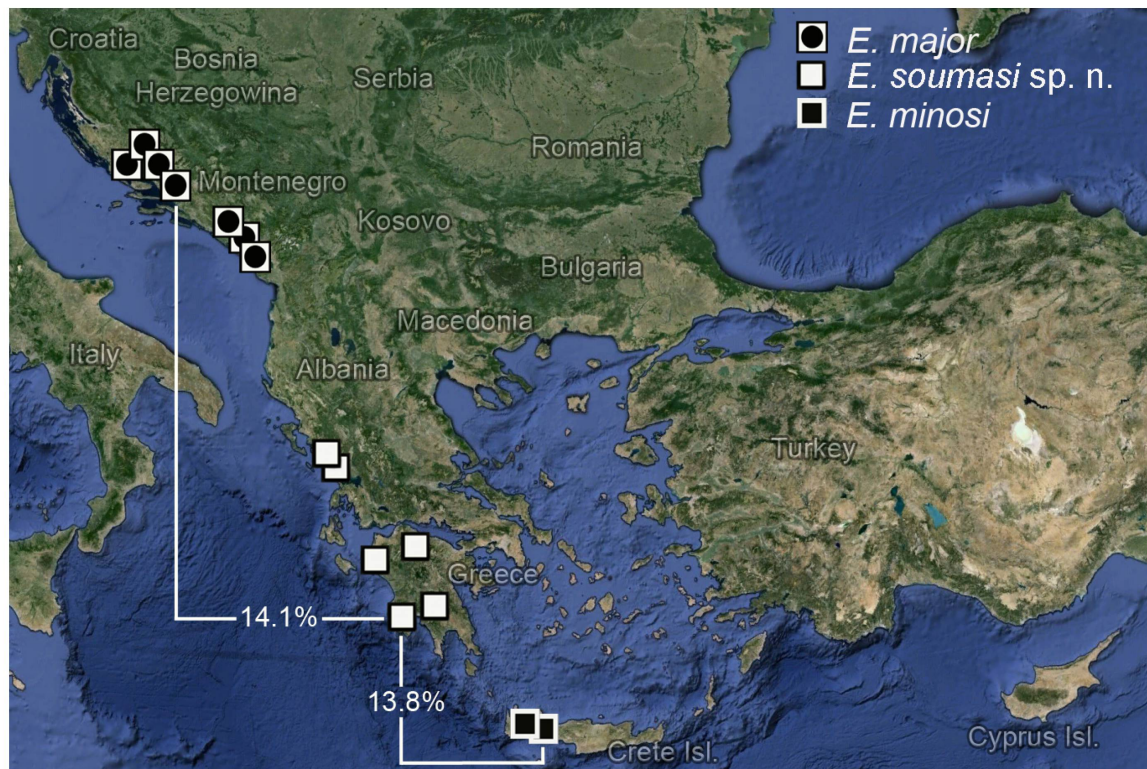


Fig. 11. Map showing records of all three members of the *Echinodera (Ruteria) major* species group, and their respective p-distances (Copyright 2015 Google).

sequence data with totally 657 positions in the final dataset fully confirm the *major* species group (Fig. 10). The p-distances between the members of the *major* species group are shown in Tab. 1 and Fig. 11.

Tab. 1. P-distance values of the investigated CO1 sequence-data between the three species of the *E. major*-species group.

p-distance (%)	<i>soumasi</i> sp. n.	<i>minosi</i>	<i>major</i>
<i>soumasi</i> sp. n.	-	-	-
<i>minosi</i>	13.8	-	-
<i>major</i>	14.1	12.6	-

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