

Description of a new species of the genus *Echinodera* WOLLASTON, 1863 (Coleoptera: Curculionidae) and supplement to the weevil fauna of Kefalonia Island (Greece)

With 21 figures and 5 Appendix

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Abstract

The revision of specimens which had been attributed to *Echinodera* cf. *brisouti* (REITTER, 1885) results here in the description of *E. stuebeni* spec. nov. The morphologically similar species *Echinodera penecke*i STÜBEN, 1998 stat. nov. is promoted to species rank, from a subspecies of *E. brisouti*. These taxonomic changes are supported by both, the comparison of the DNA barcodes of COI, and the investigation of morphological characters. The barcode of *Echinodera penecke*i is provided for the first time. In a first supplement to the faunistic list of the Curculionoidea of Kefalonia, seven further species are recorded here.

Taxonomic acts

Echinodera stuebeni spec. nov. – [urn:lsid:zoobank.org:act:FA93775A-0021-40CE-9280-14550A14BFF6](https://zoobank.org/act:FA93775A-0021-40CE-9280-14550A14BFF6)

Key words

new records, new species, island fauna, faunistics, taxonomy, Cryptorhynchinae, DNA barcoding, COI, COI, COX1, integrative taxonomy

Zusammenfassung

Die eingehende Überprüfung von Exemplaren, welche bisher *Echinodera* cf. *brisouti* (REITTER, 1885) zugeordnet worden waren, resultiert hier in der Beschreibung von *Echinodera stuebeni* spec. nov. Die morphologisch ähnliche Art *Echinodera penecke*i STÜBEN, 1998 stat. nov., ehemals Unterart von *E. brisouti*, wird zur eigenständigen Art erhoben. Diese taxonomischen Änderungen werden durch beiderlei, den Vergleich der Barcode-Sequenzdaten (COI), sowie durch die Untersuchung der morphologischen Merkmale gestützt. Der Barcode von *Echinodera penecke*i wird hier erstmals mitgeteilt. In einem ersten Supplementum zur Checkliste der Rüsselkäfer Kefalonias werden hier sieben weitere Arten gemeldet.

Introduction

The weevil fauna of the largest Ionian Island Kefalonia was recently investigated by GERMANN & BRAUNERT (2018), where 231 species of Curculionoidea were listed. New findings of the subfamilies Entiminae, Ceutorhynchinae and Curculionidae are recorded in the following for the Island's fauna, mostly based on a single excursion by Gerd and Ursula Müller in spring 2019, and by historical specimens from the Georg Frey collection in the Naturhistorisches Museum Basel (NMB). Besides the new species description, the riddle of *Echinodera peneckeii*'s species status could finally be solved by collecting and barcoding a recently collected specimen in Montenegro by the first author (Germann et al., in preparation), more than 100 years after initial collecting in 1910 by Moritz Hilf. Unfortunately weevils from pinned dry collections are not suitable for Sanger DNA sequencing methods due to DNA degrading preservation or macerating solutions. During revision of southern European *Echinodera* in 1998 Peter Stüben decided to describe the subspecies *E. brisouti peneckeii* but was never able to retrieve a specimen for sequencing purposes in the subsequent decades (STÜBEN 1998, STÜBEN 2018). The first author, Christoph Germann, collected and determined the specimen GER-3589 from Montenegro as a potential new species «*Echinodera* cf. *brisouti*». After sequencing, this assumption seems being verified, since GER-3589 was clearly none of the so far known and sequenced *Echinodera*. During preparation of the new description of *E. stuebeni* the first author examined the holotypes of its sister species and matched GER-3589 to *E. brisouti peneckeii* STÜBEN 1998. Thus, with the newly generated sequences of *E. peneckeii* stat. nov. and *E. romanboroveci*, this work includes an up-to date COI tree of the genus *Echinodera* from west Balkans.

Material and methods

Morphology

The photos were taken using the VHX-6000 photograph system (Keyence Corporation) at the NMB. The following abbreviations are used: SDEI – Senckenberg Deutsches Entomologisches Institut, Münchenberg, cCG – collection Christoph Germann, Rubigen, cGM – collection Gerd Müller, Frechen, cPS – collection Peter Stüben, Mönchengladbach, ZFMK – Research Museum Alexander Koenig, label data is given verbatim. Different labels are separated by double slash (/).

For the morphological comparison of *Echinodera stuebeni* spec. nov. the following type specimens of the most similar species were examined: *Echinodera peneckeii*: Holotype 1 ♂ Dalm. Castelnuovo M. Hilf 1910 Coll. O. Leonhard // 10 // Holotypus *Echinodera brisouti* ssp. *peneckeii* P. E. Stüben 1998 // DEI Münchenberg Col – 11467. – Paratypes: 1 ♂ ditto Paratypus *Echinodera brisouti* ssp.

peneckeii P. E. Stüben 1998 // DEI Münchenberg Col – 11468. – 1 ♀ ditto DEI Münchenberg Col – 11469. – 1 ♀ ditto // DEI Münchenberg Col – 11470. All from the collection of the SDEI. The barcode (COI) was taken from a more recently collected specimen with the following label data: «312_18.5 Montenegro, Cetinje Mun., 2 km SE Kotor, Lovćen, N 42.4091 E 18.7888, 920 m, 23.4.2018, leg. C. Braunert».

Echinodera brisouti: 1 ♂, 2 ♀ ♀ Paralectotypes *A. brisouti* mihi Corfu // Syntypus // coll. Kraatz // *E. brisouti* (Rtt.) det. Stüben 97 // Paralectotypus desig. Stüben 1997 // 1125 (4) // DEI Münchenberg Col – 11471-11473. All from the collection of the SDEI.

Molecular analyses

For the molecular part of this study 10 new barcoding sequences have been generated and combined with 18 already published ones, all have been generated in joint projects of the Curculio Institute, either with the ZFMK or the SDEI/NMB. Due to the profound determination work by recognized specialists before the molecular processing of the specimens a highly reliable dataset can be guaranteed. In many cases, additional specimens or remaining tissue samples from the same finding spot are available in frozen Ethanol. In most cases, the extracted specimens were recovered after lyses step and stored in pinned dry collections at ZFMK or NMB. This additional laboratory step facilitates the possibility to verify the previous determination.

For all sequences two Cryptorhynchinae adopted primer sets with degenerated nucleotides have been used in ZFMK and SDEI laboratory routine. For LCO1490-JJ / HCO2198-JJ see ASTRIN & STÜBEN (2008) and for LCO1490-JJ2/ HCO2198-JJ2 see ASTRIN et al. (2016). Both are targeting the same binding sites as the well known primer set from FOLMER et al. (1994) does, so the derived COI barcodes are compatible with Folmer primer generated ones.

A nucleotide alignment with all 28 sequences has been created with Muscle-Plugin in Geneious 6.1.8 (KEARSE et al. 2012), all sequences comprise 658 nucleotides in length, which is the full length for the Folmer COI barcode in weevils. From the nucleotide alignment a Jukes-Cantor (JUKES & CANTOR 1969) corrected Neighbor Joining (NJ) tree was built with Genious, *Acalles camelus* was designated as outgroup species.

Appendix 2 contains collecting data, voucher information and GenBank accession numbers. Appendix 3 provides the references with applied laboratory routine for each sequence in the molecular analysis from ASTRIN et al. (2012), SCHÜTTE et al. (2013) or STÜBEN & KRAMP (2019). Appendix 4 contains the DNA barcodes (sequences) of the newly generated sequences incl.

the sequence of the new species *Echinodera stuebeni* spec. nov. in plain text format. Appendix 5 contains p-distance matrix of the barcode sequences.

Results and Discussion

Description

Echinodera stuebeni spec. nov.

urn:lsid:zoobank.org:act:FA93775A-0021-40CE-9280-14550A14BFF6

Figs 1–2, 5–10

Type material: Holotype ♂: 301_17.19 GREECE, Kefalonia, W Vari, 38.3845, 20.5780, 430 m, Quercus-Wald, 3.5.2017, leg. C. Germann (NMB). Red label: Holotype *Echinodera stuebeni* sp. nov. des. Germann & Schütte 2021.

Paratypes: 4 ♂♂, 2 ♀♀: 301_17.19 GREECE, Kefalonia, W Vari, 38.3845, 20.5780, 430 m, Quercus-Wald, 3.5.2017, leg. C. Germann (cCG, NMB). - 1 ♂ 301_17.18 GREECE, Kefalonia, N Fiskardo, 38.466, 20.5728, 2 m, Küstenwald, 3.5.2017, leg. C. Germann (cCG). - 5 ♂♂ 301_17.21 GREECE, Kefalonia, SW Makriotika, 38.2875, 20.5231, 620 m, 4.5.2017, leg. C. Germann (cCG, NMB). - 1 ♀ 301_17.4 GREECE, Kefalonia, NE Troianata, 38.1669, 20.5679, 450 m, 28.4.2017, leg. C. Germann (cCG). All with red labels: Paratype *Echinodera stuebeni* sp. nov. des. Germann & Schütte 2021.

DNATYPE (=paratype): The DNA barcode sequence of the COI gene was taken from a male specimen with the voucher number 3279-GER (Collector's no) and GenBank accession number MW750619 from the same locality (301_17.19) as the holotype. We refer to this specimen as DNATYPE while it could also be named as paratype. The recovered specimen is being deposited in the pinned dry collection of the Curculio Institute at the NMB.

Size (without rostrum): 2.2–3.4 mm. Body colour dark brown to blackish (Figs 1–2).

Head: eyes flattened, large and oval, upper margin above rostral groove, visible from above. Rostrum deeply punctate-striate; densely covered with small oval scales and hairs from middle on towards rostral apex. Antennae reddish brown, antennal scape: 5 times longer than wide, segments of antennal funiculus: 1st thicker than the following, 1st and 2nd: 2x longer than wide, 3rd to 7th: as long as wide, club oval, 2.5x thicker than the last segments of funiculus.

Pronotum: transverse (length/width: 0.7); maximal width before base in the first third, slightly rounded towards base; strongly narrowed, cone shaped towards front margin (Fig. 1). Coarsely punctate, larger punctures towards hind margin. Integument and vestiture: colour patterns varying with darker and lighter brown scales; spotty placed light brownish to whitish scales. The integument consists of loosely standing, appressed, almost circular scales. Longer (2x longer than wide), broadly

oval, clubbed and nearly vertically raised bristles arise from punctures.

Elytra: globular (length/width: 1.0); widest in middle; 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; spotty placed light brown or whitish scales forming irregular transversal bandings. Consisting of almost circular appressed scales not entirely covering the intervals.

Striae narrow, about half the span of intervals, visible through integument; punctures with adjacent thin, scale-like bristles. On intervals long (3.5 to 4x longer than wide), scale-like, clubbed, vertically raised bristles.

Legs: brown, strong, densely covered with elongated brown and light brown scales.

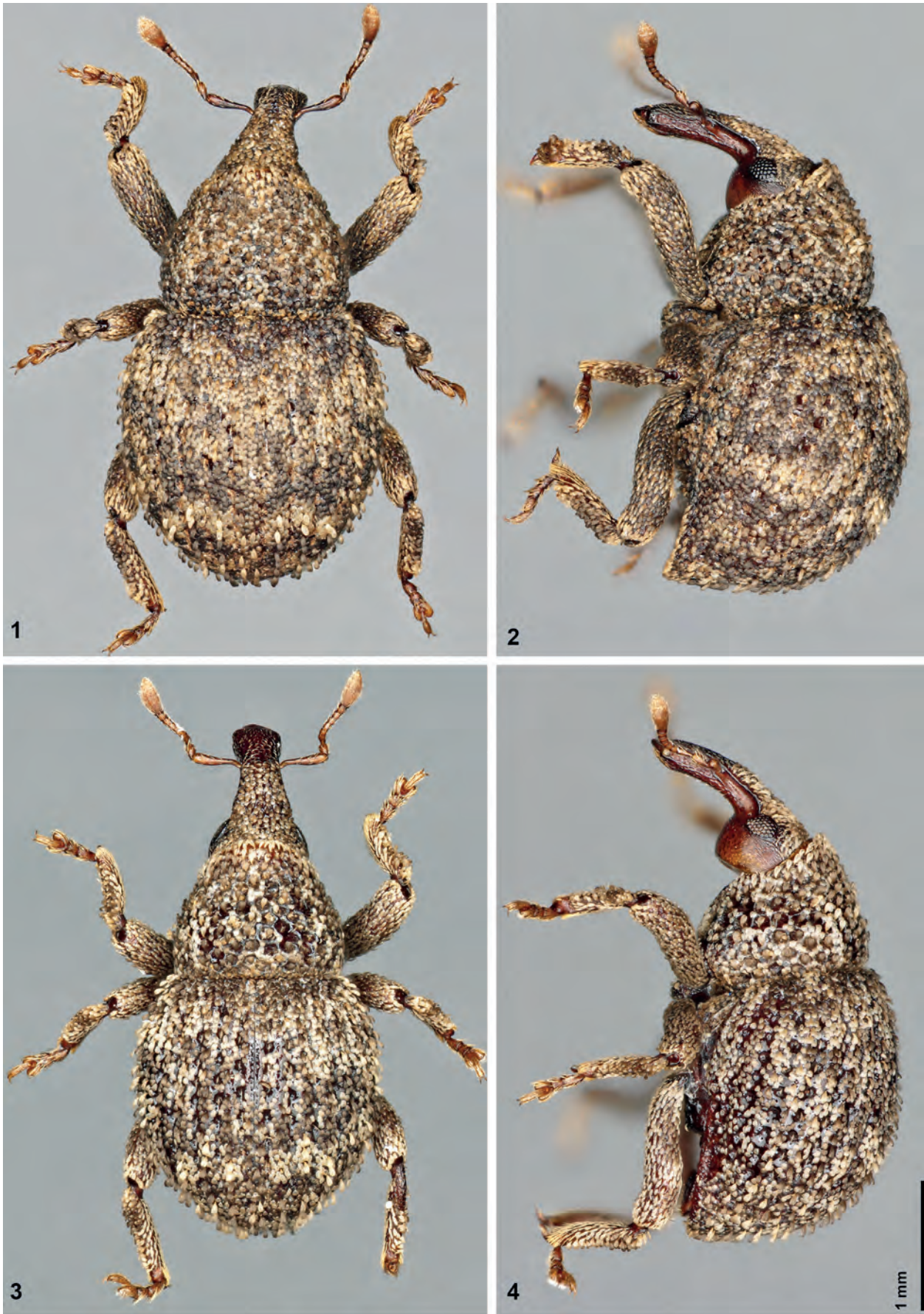
Penis: tip of median lobe bent, S-shaped waved, second turn long (Figs 5–7). Apex in dorso-ventral view regularly and sharply pointed.

Female genitalia (Figs 8–10): Spiculum ventrale with plate fork-shaped, manubrium long and slender, enlarged at apex (Fig. 8), spermatheca simple, C-shaped (Fig. 9), gonocoxite cylindrical and rather narrow, stylus elongate, three times longer than wide (Fig. 10).

Ecology: On Kefalonia *Echinodera stuebeni* spec. nov. lives sympatrically together with *E. corcyrensis* STÜBEN, 2008, *E. ingowolffi* STÜBEN, 1998 and *E. soumasi* GERMANN, WOLF & SCHÜTTE, 2015. We assume that *E. stuebeni* spec. nov. is endemic on Kefalonia, in contrast to the other species which are more widespread (STÜBEN 2018, STÜBEN 2021).

Derivation of name: The new species *Echinodera stuebeni* spec. nov. is named after our dear friend Dr. Peter E. Stüben, with whom the first author undertook adventurous, sometimes dangerous, but always incredibly interesting, very stimulating and unforgettable excursions in Tunisia, Morocco, Calabria, Sicily, Spain, France and on the Canary Islands.

Differential diagnosis: *Echinodera stuebeni* spec. nov. is morphologically similar to *E. penecke* STÜBEN, 1998 (Figs 3–4, 11–16) raised here to species level based on its characteristic morphology and the considerable barcode distance to all other species of the genus by 8.7 % or higher (Fig. 17–19, Appendix 5). *Echinodera penecke* differs in the following characters from *E. stuebeni*: raised setae on elytra oval to cordate, narrower (*E. stuebeni*: broadly oval shaped, wider); setae on elytra clearly raised in angles between 30° and 45° (*E. stuebeni*: setae raised in an angle of maximal 20°, and only along elytral decline); habitus more elongate, elytra oblong oval, pronotum smaller and less broad (*E. stuebeni*: habitus broader, elytra roundish, pronotum broader); penis more strangled before apex (Fig. 11–12, arrow) (broader in *E. stuebeni*). *Echinodera brisouti* has much longer, elongate, raised setae (4 times longer than wide), and is even



Figs 1–4: Habitus of *Echinodera* in dorsal and lateral views of the male; 1–2. *Echinodera stuebeni* spec. nov.; 3–4. *E. peneckei* (all photos by C. Germann).



Figs 5–10: Genitalia of *Echinodera stuebeni* spec. nov.; 5–7. Penis dorsal, ventral and lateral; 8. Spiculum ventrale; 9. Spermatheca; 10. Gonocoxite. – Figs 11–16: Ditto of *E. penecke* (all photos by C. Germann).

more robust in its habitus than *E. stuebeni*. The penis is more elongate and not broadened towards tip. A general overview on *Echinodera* with several determination keys to the numerous species of that cryptic genus is given by STÜBEN (2018).

The comparison of the DNA barcoding sequence (COI) reveals a significant difference to all *Echinodera* species on Kefalonia and also from west Balkans, the Ionian Sea and Italy inclusive Sardinia island. The closest species to *E. stuebeni* spec. nov. from the molecular perspective is

E. brisouti (from Epirus to Corfu) with 8.7 % p-distance, whilst the morphologically closest species are *E. brisouti* and *E. penecke* from Montenegro (9.7 %). For more information see chapter Molecular analysis.

Molecular analysis

The molecular analysis (Fig. 17 for the NJ tree and Appendix 5 for the uncorrected p-distance matrix of the COI barcode sequences) clearly confirms the species status of *Echinodera stuebeni* spec. nov. from the molecular perspective. The molecular closest sister species and their p-distance values to *E. stuebeni* is *E. brisouti* (REITTER 1885) (8.7 %, Epirus to Corfu), *E. romanboroveci* (9.4 to 10 % from Montenegro), *E. nuraghia* STÜBEN, 2009 (9.7 %, from Italy: Sardinia Island), *E. penecke* stat. nov. (9.7 %), *E. ariadnae* BÄHR & BÄYER, 2005 (9.9 % from Crete Island), *E. aspromontensis* STÜBEN, 2008 (10 to 10.5 % from Italy) and *E. nebrodiensis* STÜBEN, 2003 (10 % from Italy: Sicily). These findings are in concordance with the MWI dataset: average p-distance value for *Echinodera* island species are ~9.5 % (SCHÜTTE et al., in preparation). Two geographical distribution maps of *E. stuebeni* spec. nov. and its sister species are provided in Fig. 18 and Fig. 19.

The molecular analyses also confirm the status of *Echinodera penecke* stat. nov. as a good species from the molecular perspective. The p-distance values to the closest sister species are *E. aspromontensis* (9.1 to 9.4 %), *E. brisouti* (9.7 to 10.5 %), *E. nebrodiensis* (9.9 %) and *E. nuraghia* (10 %). These findings are in concordance with the MWI dataset where average p-distance value for endemic *Echinodera* species is ~11 % (SCHÜTTE et al., in preparation).

While the species status is out of question with the high p-distance value obtained, a distinct sister species for *E. stuebeni* spec. nov. can not be determined precisely, because all available sister species are pretty closely related in terms of p-distance, any of them could be possible actually. The Jukes-Cantor corrected NJ-tree indicates *E. ariadnae* (9.9 % p-distance) as the closest sister species to *E. stuebeni*, while the distance matrix with uncorrected p-distance value proposes *E. brisouti* (8.7 % p-distance).

New faunistic records

With the present records, the list comprises altogether 238 recorded Curculionoidea in Kefalonia Island (Appendix 1). The data is given verbatim (in German, amended where necessary in square brackets).

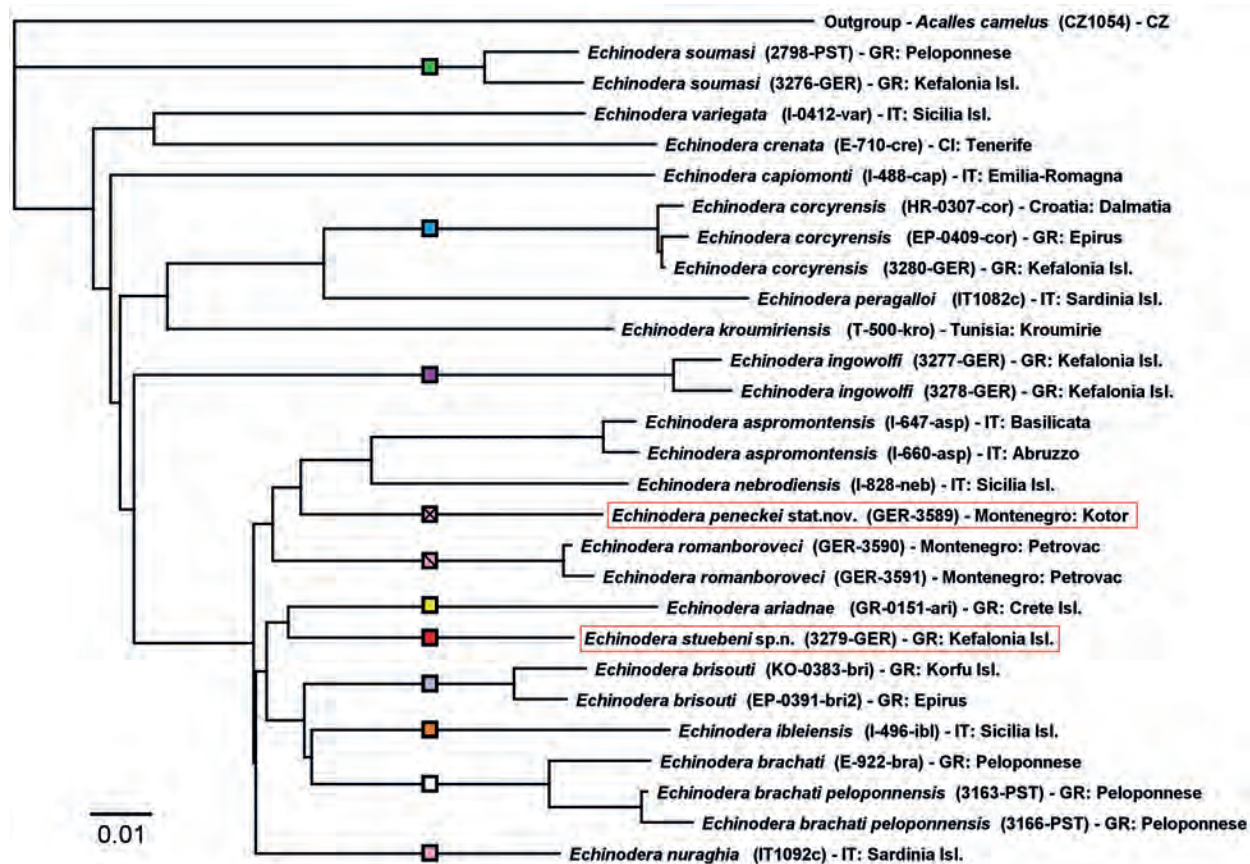


Fig. 17: Jukes-Cantor corrected Neighbor-Joining tree of west Balkans *Echinodera* including *E. stuebeni* spec. nov. and *E. penecke* stat. nov. The coloured squares match with the colours in the geographic distribution maps (Fig. 18 and Fig. 19).

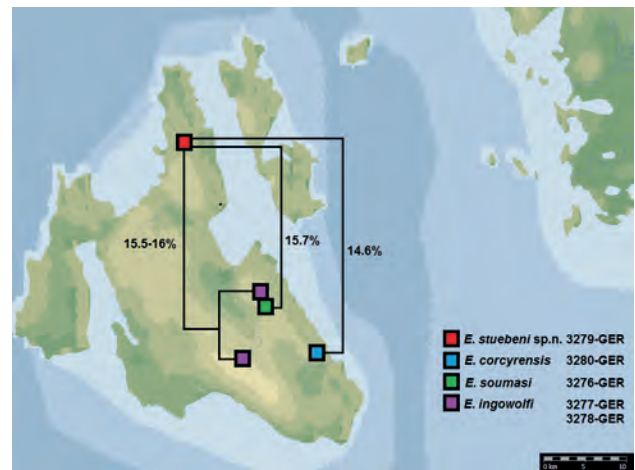


Fig. 18: Kefalonia map with genetic distances of *Echinodera stuebeni* spec. nov. to its sister species.

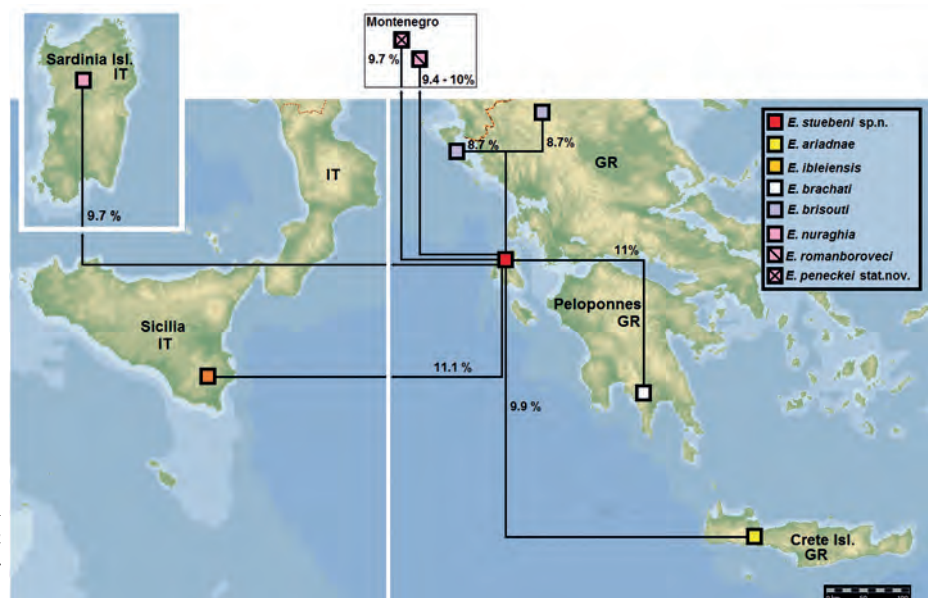


Fig. 19: West Balkans map with genetic distances of *Echinodera stuebeni* spec. nov. to its sister species.

Ceutorhynchinae

Hadroplontus trimaculatus (FABRICIUS, 1775)

1 ex.: Kefalonia, Ionian Islands, Karavados, Südküste, 77 m, 38°07'20"N, 20°34'57"E, Rud. fläche [Ruderal-fläche], 13.05.2019, leg. Gerd Müller, det. Christoph Germann (cCM).

Mogulones aubei (BOHEMAN, 1845)

1 ex. (male): Kefalonia, Ionian Islands, Kastro, Agios Georgios, 234 m, 38°08'18"N, 20°33'22"E, Burganlage, 06.05.2019, leg. Gerd Müller, det. Christoph Germann (cCM).

Oprohinus suturalis (FABRICIUS, 1775)

1 ex.: Kefalonia, Ionian Islands, Kastro, Agios Georgios, 38°08'16"N, 20°33'19"E, 260m, Böschung, 10.05.2019, leg. Gerd Müller, det. Christoph Germann (cCM).

Curculioninae

Anthonomus stierlini DESBROCHERS DES LOGES, 1869

1 ex.: Kefalonia, Ionian Islands, Kastro, Agios Georgios, 38°08'16"N, 20°33'19"E, 260 m, Böschung, 10.05.2019, leg. Gerd Müller, det. Christoph Germann (cCM).

Mecinus circulator (MARSHAM, 1802)

1 ex. Kefalonia, Ionian islands, Skala, 15 m, Ostküste, 38°04'56"N, 20°47'48"E, 12.05.2019, leg. Gerd Müller, det. Christoph Germann (cCM).

Pseudostyphlus pillumus (GYLLENHAL, 1835)

1 ex.: Kephallinia [Kefalonia] A. Winkler coll. V. Apfelbeck (hidden in a series of *Styphlus jonicus* (Reitter, 1899)), det. C. Germann, coll. G. Frey (NMB). First specimens examined since the literature reference in Germann & Braunert (2018).

Entiminae

Phyllobius emgei STIERLIN, 1887

2 ex: Kefalonia, Ionian Islands, Mt. Ainos, 1070 m, 38°09'35"N, 20°37'20"E, *Abies ceph.* [*Abies cephalonica*] Forest, 08.05.2019, leg. Gerd Müller, det. Christoph Germann (cCM).

Omiast cf. oertzeni STIERLIN, 1887

(Figs 20-21)

1 ♂, 2 ♀♀: Kefalonia [Kefalonia] 1908 Megalo-Vunó legit. M. Hilf coll. O. Leonhard // ex Orig. Samlg. J. Breit Wien. – 1 ♂, 1 ♀: Kephallinia Moczarski // Sammlung Stöcklein (all coll. G. Frey, NMB).

Comment: After the appreciated opinion by Roman Borovec (written communication), it is still unclear if the specimens from Kefalonia belong to *O. oertzeni* or to an undescribed species, morphologically close to *O. chelmosensis* (MESCHNIGG, 1939). Likely, only the examination of a larger series of specimens may help to clear this uncertainty.

Acknowledgements

We cordially thank Mandy Schröter and Lutz Behne (SDEI) for the loan of specimens, Roman Borovec (Sloupno) for his comments on the *Omiast* specimens, and



Figs 20-21: Habitus of male and female of *Omiast cf. oertzeni* STIERLIN, 1887 Kefalonia, Vunó, leg. M. Hilf, coll. Georg Frey NMB (all photos by C. Germann).

Peter Stüben is cordially acknowledged for his support. Cordial thanks to Eva Kleibusch (SDEI) who carried out most of the laboratory work to retrieve the new sequences needed for the species description. We cordially thank Gerd and Uschi Müller (Frechen) for the possibility to study their collected specimens. Carlo Braunert (Mensdorf, Luxembourg) is cordially acknowledged for his comments on the manuscript.

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Appendix 1 - Recorded Curculionoidea on Kefalonia Island (separate xls-file)

Family, subfamily, genus, species	
Anthribidae	
<i>Anthribus fasciatus</i> Forster, 1770	<i>Protapion truquii</i> (Reiche & Saulcy, 1858)
<i>Bruchela pygmaea</i> (Gyllenhal, 1833)	<i>Protapion varipes</i> (Germar, 1817)
<i>Pseudoparius centromaculatus</i> (Gyllenhal, 1833)	<i>Rhopalapion longirostre</i> (Olivier, 1807)
Apionidae	<i>Stenopterapion tenue</i> (Kirby, 1808)
<i>Apion frumentarium</i> Linné, 1758	<i>Squamapion delagrangei</i> (Desbrochers des Loges, 1895)
<i>Apion haematodes</i> Kirby, 1808	<i>Taeniapion rufescens</i> (Gyllenhal, 1833)
<i>Aspidapion aeneum</i> (Fabricius, 1775)	<i>Taeniapion rufulum</i> (Wencker, 1864)
<i>Aspidapion radiolus</i> (Marsham, 1802)	Brachyceridae
<i>Catapion corsicum</i> (Desbrochers des Loges, 1888)	<i>Brachycerus cinereus</i> Olivier, 1807
<i>Catapion pubescens</i> (Kirby, 1811)	<i>Brachycerus lutosus</i> Gyllenhal, 1833
<i>Ceratapion gibbirostre</i> (Gyllenhal, 1813)	<i>Brachycerus muricatus</i> Olivier, 1790
<i>Diplapion confluens</i> (Kirby, 1808)	<i>Brachycerus sinuatus</i> Olivier, 1807
<i>Eutrichapion facetum</i> (Gyllenhal, 1839)	<i>Brachycerus undatus</i> Fabricius, 1798
<i>Eutrichapion viciae</i> (Paykull, 1800)	Curculionidae
<i>Eutrichapion vorax</i> (Herbst, 1797)	Bagoinae
<i>Exapion compactum</i> (Desbrochers des Loges, 1888)	<i>Bagous robustus</i> H. Brisout de Barneville, 1863
<i>Exapion winkleri</i> (Wagner, 1912)	Baridinae
<i>Hemitrichapion pavidum</i> (Germar, 1817)	<i>Aulacobaris angusta</i> (Brullé, 1832)
<i>Hemitrichapion waltoni</i> (Stephens, 1839)	<i>Aulacobaris coerulescens</i> (Scopoli, 1763)
<i>Holotrichapion aethiops</i> (Herbst, 1797)	<i>Labiaticola atricolor</i> (Boheman, 1844)
<i>Holotrichapion gracilicollis</i> (Gyllenhal, 1839)	<i>Malvaevora timida</i> (Rossi, 1792)
<i>Holotrichapion pisi</i> (Fabricius, 1801)	<i>Melanobaris laticollis</i> (Marsham, 1802)
<i>Ischnopterapion cognatum</i> (Hochhuth, 1851)	Ceutorhynchinae
<i>Ischnopterapion fallens</i> (Marseul, 1888)	<i>Calosirus apicalis</i> (Gyllenhal, 1827)
<i>Ischnopterapion subglabrum</i> (Desbrochers des Loges, 1870)	<i>Calosirus orientalis</i> (Hustache, 1915)
<i>Kalcapion semivittatum</i> (Gyllenhal, 1833)	<i>Calosirus terminatus</i> (Herbst, 1795)
<i>Malvapion malvae</i> (Fabricius, 1775)	<i>Ceutorhynchus assimilis</i> (Paykull, 1792)
<i>Omphalapion dispar</i> (Germar, 1817)	<i>Ceutorhynchus chalybaeus</i> Germar, 1823
<i>Oryxolaemus croceifemoratus</i> (Gyllenhal, 1839)	<i>Ceutorhynchus contractus</i> (Marsham, 1802)
<i>Oryxolaemus scabiosus</i> Weise, 1889	<i>Ceutorhynchus duvali</i> C. N. F. Brisout de Barneville, 1869
<i>Oxystoma pomonae</i> (Fabricius, 1798)	<i>Ceutorhynchus erysimi</i> (Fabricius, 1787)
<i>Phrisotrichum tubiferum</i> (Gyllenhal, 1833)	<i>Ceutorhynchus cf. griseus</i> C.N.F. Brisout de Barneville, 1869
<i>Perapion oblongum</i> (Gyllenhal, 1839)	<i>Ceutorhynchus lukei</i> Tyl, 1914
<i>Perapion violaceum</i> (Kirby, 1808)	<i>Ceutorhynchus pallidactylus</i> (Marsham, 1802)
<i>Protapion brenskei</i> (Desbrochers des Loges, 1895)	<i>Ceutorhynchus pectoralis</i> Weise, 1895
<i>Protapion dentipes</i> (Gerstaecker, 1854)	<i>Ceutorhynchus picitarsis</i> Gyllenhal, 1837
<i>Protapion difforme</i> (Germar, 1818)	<i>Ceutorhynchus sulcicollis</i> (Paykull, 1800)
<i>Protapion nigrirtarse</i> (Kirby, 1808)	<i>Ceutorhynchus typhae</i> (Herbst, 1795)
<i>Protapion ononidis</i> (Gyllenhal, 1827)	<i>Coeliodes transversealbofasciatus</i> (Goeze, 1777)
<i>Protapion trifolii</i> (Linnaeus, 1768)	<i>Hadroplontus litura</i> (Fabricius, 1775)
	<i>Hadroplontus trimaculatus</i> (Fabricius, 1775)
	<i>Microplontus rugulosus</i> (Herbst, 1795)

Mogulones aubei (Boheman, 1845)	Orchestes hirtellus Miller, 1862
Mogulones austriacus (C. Brisout, 1869)	Orchestes pilosus (Fabricius 1781)
Mogulones beckeri (Schultze, 1900)	Pachytychius hordei grandicollis Walth, 1835
Mogulones cynoglossi (Frauenfeld, 1866)	Pseudostyphlus pillumus (Gyllenhal, 1835)
Mogulones geographicus (Goeze, 1777)	Rhinusa bipustulata (Rossi, 1792)
Nedyus quadrimaculatus (Linné, 1758)	Rhinusa comosa (Rosenschoeld, 1838)
Neoprohinus cinnamomeus (Schultze, 1897)	Rhinusa tetra (Fabricius, 1792)
Neoxyonyx strigatirostris (Hochhuth, 1847)	Rhinusa verbasci (Rosenschoeld, 1838)
Oprohinus consputus (Germar, 1824)	Sibinia attalica (Gyllenhal, 1835)
Oprohinus suturalis (Fabricius, 1775)	Sibinia aureofulva Desbrochers des Loges, 1875
Prisistus obsoletus (Germar, 1824)	Smicronyx jungermanniae (Reich, 1797)
Ranunculiphilus obscurus (C. N. F. Brisout de Barneville, 1869)	Smicronyx pauperculus Wollaston, 1864
Sirocalodes depressicollis (Gyllenhal, 1813)	Smicronyx syriacus Faust, 1887
Sirocalodes mixtus (Mulsant & Rey, 1859)	Styphlidius brevisetis Osella, 1981
Stenocarus cardui (Herbst, 1784)	Styphlus jonicus (Reitter, 1899)
Trichosirocalus campanella (Schultze, 1895)	Tychius balcanicus Caldara, 1990
Trichosirocalus rufulus (Dufour, 1851)	Tychius cuprifer (Panzer, 1799)
Cossoninae	Tychius exiguus Faust, 1889
Brachytemnus porcatus (Germar, 1824)	Tychius naxiae Faust, 1889
Cryptorhynchinae	Tychius ochraceus Tournier, 1873
Acallocrates denticollis (Germar, 1823)	Tychius polylineatus (Germar, 1823)
Echinodera corcyrensis Stüben, 2008	Tychius pusillus Germar, 1842
Echinodera ingowolfi Stüben, 1998	Tychius rufipennis Brisout de Barneville, 1863
Echinodera soumasi Germann, Wolf & Schütte, 2015	Tychius thoracicus Boheman, 1843
Echinodera stuebeni Germann & Schütte, 2021	Tychius tibialis Boheman, 1843
Torneuma deplanatum deplanatum (Hampe, 1864)	Entiminae
Curculioninae	Auchmeresthes kiesenwetteri Kraatz, 1862
Anthonomus multifasciatus Pic, 1926	Charagmus variegatus (Fähræus, 1840)
Anthonomus pomorum Linné, 1758	Chiloneus jonicus Kraatz, 1859
Anthonomus stierlini Desbrochers des Loges, 1869	Cycloderes fritillum (Panzer, 1794)
Archarius pyrrhoceras (Marsham, 1802)	Metadrosus bellus bellus (Kraatz, 1859)
Cionus balianii Solari, 1932	Omias cf. oertzeni Stierlin, 1887
Cionus olivieri Rosenschoeld, 1838	Otiorhynchus anadolicus Boheman, 1842
Cionus pulverosus Guérin-Méneville, 1833	Otiorhynchus aurifer Boheman, 1842
Cleopomiarus graminis (Gyllenhal, 1813)	Otiorhynchus brenskei Reitter, 1884
Cleopus solani (Fabricius, 1792)	Otiorhynchus cephalonicus Pic, 1902
Curculio glandium Marsham, 1802	Otiorhynchus championi Reitter, 1912
Gymnetron veronicae (Germar, 1821)	Otiorhynchus concavirostris Boheman, 1842
Mecinus circulatus (Marsham, 1802)	Otiorhynchus graecus graecoinsularis Reitter, 1914
Mecinus pascuorum (Gyllenhal, 1813)	Otiorhynchus gravidus Stierlin, 1872
Mecinus pyraister (Herbst, 1795)	Otiorhynchus jovis Miller, 1862
Mecinus simus (Mulsant & Rey, 1859)	Otiorhynchus lugens (Germar, 1817)
Miarus rotundicollis Desbrochers, 1893	Otiorhynchus ovalipennis Boheman, 1842
	Otiorhynchus picimanus picimanus Stierlin, 1861

Pachyrrhinus lethierryi (Desbrochers des Loges, 1875)
Parascythopus apollinis (Miller, 1862)
Phyllobius dispar Redtenbacher, 1847
Phyllobius emgei Stierlin, 1887
Phyllobius insulanus Schilsky, 1911
Phyllobius montanus Miller, 1862
Phyllobius pallidus (Fabricius, 1792)
Polydrusus angustus (Lucas, 1854)
Polydrusus armipes Brullé, 1832
Polydrusus bardus Gyllenhal, 1834
Polydrusus calabricus (Faust, 1890)
Polydrusus cephalonicus Apfelbeck, 1922
Polydrusus cervinus (Linné, 1758)
Polydrusus cocciferae Kiesenwetter, 1864
Polydrusus elegantulus (Boheman, 1840)
Polydrusus jucundus Miller, 1862
Polydrusus marcidus Kiesenwetter, 1864
Polydrusus moricei Pic, 1903
Psallidium spinimanum Reiche, 1861
Sitona discoideus Gyllenhal, 1834
Sitona humeralis Stephens, 1831
Sitona lineatus (Linné, 1758)
Sitona macularius (Marsham, 1802)
Sitona ophtalmicus Desbrochers des Loges, 1869
Sitona sulcifrons deubeli Krauss, 1902
Sitona verecundus (Rossi, 1790)
Strophomorphus albarius (Reiche & Saulcy, 1858)
Strophomorphus porcellus (Schönherr, 1832)
Tanymecus dilaticollis Gyllenhal, 1834
Trachyploeus laticollis Boheman, 1842
Hyperinae
Brachypera crinita (Boheman, 1834)
Brachypera zoilus (Scopoli, 1763)
Coniatus tamaricis (Fabricius, 1787)
Donus capiomonti (Petri, 1901)
Donus cyrtus (Germar, 1821)
Hypera melancholica (Fabricius, 1792)
Hypera meles (Fabricius, 1792)
Hypera nigrirostris (Fabricius, 1775)
Hypera postica (Gyllenahl, 1813)
Hypera venusta (Fabricius, 1781)
Limobius borealis (Paykull, 1792)
Lixinae
Bangasternus planifrons (Brullé, 1832)

Coniocleonus excoriatus (Gyllenhal, 1834)
Coniocleonus nigrosuturatus (Goeze, 1777)
Cyphocleonus testatus (Gyllenhal, 1834)
Larinus adspersus Hochhuth, 1847
Larinus carlinae (Olivier, 1807)
Larinus iaceae (Fabricius, 1775)
Larinus latus (Herbst, 1783)
Larinus rusticanus Gyllenhal, 1835
Larinus scolymi (Olivier, 1807)
Larinus syriacus Gyllenhal, 1835
Larinus turbinatus Gyllenhal, 1836
Larinus ursus (Fabricius, 1792)
Lixomorphus algirus (Linnaeus, 1758)
Lixus angustus (Herbst, 1795)
Lixus cardui (Olivier, 1807)
Lixus cinerascens Schoenherr, 1832
Lixus filiformis (Fabricius, 1781)
Lixus myagri Olivier, 1807
Lixus ochraceus Boheman, 1843
Lixus pulverulentus (Scopoli, 1763)
Lixus punctiventris Boheman, 1836
Pseudocleonus cinereus (Schrank, 1781)
Rhinocyllus conicus (Fröhlich, 1792)
Molytinae
Liparus tenebrioides (Pallas, 1781)
Minyops insularis Osella & Bellò, 2010
Styphloderes exsculptus (Boheman, 1843)
Scolytinae
Coccotrypes dactyliperda (Fabricius, 1801)
Cryphalus saltuarius (Weise, 1891)
Pityokteines curvidens (Germar, 1824)
Pityophthorus micrographus (Linnaeus, 1758)
Dryophthoridae
Sphenophorus abbreviatus (Fabricius, 1787)
Sphenophorus piceus (Pallas, 1771)
Nanophyidae
Dieckmanniellus nitidulus (Gyllenhal, 1838)
Rhynchitidae
Eomesauletes politus (Lepeletier & Audinet-Serville, 1825)
Mecorhis ungarica (Herbst, 1783)
Rhodocyrtus cribripennis (Desbrochers des Loges, 1869)
Tatianaerhynchites aequatus (Linnaeus, 1767)

Appendix 2 - collecting data and voucher numbers

Collecting data and voucher numbers for the material used in the molecular analysis is provided below, alphabetically sorted by species name. DNA extracts are stored either at the ZFMK Biobank in Bonn or at the SDEI in Müncheberg. Often remaining or additional tissue samples of the sequenced specimens are available as well.

Dry collection of ZFMK/CURCI processed samples are located at ZFMK Bonn, Germany.

Dry collection of SDEI/CURCI processed samples are located at Natural History Museum in Basel (NMB).

Acalles camelus (Fabricius, 1792)

Czech Republic, SE Moravia (UH), Lopenik, Bilé Karpaty Mts., collected on: *Fagus*, 15-May-2009, 727m, 48°56'00" 17°46'00", leg. Kresl, P., det. Kresl, P., dry collection: CURCI at ZFMK; Collector's No / Biobank No: CZ1054 / 9637; Tissue No / DNA No: ZFMK-TIS-cCZ1054 / ZFMK-DNA-0112704615; CO1 Genbank Accession No: KF680229

Echinodera ariadnae Bahr & Beyer, 2005

Greece, Crete Isl. West, Levka Ori, Imbros, above the Imbros Gorge, collected on: *Quercus*, 02-Oct-2006, 900m, N35°14'51" E24°10'30", leg. Bahr, F. & Bayer, B., det. Bahr, F. & Bayer, B., dry collection: CURCI at ZFMK; Collector's No / Biobank No: GR-0151-ari / 8786; Tissue No / DNA No: ZFMK-TIS-cGR0151 / ZFMK-DNA-0100400173; CO1 Genbank Accession No: EU286479

Echinodera aspromontensis Stüben, 2008

Italy, Basilicata, Monte Pollino, 17 km N of Rotonda, N of Episcopia, collected on: *Quercus*, *Castanea*, 8-Jul-2008, 894m, N40°05'55" E16°07'13", leg. Stüben, P., det. Stüben, P., dry collection: CURCI at ZFMK; Collector's No / Biobank No: I-647-asp / 9248; Tissue No / DNA No: ZFMK-TIS-cI647 / ZFMK-DNA-0100404242; CO1 Genbank Accession No: GU987985

Echinodera aspromontensis Stüben, 2008

Italy, Abruzzo, 28 km SE of Pescara, S. Vito, collected on: *Quercus*, 17-Jul-2008, 79m, N42°17'30" E14°27'35", leg. Stüben, P., det. Stüben, P., dry collection: CURCI at ZFMK; Collector's No / Biobank No: I-660-asp / 9261; Tissue No / DNA No: ZFMK-TIS-cI660 / ZFMK-DNA-0100404886; CO1 Genbank Accession No: GU987992

Echinodera brachati Stüben, 2002

Greece, Peloponnese, Mt. Taygetos W, Saidona E, collected on: *Quercus*, *Onosma*, *Cistus*, *Salvia fruticosa*, broom, 25-Apr-2009, 800m, N36°52'59" E22°17'25", leg. Bahr, Bayer, Brunner & Bueche, det. Stüben, P., dry collection: CURCI at ZFMK; Collector's No / Biobank No: E-922-bra / 9539; Tissue No / DNA No: ZFMK-TIS-cE922 / ZFMK-DNA-0100405279; CO1 Genbank Accession No: GU213764

Echinodera brachati peloponnensis Stüben, 2019

Greece, Peloponnese, Arkadia: Kosmas, collected on: *Astragalus*, 9-Aug-2018, 1151m, N37°05'45" E22°44'28", leg. Stüben, P., det. Stüben, P., dry collection: CURCI/SDEI at NMB; Collector's No: 3163-PST; DNA No: SDEI-DNA-3163-PST; CO1 Genbank Accession No: MK347695

Echinodera brachati peloponnensis Stüben, 2019

Greece, Peloponnese, Arkadia, N Kosmas: near Moni Elonis, collected on: *Quercus*, 11-Aug-2018, 427m, N37°08'42" E22°45'03", leg. Stüben, P., det. Stüben, P., dry collection: CURCI/SDEI at NMB; Collector's No: 3166-PST; DNA No: SDEI-DNA-3166-PST; CO1 Genbank Accession No: MK347697

Echinodera brisouti (Reitter, 1885)

Greece, Korfu Isl., 8 km S of Kerkyra, Mt. Pantokratoras NW of Makrata, collected on: *Quercus*, *Arbutus*, 27-Sep-2007, 482m, N39°32'52" E19°52'59", leg. Stüben, P., det. Stüben, P., dry collection: CURCI at ZFMK; Collector's No / Biobank No: KO-0383-bri / 8897; Tissue No / DNA No: ZFMK-TIS-cKO0383 / ZFMK-DNA-0100400347; CO1 Genbank Accession No: GU213655

Echinodera brisouti (Reitter, 1885)

Greece, Epirus, 9 km SW of Metsovo, Mikro Peristeri, collected on: *Quercus ilex*, 30-Sep-2007, 693m, N39°45'03" E21°05'09", leg. Stüben, P., det. Stüben, P., Dry collection: CURCI at ZFMK; Collector's No / Biobank No: EP-0391-bri2 / 8898; Tissue No / DNA No: ZFMK-TIS-cEP0391 / ZFMK-DNA-0100400348; CO1 Genbank Accession No: GU213656

Echinodera capiomonti (H. Brisout de Barneville, 1864)

Italy, Emilia-Romagna, San Giovanni in Marignano, 10 km W of Pésaro (RN), collected on: *Quercus*, 15-Oct-2001, 100m, N43°56'06" E12°43'00", leg. Stüben, P., det. Stüben, P., dry collection: CURCI at ZFMK; Collector's No / Biobank No: I-488-cap / 9045; Tissue No / DNA No: ZFMK-TIS-cI488 / ZFMK-DNA-0100400974; CO1 Genbank Accession No: GU213682

Echinodera corcyrensis Stüben, 2008

Croatia, Dalmatia, 24 km W of Split, 1 km E of Marina, Poljica, collected on: *Quercus*, 1-Jul-2007, 20m, N43°31'11" E16°08'31", leg. Stüben, P., det. Stüben, P., dry collection: CURCI at ZFMK; Collector's No / Biobank No: HR-0307-cor / 8888; Tissue No / DNA No: ZFMK-TIS-CHR0307 / ZFMK-DNA-0100400080; CO1 Genbank Accession No: GU213650

Echinodera corcyrensis Stüben, 2008

Greece, Epirus, 19 km E of Igoumenitsa, Petrovitsa, collected on: *Quercus ilex*, 01-Oct-2007, 355m, N39°33'30" E20°28'12", leg. Stüben, P., det. Stüben, P., dry collection: CURCI at ZFMK; Collector's No / Biobank No: EP-0409-cor / 8900; Tissue No / DNA No: ZFMK-TIS-CEP0409 / ZFMK-DNA-0100400350; CO1 Genbank Accession No: GU213658

Echinodera corcyrensis Stüben, 2008

Greece, Kefalonia Isl., S Poros, 30-Apr-2017, 170m, N38°07'59" E20°47'01", leg. Germann, Ch., det. Germann, Ch., dry collection: CURCI/SDEI at NMB; Collector's No: 3280-GER; DNA No: SDEI-DNA-3280-GER; CO1 Genbank Accession No: MW750620

Echinodera crenata Wollaston, 1863

Spain, Canary Islands, Tenerife, S of Orotava, Orotava valley, Mirador de la Rosa, collected on: *Greenovia* sp., *Aeonium spathulatum*, 04-Oct-2008, 1503m, N28°20'25" W16°31'29", leg. Astrin, J. & Stüben, P., det. Stüben, P., dry collection: CURCI at ZFMK; Collector's No / Biobank No: E-710-cre / 9299; Tissue No / DNA No: ZFMK-TIS-cE710 / ZFMK-DNA-0100404845; CO1 Genbank Accession No: GU213719

Echinodera ibleiensis Stüben, 2003

Italy, Sicilia Isl. (SR), 1.5 km S of Ferla, Valle dell'Anapo, Monti Iblei, collected on: *Castanea*, *Quercus*, *Ceratonia siliqua*, 24-Oct-2002, 450m, N37°06'14" E14°56'07", leg. Stüben, P., det. Stüben, P., dry collection: CURCI at ZFMK; Collector's No / Biobank No: I-496-ibl / 9053; Tissue No / DNA No: ZFMK-TIS-cI496 / ZFMK-DNA-0100400675; CO1 Genbank Accession No: GU213687

Echinodera ingowolffi Stüben, 1998

Greece, Kefalonia Isl., E Koulourata, 29-Apr-2017, 320m, N38°12'02" E20°40'57", leg. Germann, Ch., det. Germann, Ch., dry collection: CURCI/SDEI at NMB; Collector's No: 3277-GER; DNA No: SDEI-DNA-3277-GER; CO1 Genbank Accession No: MW750617

Echinodera ingowolffi Stüben, 1998

Greece, Kefalonia Isl., Mt. Enos, collected on: *Abies cephalonica*, 29-Apr-2017, 1100m, N38°09'46" E20°37'19", leg. Germann, Ch., det. Germann, Ch., dry collection: CURCI/SDEI at NMB; Collector's No: 3278-GER; DNA No: SDEI-DNA-3278-GER; CO1 Genbank Accession No: MW750618

Echinodera kroumiriensis Stüben, 2004

Tunisia, Kroumirie, 2 km E of Ain Draham, Jebel Bir, collected on: *Quercus suber*, *Quercus* sp., 20-Oct-2003, 770m, N36°46'20" E08°42'40", leg. Stüben, P., det. Stüben, P., dry collection: CURCI at ZFMK; Collector's No / Biobank No: T-500-kro / 9057; Tissue No / DNA No: ZFMK-TIS-cT500 / ZFMK-DNA-0100400671; CO1 Genbank Accession No: GU213691

Echinodera nebrodiensis Stüben, 2002

Italy, Sicilia Isl., Madonie Castelbuono, Rifugio Crispi Agrifol., Piano Pomo, collected on: *Fagus*, 7-Feb-2008, 1400m, N37°53'46" E14°04'01", leg. Kapp, det. Kapp, dry collection: CURCI at ZFMK; Collector's No / Biobank No: I-828-neb / 9448; Tissue No / DNA No: ZFMK-TIS-cI828 / ZFMK-DNA-0100405551; CO1 Genbank Accession No: GU213743

***Echinodera nuraghia* Stüben, 2009**

Italy, Sardinia Isl. West, E of Macomer, above Lei, collected on: *Quercus*, *Acer monspessulanum*, 04-Oct-2010, 1020m, N40°19'54" E08°53'49", leg. Stüben, P., det. Stüben, P., dry collection: CURCI at ZFMK; Collector's No / Biobank No: IT1092c / 9675; Tissue No / DNA No: ZFMK-TIS-cIT1092c / ZFMK-DNA-0112704586; CO1 Genbank Accession No: MG322670

***Echinodera peneckeï stat. nov.* Stüben, 1998 (formerly: *Echinodera brisouti peneckeï*)**

Montenegro, Cetinje Mun., 2km SE Kotor, Lovćen, collected: 23-APR-2018, 920 masl, N42°24'33" E18°47'20", leg. Braunert, C., det. Germann, Ch., dry collection: CURCI/SDEI at NMB; Collector's No: 3589-GER; DNA No: SDEI-DNA-3289-GER; CO1 GenBank Accession No: MW822684

***Echinodera peragalloi* (Chevrolat, 1863)**

Italy, Sardinia Isl., S of Aritzo, Gadoni, R. Tistigliosi x F. Flumendosa, collected on: *Quercus ilex*, 30-Sep-2010, 490m, N39°53'57" E09°11'02", leg. Stüben, P., det. Stüben, P., dry collection: CURCI at ZFMK; Collector's No / Biobank No: IT1082c / 9665; Tissue No / DNA No: ZFMK-TIS-cIT1082c / ZFMK-DNA-0112702487; CO1 Genbank Accession No: MG322664

***Echinodera romanboroveci* Stüben, 1998**

Montenegro, Budva Mun., 3.5km SE Petrovac, collected: 01-MAY-2018, 30 masl, N42°10'52" E18°58'11", leg. Germann, Ch., det. Germann, Ch., dry collection: CURCI/SDEI at NMB; Collector's No: 3590-GER; DNA No: SDEI-DNA-3590-GER; CO1 GenBank Accession No: MW822685

***Echinodera romanboroveci* Stüben, 1998**

Montenegro, Bar Mun., 7km E Petrovac, collected: 24-APR-2018, 490 masl, N42°13'28" E19°01'24", leg. Germann, Ch., det. Germann, Ch., dry collection: CURCI/SDEI at NMB; Collector's No: 3591-GER; DNA No: SDEI-DNA-3591-GER; CO1 GenBank Accession No: MW822686

***Echinodera soumasi* Germann, Wolf & Schütte, 2015**

Greece, Peloponnese, NE of Pilos, S of Kazama, Polilimnos, 26-Sep-2014, 300m, N36°59'00" E21°51'16", leg. Germann, Ch., det. Germann, Ch., dry collection: CURCI at ZFMK; Collector's No / Biobank No: 2798-PST / 17163; Tissue No / DNA No: ZFMK-TIS-26152 / ZFMK-DNA-0169166944; CO1 Genbank Accession No: KT289402

***Echinodera soumasi* Germann, Wolf & Schütte, 2015**

Greece, Kefalonia Isl., E Koulourata, 29-Apr-2017, 320m, N38°12'02" E20°40'57", leg. Germann, Ch., det. Germann, Ch., dry collection: CURCI/SDEI at NMB; Collector's No: 3276-GER; DNA No: SDEI-DNA-3276-GER; CO1 Genbank Accession No: MW750616

***Echinodera stuebeni spec.nov.* Germann & Schütte, 2021**

Greece, Kefalonia Isl., W Vari, collected on: *Quercus*, 3-May-2017, 430m, N38°23'04" E20°34'41", leg. Germann, Ch., det. Germann, Ch., dry collection: CURCI/SDEI at NMB; Collector's No: 3279-GER; DNA No: SDEI-DNA-3279-GER; CO1 Genbank Accession No: MW750619

***Echinodera variegata* (Boheman, 1837)**

Italy, Sicilia Isl. (PA), 8 km S of Carini, W of M. Gibilmesì, collected on: *Quercus*, 10-Oct-2006, 539m, N38°04'03" E13°11'37", leg. Stüben, P., det. Stüben, P., dry collection: CURCI at ZFMK; Collector's No / Biobank No: I-0412-var / 8902; Tissue No / DNA No: ZFMK-TIS-cI0412 / ZFMK-DNA-0100400007; CO1 Genbank Accession No: GU213660

Appendix 3 - laboratory references

References to the different laboratory routines for sequences used in this study are provided in this table.

Organism	Collector 's no / GenBank acc no	laboratory routine ref.
<i>Echinodera ariadnae</i>	GR-0151-ari / EU286479	Astrin et al. 2012
<i>Echinodera aspromontensis</i>	I-647-asp / GU987985	Astrin et al. 2012
<i>Echinodera aspromontensis</i>	I-660-asp / GU987992	Astrin et al. 2012
<i>Echinodera brachati</i>	E-922-bra / GU213764	Astrin et al. 2012
<i>Echinodera brachati peloponnensis</i>	3163-PST / MK347695	Schütte et al. 2013
<i>Echinodera brachati peloponnensis</i>	3166-PST / MK347697	Schütte et al. 2013
<i>Echinodera brisouti</i>	EP-0391-bri2 / GU213656	Astrin et al. 2012
<i>Echinodera brisouti</i>	KO-0383-bri / GU213655	Astrin et al. 2012
<i>Echinodera capiomonti</i>	I-488-cap / GU213682	Astrin et al. 2012
<i>Echinodera corcyrensis</i>	3280-GER / MW750620 (new)	Stüben & Kramp 2019
<i>Echinodera corcyrensis</i>	EP-0409-cor / GU213658	Astrin et al. 2012
<i>Echinodera corcyrensis</i>	HR-0307-cor / GU213650	Astrin et al. 2012
<i>Echinodera crenata</i>	E-710-cre / GU213719	Astrin et al. 2012
<i>Echinodera ibleiensis</i>	I-496-ibl / GU213687	Astrin et al. 2012
<i>Echinodera ingowolffi</i>	3277-GER / MW750617 (new)	Stüben & Kramp 2019
<i>Echinodera ingowolffi</i>	3278-GER / MW750618 (new)	Stüben & Kramp 2019
<i>Echinodera kroumiriensis</i>	T-500-kro / GU213691	Astrin et al. 2012
<i>Echinodera nebrodiensis</i>	I-828-neb / GU213743	Astrin et al. 2012
<i>Echinodera nuraghia</i>	IT1092c / MG322670 (new)	Schütte et al. 2013
<i>Echinodera penecke</i> stat. nov.	GER-3589 / MW822684 (new)	Stüben & Kramp 2019
<i>Echinodera peragalloi</i>	IT1082c / MG322664 (new)	Schütte et al. 2013
<i>Echinodera romanboroveci</i>	GER-3590 / MW822685 (new)	Stüben & Kramp 2019
<i>Echinodera romanboroveci</i>	GER-3591 / MW822686 (new)	Stüben & Kramp 2019
<i>Echinodera soumasi</i>	2798-PST / KT289402	Schütte et al. 2013
<i>Echinodera soumasi</i>	3276-GER / MW750616 (new)	Stüben & Kramp 2019
<i>Echinodera stuebeni</i> spec. nov.	3279-GER / MW750619 (new)	Stüben & Kramp 2019
<i>Echinodera variegata</i>	I-0412-var / GU213660	Astrin et al. 2012
<i>Acalles camelus</i> (Outgroup)	CZ1054 / KF680229	Schütte et al. 2013

Appendix 4 - COI sequences

We are convinced that molecular sequences should also be part of the initial description in which they were first published, if possible. The fact that they are additionally stored separately in public databases like NIH's GenBank is undoubtedly a further safeguard for the long-term availability of species-specific DNA barcodes. Here we provide previously unreleased sequences in easy to use fasta format. The content can be copied and pasted into any fasta or text file and easily imported into any bioinformatics application. The provided sequences represent the full length of 658 nucleotides of COI barcodes of the Folmer barcode region (Folmer et al. 1994).

First number in taxa name is collector's number, second one is GenBank accession number. More details to the finding localities are provided in Appendix 2.

> *Echinodera stuebeni* spec.nov.-3279-GER. MW750619-Greece_Kefalonia_Isl.

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AACTTTATATTTTCATCTTCGGTTCATGATCAGGAATAGTGGGAACATCATTAAGAATATTAATCCGAA-
CAGAACTAGGAAACCCAGGAACCCTAATCGGTAATGATCAAATCTATAACACAATTGTTACCGCT-
CACGCTTTCATCATAATCTTTTTTATAGTCATACCCATTATAATCGGAGGATTTGGAAATTGATTAATC-
CCACTAATACTTGGAGCTCCCGATATAGCTTTCCCACGACTAAATAATATAAGATTCTGACTCCTTCC-
CCCATCACTTACCCTTCTATTAATAAGAAGAATTATTGATAAAGGAGCCGGAAGTGGTTGAACAGTT-
TATCCCCCTTTATCCTCAAATATTGCTCATGAAGGAGCTTCTATTGACCTGGCCATTTTCAGCCTTCAT-
ATAGCAGGAATCTCATCAATCCTAGGAGCCATAAACTTTATTTCCACAGTAATCAATATACGACCAACAG-
GAATAAACTAGATCGAATACCTCTATTTATCTGAGCCGTAAAAAATTACTGCCATTCTTCTTCTATTATCTT-
TACCTGTTCTAGCAGGCGCTATCACCATACTTTTAACAGACCGAAATATTAACACATCATTTTTTGACCC-
CGCAGGAGGAGGAGACCCAATTCTCTACCAACATCTATTT
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> *Echinodera corcyrensis* 3280-GER. MW750620-Greece_Kefalonia_Isl.

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AACTCTCTATTTTCATTTTTTGGGTCATGATCAGGAATAGTGGGAACATCCCTAAGTATACTAATTCGTA-
CAGAACTTGGAATCCAGGAACCTTAATCGGAAATGACCAAATCTATAATACAATTGTTACCGCCCAT-
GCTTTCATTATAATTTTCTTCATAGTTATACCCATTATAATTGGAGGGTTTGGAATGATTAATTC-
CTTTAATACTAGGAGCCCTGATATAGCATTTCCCCGACTTAATAATATAAGATTTTGATTATTACCAC-
CATCCCTTACCCTCCTCCTAATAAGAAGAATTATCGACAACGGAGCCGGAAGTGGTTGAACAGTT-
TATCCCCCTCTATCTTCAAATATCGCTCATGAAGGAGCCTCTATTGACTTAGCCATTTTCAGTTTACA-
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GAATAAATTTAGACCAAATACCCCTATTTATTTGAGCTGTAAAAAATTACAGCTATTCTCTTACTCTTATCTC-
TACCAGTTCTTGAGGAGCAATTACTATACTCTTAACAGATCGAAATATTAACACAACATTCTTCGACCCT-
GCTGGAGGAGGAGACCCAATTCTTTATCAACACTTATTT
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> *Echinodera ingowolfi* 3277-GER. MW750617-Greece_Kefalonia_Isl.

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AACATTGTACTTTATTTTTTGGGTCATGATCAGGAATAATAGGAACATCACTAAGCATACTTATTCGAA-
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CACGCCTTCATTATGATTTTTTTTATAGTTATACCAATCATAATTGGCGGATTTGGAAACTGATTAGTTC-
CACTAATATTAGGAGCTCCTGATATAGCCTTTCTCTCGATTAAACAACATAAGATTTTGACTACTCCCC-
CCATCTCTCAGCCTTCTTTTAATAAGAAGAATTATTGATAAAGGAGCTGGAAGTGGTTGAACAGTC-
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GAATAAATCTAGATCGAATACCACTATTTATTTGAGCTGTAAAAAATTACTGCCATCCTGCTTCTCCTATCC-
CTACCTGTCCTAGCAGGAGCAATCACTATACTCTTAACAGATCGTAATATCAATACATCATTTTTTGACCC-
CGCTGGAGGGGGGAGATCCCATCCTCTATCAACACCTATTT
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> *Echinodera ingowolfi* 3278-GER. MW750618-Greece_Kefalonia_Isl.

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CACGCCTTCATTATAATTTTTTTTATAGTTATACCAATCATAATTGGAGGATTTGGAAACTGGTTAGTTC-
CACTAATATTAGGAGCTCCTGATATAGCCTTTCTCTCGATTAAACAACATAAGATTTTGATTACTCCCTC-
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GAATAAATCTAGATCGAATACCACTATTTATTTGAGCTGTAAAAAATTACTGCCATCCTGCTTCTCCTATCC-
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CGCTGGGGGGGGGAGATCCCATCCTCTATCAACACCTATTT
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>*Echinodera_nuraghia*_IT1092c.MG322670-Italy_Sardinia_Isl.

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GCTCATGCTTTTATTATAATCTTTTTCATAGTAATACCCATCATAATTGGAGGATTTGGAAACT-
GATTAATCCCATTAATACTTGGAGCCCCTGATATAGCTTTCCCACGGCTAAACAATATAAGATTTT-
GACTCCTACCCCATCTCTCACCTTATTACTAATAAGAAGAATTATTGATAAAGGAACAGGAAGT-
GTTGAACAGTCTATCCCCCTTTATCCTCAAATATTGCTCATGAAGGAGCTTCTATTGACCTAGC-
CATTTTTAGCCTCCATATAGCAGGAATTCGTCAATCTTAGGAGCTATAAACTTTATTTCTACAG-
TAATCAATATACGCCCAACAGGAATAAACTAGACCGAATACCCTTATTTATTTGAGCCGTAAAAAT-
TACTGCCATCCTTCTCCTATTATCTTTACCTGTCCTAGCAGGTGCTATCACTATACTTTTAACAGAC-
CGAAATATTAATACGTCATTTTTTGACCCTGCGGGGGGAGGAGATCCTATCCTCTACCAACATT-
TATTT

>*Echinodera_penecke*_stat. nov._GER-3589. MW822684-Montenegro_Kotor

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GCTCATGCCTTCATCATAATCTTTTTCATAGTCATACCTATCATAATCGGAGGCTTTGGAAATTGAT-
TAATTCATTAATACTTGGAGCTCCTGATATAGCTTTCCCCCGCCTAAATAATATAAGATTTTGACTC-
CTGCCACCTTCTCTCACCTTCTACTAATAAGAAGTGTATTGATAAAGGAGCTGGAAGTGGCTGAA-
CAGTCTATCCCCCTTATCCTCAAATATTGCCCATGAAGGAGCTTCTATTGACCTAGCCATTTTCAGC-
CTACACATAGCCGGAATTTTCATCAATTCTAGGAGCCATAAACTTTATTTCCACAGTAATCAATATAC-
GACCAACAGGAATAAAGCTAGACCGAATACCCTTATTTATTTGAGCTGTAAAAATCACCGC-
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ATTAACACATCATTTTTTGACCCTGCAGGAGGAGGCGACCCCATCCTCTACCAACATCTATTT

>*Echinodera_peragalloi*_IT1082c.MG322664-Italy_Sardinia_Isl.

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GACTAATTTCCCCTTATATTAGGAGCCCCTGATATAGCATTTCCACGACTTAATAATATAAGATTCT-
GATTATTGCCCCCGTCTCTCACCTCCTATTAATAAGTAGAGCCATTGATAAAGGAGCCGGAAGT-
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CATTTTCAGATTACATATAGCAGGAATCTCATCAATTCTAGGAGCCATAAATTTTCATCTCCACAGT-
TATTAATATACGCCCAACAGGAATAAATCTTGATCGAATACCCTCTATTTATTTGAGCAGTAAAAAT-
TACTGCCATTCTCTTACTTTTATCCCTACCCGTTCTTGCCAGGAGCTATTACTATACTCTTAACAGAC-
CGAAATATTAACACAACATTTCTTTGACCCTGCTGGAGGAGGTGATCCAATCCTCTATCAACATT-
TATTT

>*Echinodera_romanboroveci*_GER-3590_MW822685-Montenegro_Petrovac

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GACTTCTACCTCCCTCTCTTACCCTCCTACTAATAAGAAGAATTATTGATAAAGGAGCTGGTACTG-
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CATTTTTAGTCTCCATATAGCAGGAATTTTCATCAATTCTAGGAGCTATAAACTTTATCTCTACAG-
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CGAAATATTAATACATCATTTTTTGACCCCGCGGGAGGAGGAGACCCAATCCTCTACCAACATC-
TATTT

>*Echinodera_romanboroveci*_GER-3591.MW822686-Montenegro_Petrovac

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 GCTTTCATTATAATCTTTTTCATAGTCATACCTATCATAATTGGAGGCTTTGGAAATTGACTAATTC-
 CATTAATACTTGGAGCTCCAGATATAGCTTTCCCACGCCTAAATAATATAAGATTTTGACTTCTACCTC-
 CCTCTCTTACCCTCCTACTAATAAGAAGAATTATTGATAAAGGAGCTGGTACTGGCTGAACAGTATAC-
 CCCCCTTTATCCTCAAATATTGCTCATGAAGGAGCCTCTATCGACTTAGCCATTTTTAGTCTCCAT-
 ATAGCAGGAATTCGTCAATTCTAGGAGCTATAAACTTTATCTCTACAGTAATCAACATACGTCCGACAG-
 GTATAAACTAGACCAAATACCTCTATTTATTTGAGCCGTAAAAATTACTGCCATTCTTCTTCTACTATCAT-
 TACCCGTCCTTGCAGGAGCTATCACCATACTTTTAACAGACCGAAATATTAATACATCATTTTTTGACCC-
 CGCGGGAGGAGGAGACCCAATCCTCTACCAACATCTATTT

>*Echinodera_soumasi*_3276-GER.MW750616-Greece-Kefalonia_Isl.

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 TAACTTTACTCCTAATAAGAAGCATTATTAATAATGGAGCTGGAAGTGGATGAAGTGTATACCCGC-
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 TAGATCGCATACCCCTATTTATTTGAGCCGTAAAAATTACTGCAATTCTTCTACTTTTATCCTTGCCTGTCT-
 TAGCAGGAGCAATTACTATACTTCTAACCGATCGTAATATTAATACATCATTTTTTGATCCCGCAGGAG-
 GTGGAGACCCAATCTTATACCAACATTTATTT

Appendix 5 - p-distance matrix

p-Distance	<i>Echinodera ariadnae</i> (GR-0151-ari) - GR: Crete Isl.	<i>Echinodera aspromontensis</i> (I-647-as) - IT: Basilicata	<i>Echinodera aspromontensis</i> (I-660-as) - IT: Abruzzo	<i>Echinodera brachati</i> (E-922-bra) - GR: Peloponnese	<i>Echinodera brachati peloponnensis</i> (3163-PST) - GR: Pelop.	<i>Echinodera brachati peloponnensis</i> (3166-PST) - GR: Pelop.	<i>Echinodera brisouti</i> (EP-0391-br)2 - GR: Epirus	<i>Echinodera brisouti</i> (KO-0383-br) - GR: Korfu Isl.	<i>Echinodera capiromonti</i> (I-488-cap) - IT: Emilia-Romagna	<i>Echinodera corcyrensis</i> (3280-GER) - GR: Kefalonia Isl.	<i>Echinodera corcyrensis</i> (EP-0409-cor) - GR: Epirus	<i>Echinodera corcyrensis</i> (HR-0307-cor) - Croatia: Dalmatia	<i>Echinodera crenata</i> (E-710-cre) - CI: Tenerife	<i>Echinodera ibleiensis</i> (I-496-ib) - IT: Sicilia Isl.	<i>Echinodera ingowolffii</i> (3277-GER) - GR: Kefalonia Isl.	<i>Echinodera ingowolffii</i> (3278-GER) - GR: Kefalonia Isl.	<i>Echinodera kroumiriensis</i> (T-500-kro) - Tunisia: Kroumirie	<i>Echinodera nebrodiensis</i> (I-828-neb) - IT: Sicilia Isl.	<i>Echinodera nuraghia</i> (IT1092c) - IT: Sardinia Isl.	<i>Echinodera penecke stat.nov.</i> (GER-3589) - Montenegro	<i>Echinodera peragalioi</i> (IT1082c) - IT: Sardinia Isl.	<i>Echinodera romanboroveci</i> (GER-3590) - Montenegro	<i>Echinodera romanboroveci</i> (GER-3591) - Montenegro	<i>Echinodera soumasi</i> (2798-PST) - GR: Peloponnese	<i>Echinodera soumasi</i> (3276-GER) - GR: Kefalonia Isl.	<i>Echinodera stuebeni sp.n.</i> (3279-GER) - GR: Kefalonia Isl.	<i>Echinodera variegata</i> (I-0412-var) - IT: Sicilia Isl.	
<i>Echinodera ariadnae</i> (GR-0151-ari) - GR: Crete Isl.		12.3																										
<i>Echinodera aspromontensis</i> (I-647-as) - IT: Basilicata	12.3		1.1																									
<i>Echinodera aspromontensis</i> (I-660-as) - IT: Abruzzo	12.3	1.1																										
<i>Echinodera brachati</i> (E-922-bra) - GR: Peloponnese	11.8	11.8	11.8																									
<i>Echinodera brachati peloponnensis</i> (3163-PST) - GR: Pelop.	10.9	10.9	10.9	3.1																								
<i>Echinodera brachati peloponnensis</i> (3166-PST) - GR: Pelop.	11.7	11.7	11.7	4	0.9																							
<i>Echinodera brisouti</i> (EP-0391-br)2 - GR: Epirus	10.9	10.9	10.9	9.3	9.4	9.3																						
<i>Echinodera brisouti</i> (KO-0383-br) - GR: Korfu Isl.	10.8	10.8	10.8	9.5	9.5	9.5	2																					
<i>Echinodera capiromonti</i> (I-488-cap) - IT: Emilia-Romagna	15.5	15.5	15.5	16.3	16.3	16.3	16.3	16.3																				
<i>Echinodera corcyrensis</i> (3280-GER) - GR: Kefalonia Isl.	15.2	15.2	15.2	16.6	16.6	16.6	15.5	15.5	0.5																			
<i>Echinodera corcyrensis</i> (EP-0409-cor) - GR: Epirus	15.3	15.3	15.3	16.6	16.6	16.6	15.5	15.5	0.5	0.5																		
<i>Echinodera corcyrensis</i> (HR-0307-cor) - Croatia: Dalmatia	15.3	15.3	15.3	16.6	16.6	16.6	15.5	15.5	0.5	0.5	0.5																	
<i>Echinodera crenata</i> (E-710-cre) - CI: Tenerife	17	17	17	16.1	16.1	16.1	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
<i>Echinodera ibleiensis</i> (I-496-ib) - IT: Sicilia Isl.	11.9	11.9	11.9	10.4	10.5	10.4	9.1	9.1	15.7	15.7	15.7	15.7	15.3	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7
<i>Echinodera ingowolffii</i> (3277-GER) - GR: Kefalonia Isl.	16.3	16.3	16.3	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.3	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7
<i>Echinodera ingowolffii</i> (3278-GER) - GR: Kefalonia Isl.	16.3	16.3	16.3	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.3	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7
<i>Echinodera kroumiriensis</i> (T-500-kro) - Tunisia: Kroumirie	14.6	14.6	14.6	10.4	10.4	10.4	13.8	14.1	16.3	16.3	16.3	16.3	16.3	10.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
<i>Echinodera nebrodiensis</i> (I-828-neb) - IT: Sicilia Isl.	10.5	10.5	10.5	8.2	8.2	8.2	13.8	14.1	16.3	16.3	16.3	16.3	16.3	10.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
<i>Echinodera nuraghia</i> (IT1092c) - IT: Sardinia Isl.	10.5	10.5	10.5	8.2	8.2	8.2	13.8	14.1	16.3	16.3	16.3	16.3	16.3	10.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
<i>Echinodera peneckeii stat.nov.</i> (GER-3589) - Montenegro	11.9	11.9	11.9	10.6	10.6	10.6	13.8	14.1	16.3	16.3	16.3	16.3	16.3	10.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
<i>Echinodera peragalioi</i> (IT1082c) - IT: Sardinia Isl.	16	16	16	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
<i>Echinodera romanboroveci</i> (GER-3590) - Montenegro	10.5	10.5	10.5	11.8	11.8	11.8	13.8	14.1	16.3	16.3	16.3	16.3	16.3	10.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
<i>Echinodera romanboroveci</i> (GER-3591) - Montenegro	10.8	10.8	10.8	12.1	12.1	12.1	13.8	14.1	16.3	16.3	16.3	16.3	16.3	10.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
<i>Echinodera soumasi</i> (2798-PST) - GR: Peloponnese	14.6	14.6	14.6	12.1	12.1	12.1	13.8	14.1	16.3	16.3	16.3	16.3	16.3	10.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
<i>Echinodera soumasi</i> (3276-GER) - GR: Kefalonia Isl.	15.7	15.7	15.7	15.6	15.6	15.6	13.8	14.1	16.3	16.3	16.3	16.3	16.3	10.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
<i>Echinodera stuebeni sp.n.</i> (3279-GER) - GR: Kefalonia Isl.	9.9	10.5	10.5	15.6	15.6	15.6	13.8	14.1	16.3	16.3	16.3	16.3	16.3	10.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
<i>Echinodera variegata</i> (I-0412-var) - IT: Sicilia Isl.	15.2	15.2	15.2	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3

ZOBODAT - www.zobodat.at

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Beiträge zur Entomologie = Contributions to Entomology](#)

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