



***Aeoniacalles tabladoensis* sp.n. and  
*Aeoniacalles aeonii bodegensis* (Stüben 2000) resyn. from the Canary Islands  
(Coleoptera: Curculionidae: Cryptorhynchinae)**

by

**Peter E. Stüben, Mönchengladbach & Jonas J. Astrin, Bonn  
with 10 figures**

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**Abstract**

A new species of the Macaronesian weevil genus *Aeoniacalles* Stüben & Astrin 2010 is described from the Canary Island of La Palma. This species is distinguished from the related species *Aeoniacalles aeonisimilis* (Stüben 2010) from La Gomera. A Re-synonymization of *Acalles bodegensis* Stüben 2000 (Tenerife: Anaga Mts.), which is a subspecies of *Aeoniacalles aeonii* (Wollaston 1864), is given. The genetic p-distances of these species and a molecular phylogeny for all Canarian species of the genus *Aeoniacalles* are presented by a Bayesian analysis using the mitochondrial COI-gene.

**Key words.** Curculionidae, Cryptorhynchinae, *Aeoniacalles*, new species, taxonomy, molecular phylogenetic, morphology, Spain, Canary Islands.

**Introduction**

In the first description of *Aeoniacalles aeonisimilis* Stüben 2000 from La Gomera (locus typicus) the type material was already separated from "other material" coming from La Palma (Stüben 2000: 39). The author points out in his differential diagnosis that the specimens from La Palma are larger on average than those from La Gomera. But other distinguishing characteristics could not be given at the time. New material collected in 2006 raised grave doubts that the specimens from La Palma belonged to *Aeoniacalles aeonisimilis*. But it was only after the obvious results of molecular analysis that the morphologist is now forced to face up to this subject again. The results are presented here for the first time.

In addition to our new molecular research a re-synonymisation of *Acalles bodegensis* Stüben 2000 (Tenerife, Anaga Mts.) is proposed. This species is a subspecies of *Aeoniacalles aeonii* (Wollaston 1864).

***Aeoniacalles tabladoensis* sp.n.**

**Type material**

**Holotype.** 1♂, "E, La Palma, El Tablado, El Portal, 28°50'03"N 17°52'36"W, 200 m, *Aeonium palmense*, 24.6.1999, leg. Stüben (23)", coll. Curculio-Institute, D-Mönchengladbach. / **Paratypes.** 5♂11♀, data as for holotype, coll. Curculio-Institute 1♀, Stüben; 5♂, 3♀, "E: (La Palma): 6,5 km E Garafis: El Tablado: El Portal, 28°50'04"N 17°52'36"W, 300 m, *Aeonium palmense*, 12. VII. 2006, leg. Stüben (43)", coll. Stüben, ZFMK 1♂, 1♀. **DNAtype.** 1♂, data as for paratype, coll. ZFMK, Vouchers: ZFMK-DNA-JJ0151, ZFMK-TIS-E-102-aes / GenBank: 16S, Acc, no: GU988218; COI, Acc, no: GU987801.



**Fig. 1** *Aeoniacalles tabladoensis* (La Palma) – HT, habitus ♂ (dor./lat.) **Fig. 2** *Aeoniacalles aeonisimilis* (La Gomera) – HT, habitus ♂ (dor./lat.)

**Description (Fig. 1, 3, 6, 7, 8)**

**Size:** 4.9 – 8.9 mm (without rostrum).

**Head & Rostrum.** Eyes rounded towards front and acuminate towards underside of rostrum. Punctures of the dark brown rostrum of the ♂ dense, deep and robust, rostrum about  $\frac{3}{4}$  as long as pronotum; rostrum of the ♀ slightly longer, conspicuously more slender and more rounded, lighter in colour, the punctures towards the apex finer, more sparse and less deep.

**Pronotum.** 1.05x – 1.10x as wide as long; widest directly behind the middle; laterally, strongly and regularly rounded towards the base with a slight constriction at the front-margin. Without a mid-groove or depression. Disk of pronotum slightly convex, predominantly with bright beige scales and sometimes with two dark brown marks of bristles sticking out vertically near the middle and also with diffuse dark, longitudinal marks next to the base. Pronotum with fine and close punctures.

**Elytra.** Elongated, 1.40x as long as wide; widest in the middle at the end of the dark lateral fascia (slightly egg-shaped), basal third or directly in front of the middle. Outline towards base and elytral slope rounded oblong-oval. With a lateral depression next to the apex. The even intervals super-elevated, often tubercle-like, the uneven intervals on the same level as the stripes of punctures; punctures on the disc of elytra mostly smaller than the intervals and with finer punctures as on the flanks of elytra. In and behind the middle with a broad black fascia which fades towards the sides; but a deep black rhomboidal spot in the centrum is always visible. Fascia on its anterior part often with a pitch-dark tuft of bristles on the suture, followed towards the apex by a second white lateral fascia. But the elytral slope in front of the apex always light brown, without a pitch-dark mark (as with *Aeoniacalles grancanariensis*). There are further diffuse dark marks on the 2<sup>nd</sup> to 4<sup>th</sup> interval at the base of elytra. The predominantly bright integument consists of tiny, round and overlapping scales so that the underground is not visible. Their diameter is half of the diameter of the considerably larger pronotum-scales.

**Legs.** Front femur long, protruding front-margin of the eye; hind femur reaching the middle of the last abdominal sternite. Basic cover of legs consisting of dense, light brown scales. Tibia with a black spot in the middle and covered on the outer edge with short elevated bristles and on the inner surface with hair-like bristles.

**Venter.** With a deep pectoral canal. The middle of the front-margin of 2<sup>nd</sup> abdominal sternite often protruding arc-like to the 1<sup>st</sup> sternite. 2<sup>nd</sup> sternite as long as or longer than sternites 3 and 4 combined. 1<sup>st</sup> and 2<sup>nd</sup> sternite - in addition to the densely well covering, round and beige scales - with slender, acuminate bristles (Fig.3).

**Stridulation.** See the sonograms and oscillograms of two time resolutions of *A. tabladoensis* in fig. 7 (vgl. Riede & Stüben 2000: the examined specimen (♀) here is from La Palma – formerly known as *A. aeonisimilis*).

**Female genital.** Ovipositor, spiculum ventrale, spermatheca, see fig. 8.

**Aedeagus.** The endophallus consists of a simple equal-sided, inverse v-shaped structure; the ends of this structure are attached to a 'sickle' (Fig. 6).



**Fig. 3** *A. tabladoensis* ♀, PT(ven.) **Fig. 4** *A. tabladoensis*: El Tablado & *A. palmense* **Fig. 5** *A. tabladoensis* – larva & imago in "cocoon" of pupa

**Differential diagnosis (Fig. 2, 9, 10)**

**Morphological analysis.** The new species is closely related to *Aeoniacalles aeonisimilis* (Stüben 2000) from La Gomera (locus typicus: Tamargada).

*Aeoniacalles tabladoensis*. **1.** Elytra brighter, often only with a deep black rhomboidal spot on the disc, more egg-shaped (oblong-oval) rounded, widest in the middle (Fig. 1); **2.** Intervals of elytra flatter, punctures of striae not so deep (Fig.4). **3.** Elytra in lateral view in front of the apex steep sloping (Fig. 1).

*Aeoniacalles aeonisimilis*. **1\***. Elytra darker, with more black spots behind the base, fascia towards the sides at full length black, richer in contrast; elytra in the mid-part with nearly parallel sides (Fig. 2); **2\***. Intervals of elytra stronger and more super-elevated, punctures of striae deeper (particularly on the sides, Fig.2). **3\***. Elytra in lateral view in front of the apex flatter (Fig. 2).



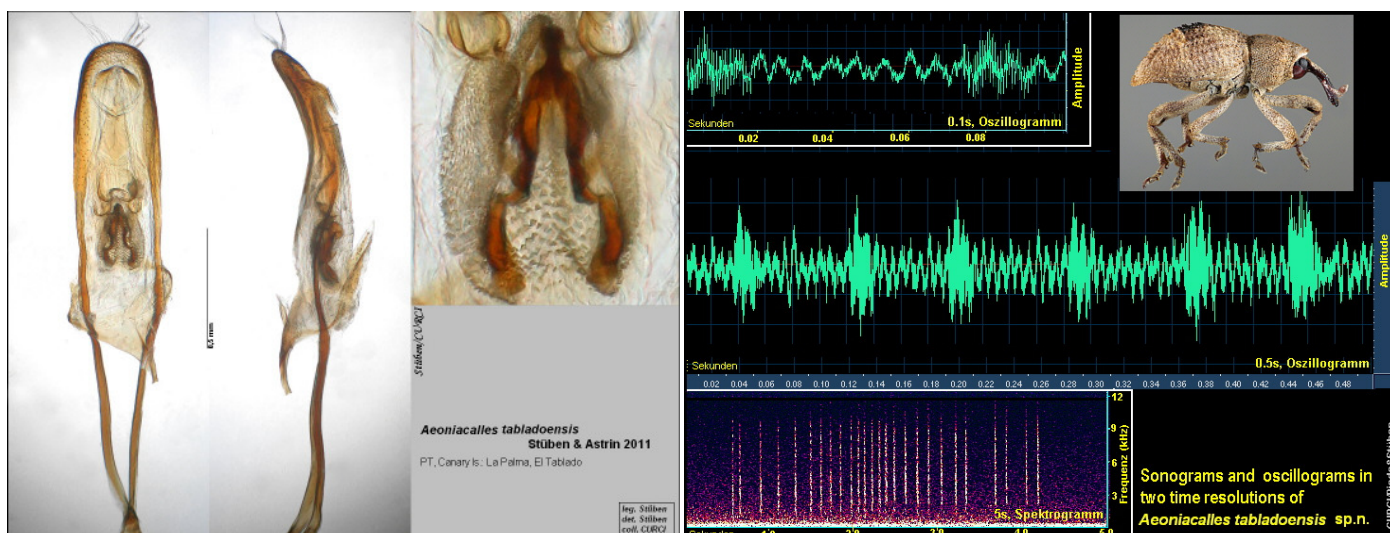


Fig. 6 *A. tabladoensis* sp.n. – HT, aedeagus (ven./lat.)

Fig. 7 *A. tabladoensis* ♀ – PT, stridulation

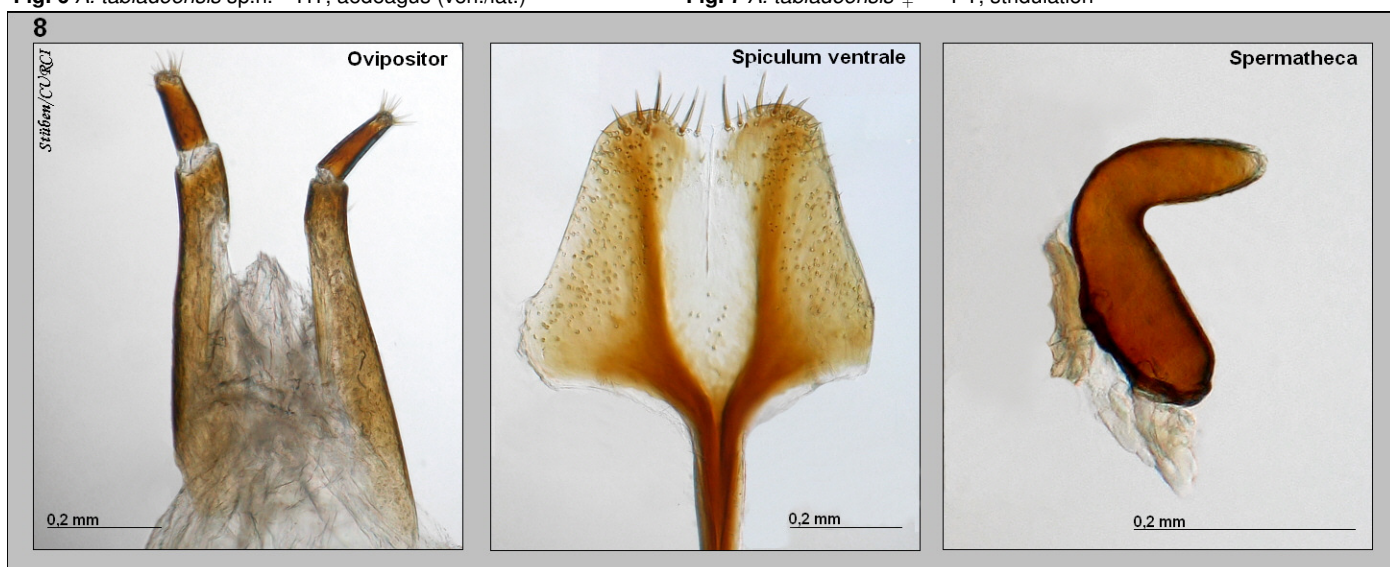


Fig. 8 *A. tabladoensis* ♀: Female genital. Ovipositor, spiculum ventrale, spermatheca.

**Phylogenetic analyses.** Apart from the 6 outgroups (related Canarian Cryptorhynchinae from 5 other genera), our molecular analysis is based on 19+2 specimens of 6 (+ 1 *Aeoniocalles* sp.) out of 7 valid *Aeoniocalles* species (cf. Stüben & Astrin 2010). Collecting and vouchering information, as well as GenBank accession numbers, are given in Stüben & Astrin (2010). Data for the 7 new specimens analyzed here for the first time are presented in Appendix 1. We sequenced part of the cytochrome c oxidase subunit (COI) gene (sequence length 658 bp) from the standard DNA barcoding region. Voucher specimens and extracted genomic DNA are deposited at the Biobank of the ZFMK (Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany). The laboratory routine followed Astrin & Stüben (2008). The sequence data of the COI gene was used in parallel Bayesian MCMC analyses, as implemented in MrBayes ver. 3.1.2 (Ronquist & Huelsenbeck 2003). Analyses were run for 20 million generations, sampling 40.000 trees of which 39.800 were retained after discarding burn-in. The results (majority rule consensus) are presented in Fig. 9. BioEdit 7.0.9 was used to calculate uncorrected distances of the COI gene. The results of the related species of *Aeoniocalles tabladoensis* are presented in the map (Fig. 10).

**Etymology.** The species name refers to the El Tablado, a village near the steep coast in the North of La Palma.

**Ecology.** This species lives on *Aeonium palmense* and was bred on this Crassulaceae by the first author: Fig. 4, 5.

**Distribution.** This species is so far only known from the North of La Palma (Canary Island), El Tablado: Fig. 4.

## ***Aeoniocalles aeonii bodegensis* Stüben 2000 resyn.**

### **‘Molecules versus Cross-Breeding’**

*Acalles bodegensis* Stüben 2000, which lives on its hostplant *Aeonium holochrysum* W. & B. at the extreme North-east of the Anaga Mountains on Tenerife, was described and distinguished by clear morphological characteristics from the related species *Acalles aeonii* Wollaston 1854, a species, that lives on *Aeonium cuneatum* W. & B. only 10 km further west near the village Afur (Anaga Mts.). After successful cross-breeding over three generations (2 years)

without any degenerations it seems evident that *Acalles bodegensis* is a junior synonym of *Acalles aeonii* (Stüben 2005, Stüben & Germann 2005).

However the molecular analysis, using mitochondrial cytochrome oxidase, supports another conclusion: *A. bodegensis* stands isolated from *A. aeonii*, separated by high genetic distances (see Fig. 9, 10) and not forming a monophylum with *A. aeonii* (as *A. argillosus* is recovered as sister to *A. aeonii*). This topology is not highly supported, but the clade formed by *A. aeonii* is maximally supported.

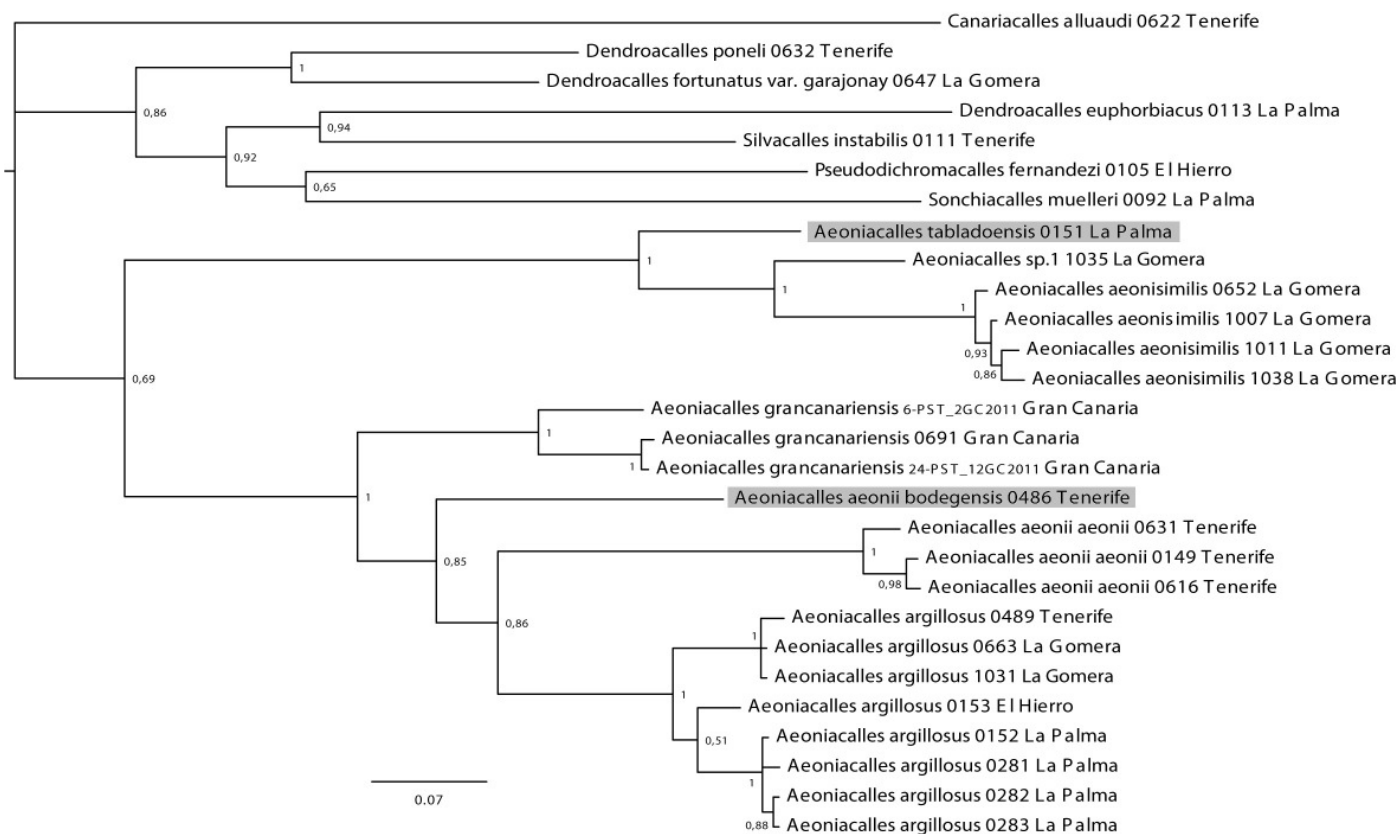


Fig. 9 Bayesian 50% majority rule consensus tree for COI.

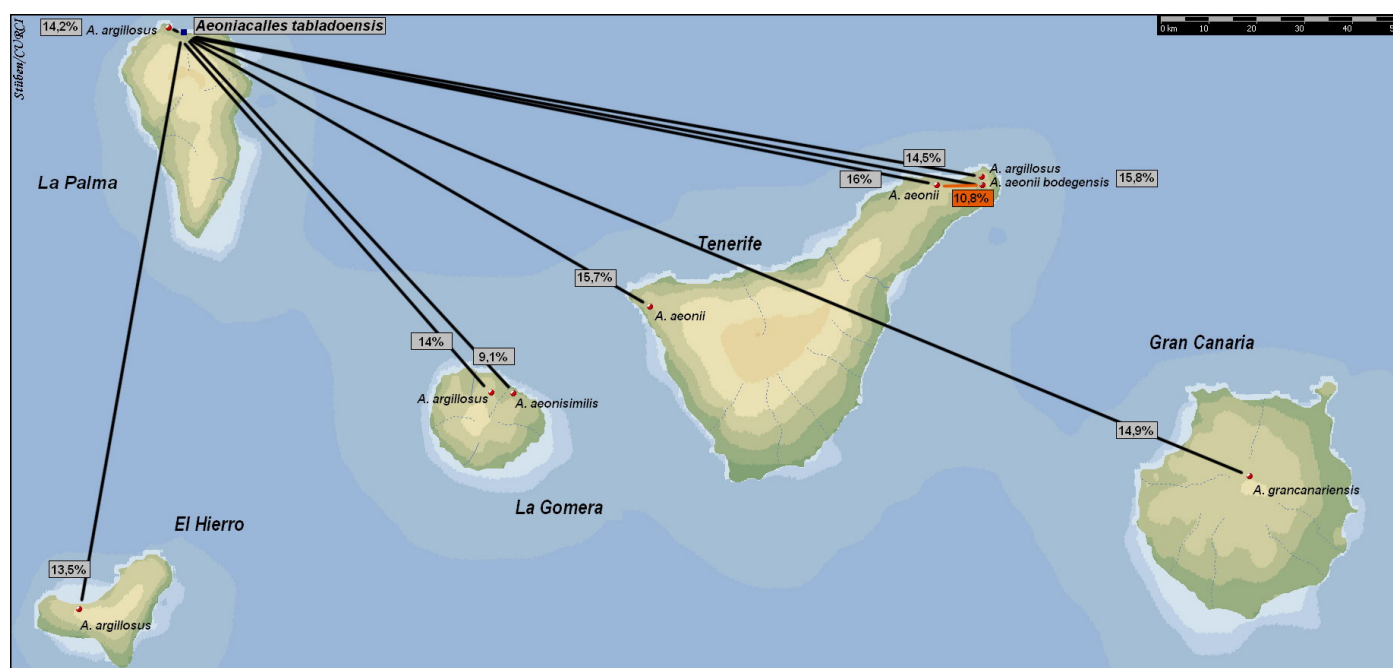


Fig. 10 Distribution of related species of *A. tabladoensis* on the Canarian Islands with values of COI p-distance, expressed in percentage.

It seems, that both species are not reproductively isolated in the strict sense of the biological species concept (E.Mayr). The two populations are closely related, but their distribution could be the result of parapatric speciation –

in this case by a mountain range - or (more probably) the result of a peripatric speciation by forming an isolated peripheral population induced by the adoption of a new host plant. But although genetic drift seems to exist, cross-breeding (hybridisation) "in vitro" of at least three generations took place (Stüben 2005). At this juncture it is justifiable to speak of "developing species" or – in taxonomic terms – of a "subspecies" (despite every objection against using the term "subspecies").

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## Authors

Peter E. Stüben: CURCULIO Institute, Hauweg 62, D-41066 Mönchengladbach, Germany. E-mail: [P.Stueben@curci.de](mailto:P.Stueben@curci.de)

Jonas J. Astrin: Zoologisches Forschungsmuseum A. Koenig (ZFMK), Adenauerallee 160, D-53113 Bonn, Germany. E-mail: [J.Astrin.ZFMK@uni-bonn.de](mailto:J.Astrin.ZFMK@uni-bonn.de)

## Appendix 1

| Taxon                                             | Collecting data                                                                                                                                                               | DNA Voucher                                | CO1 GenBank |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------|
| <i>Aeoniocalles aeonismilis</i> (Stüben 2000)     | SPAIN: Canary Is., La Gomera: El Cedro, 28° 8'19.44"N 17°12'51.53"W, 773m, 6.12.2009, leg. Stüben (12)                                                                        | ZFMK-DNA-JJ1007<br>ZFMK-TIS-cES1007        | JN627854    |
| <i>Aeoniocalles aeonismilis</i> (Stüben 2000)     | SPAIN: Canary Is., La Gomera: El Cedro: Mirador del Bailadero, 28° 7'27"N 17°12'29"W, <i>Aeonium subplanum</i> , 1015m, 9.12.2009, leg. Stüben (23)                           | ZFMK-DNA-JJ1011<br>ZFMK-TIS-cES1011        | JN627855    |
| <i>Aeoniocalles aeonismilis</i> (Stüben 2000)     | SPAIN: Canary Is., La Gomera: NE Taguluche, Lomo del Carretón, <i>A. holochrysum</i> , 28° 9'19"N 17°18'40"W, 551m, 22.2.2010, leg. Stüben (72)                               | ZFMK-DNA-JJ1035<br>ZFMK-TIS-cES1035        | JN627857    |
| <i>Aeoniocalles aeonismilis</i> (Stüben 2000)     | SPAIN: Canary Is., La Gomera: near Tamargada (type loc.), <i>Aeonium subplanum</i> , 28°11'32"N 17°13'54"W, 609m, 26.2.2010, leg. Stüben (77)                                 | ZFMK-DNA-JJ1038<br>ZFMK-TIS-cES1038        | JN627858    |
| <i>Aeoniocalles argillosus</i> (Boheman 1837)     | SPAIN: Canary Is., La Gomera, E Hermigua: El Palmar, thermophilous shrub forest: <i>Kleinia</i> , 28° 9'34"N 17°10'01"W, 411m, 27.1.2010, leg. Stüben (62)                    | ZFMK-DNA-JJ1031<br>ZFMK-TIS-cES1031        | JN627856    |
| <i>Aeoniocalles grancanariensis</i> (Stüben 2000) | SPAIN: Canary Is., Gran Canaria, Las Lagunetas, Barranco de la Mina, 27°59'56"N 15°35'13"W, 1252m, <i>Aeonium undulatum</i> , 10.12.2010, leg., det. Stüben - 24-PST_12GC2011 | ZFMK-DNA-100438106<br>ZFMK-TIS-2D100446911 | JN555593    |
| <i>Aeoniocalles grancanariensis</i> (Stüben 2000) | SPAIN: Canary Is., Gran Canaria, Marzagan: Caldera de Bandama, 28°02'07"N 15°27'36"W, 401m, <i>Aeonium manriqueorum</i> , 23.12.2010, leg., det. Stüben - 6-PST_2GC2011       | ZFMK-DNA-100437972<br>ZFMK-TIS-2D100447041 | JN555592    |

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