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Lowe's *Epilobium gorgoneum* (Onagraceae), reassessment and typification of a long-forgotten name for the flora of the Cabo Verde archipelago

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Summary. During the reassessment of the *Epilobium hirsutum* L. (Onagraceae) species concept in the Cabo Verde archipelago, a critical review of the available literature revealed the name of a species forgotten for over 130 years: *E. gorgoneum* Lowe ex B.D.Jacks. In this study, the status of this endemic species is reassessed, its original description emended, its geographical distribution modified and circumscribed to the islands of Fogo and Santiago. Additionally, a lectotype conforming to the protologue is proposed. The range of *E. hirsutum* in the archipelago is now restricted to the island of Santo Antão. Photographs, a comparative table of the morphological features of these two species, and a distribution map are provided.

Key Words. Africa, endemic, *Index Kewensis*, lectotype, nomenclature.

Introduction

With 187 species, *Epilobium* L. is the largest genus in Onagraceae (Wagner *et al.* 2007). The diversity of this almost cosmopolitan genus (except Antarctica) peaks at the highest latitudes and highest altitudes (Raven 1988). Nevertheless, some species are present in tropical regions, notably in Africa and its adjacent islands where approximately ten species have been recorded (Raven 1967). In the Cabo Verde archipelago, located 500 km from the coast of West Africa in the North Atlantic Ocean, the genus is found in high-altitude areas of the three highest western mountainous islands. Although most recent studies consider *Epilobium hirsutum* L., widespread across Eurasia and Africa, to be the only indigenous representative of the genus in the archipelago (Gonçalves 2002; Sánchez-Pinto *et al.* 2005), there have been varying opinions about the identity of *Epilobium* in Cabo Verde. After a critical literature review, this study attempts to clarify the concept of the genus in this small island territory, particularly by resurrecting a long-forgotten name.

Background

In 1849, Webb was the first to mention an *Epilobium* species in the archipelago, under *Epilobium parviflorum* Schreb., then known only from the collections of T. Vogel and J. da Silva Feijó from the island of Santo Antão (Webb 1849; Gardère *et al.* 2019). Without further collections, this concept was followed by Schmidt (1852). Later, Béguinot (1918) publishing the results of the naturalist L. Fea, reported it as new for the island of Fogo. Chevalier (1935) expanded its distribution to the island of Santiago based on his own specimens. In the first revision of the genus for the archipelago, Fernandes & Fernandes (1957) identified all the collections under *E. hirsutum* var. *villosissimum* Koch, a European variety described for the flora of Germany and Switzerland (Koch 1836). In the revision of the genus for Africa, Raven (1967) also recognised *E. hirsutum* in the archipelago under which he placed *E. hirsutum* var. *villosissimum* as a synonym. Subsequent authors did not support this concept, all retaining *E. parviflorum* on the three islands (Sunding 1973; Erikson *et al.* 1974, 1979) and some also reporting the existence of *E. hirsutum* on Santiago (Erikson *et al.* 1974, 1979). It was not until the treatment of Onagraceae in *Flora de Cabo Verde* (Gonçalves 2002) that a monospecific concept of *E. hirsutum* in the archipelago was reinstated and followed by Sánchez-Pinto *et al.* (2005).

Resurrection of a name

Recent observations made by the author in the field and in Herbaria call into question the monospecific concept for the genus in the archipelago. Indeed, it was observed that the southern populations (i.e. Fogo and Santiago) form a morphologically clearly distinguishable entity from the northern populations (i.e. Santo Antão) of *Epilobium hirsutum* through a series of foliar and fruiting features.

While examining botanical literature with the objective of proposing a new taxon, a name unused for over 130 years, *Epilobium gorgoneum* Lowe ex Hausskn. resurfaced in *Index Kewensis* (Jackson 1895: 852), with an original description exactly matching this thought-to-be new entity. The name is also listed in the IPNI (2024), POWO (2024) and WFO (2024)

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online databases, and is designated in the two latter as "unplaced". The species was succinctly described by Haussknecht (1884) only from the specimens collected by the naturalist R. T. Lowe from the islands of Santo Antão and Fogo, who had labelled it as "*E. gorgoneum*" on his herbarium specimens. Invalidly published because it was considered a synonym of *E. hirsutum* (Haussknecht 1884), this name was then accepted by (Jackson 1895), so the correct author citation should be: *E. gorgoneum* Lowe ex B.D.Jacks.

In this study, the concept of *Epilobium hirsutum* in the archipelago is reduced to the island of Santo Antão. The reassessment of *E. gorgoneum* was carried out by selecting a lectotype that conforms to the original description of the species, along with circumscribing its range to the islands of Fogo and Santiago in the southern part of the archipelago. Furthermore, its description has been emended with a more complete morphological analysis of the plant.

Materials and Methods

This study is essentially based on field observations made by the author during several trips to the Cabo Verde archipelago between 2012 and 2023 and specimens mainly deposited in the Herbaria of LISC, LPA, P and in the Herbarium of Cabo Verde — as yet unreferenced in *Index Herbariorum* (Thiers 2024): CECV (Centro de Estudos Agrários do Ministério do Desenvolvimento Rural) of the Instituto Nacional de Investigação e Desenvolvimento Agrário (INIDA) in São Jorge dos Órgãos, in Santiago (Cabo Verde); supplemented with an analysis of numerous herbarium specimens conserved in BM, COI, FI-Webb, FR, GDOR, K, LISC, O and P. All cited specimens have been seen by the author, except for the specimens from FI and FR, which were examined on scans.

The preliminary conservation status of *Epilobium gorgoneum* was assessed according to the IUCN (2024) *Red List Categories and Criteria*, based on localities from herbarium specimens plus observations made during the fieldwork. The extent of occurrence (EOO) and area of occupancy (AOO) are calculated using the GeoCAT tool (Bachman *et al.* 2011) with a cell area set to 4 km^2 (cell size = 2 × 2 km).

Taxonomic Treatment

Epilobium gorgoneum *Lowe ex B.D.Jacks.* (Jackson 1895: 852). Type: Cabo Verde, Fogo, Monte Nhuco, at the Fonte, 24 March 1864, *Lowe* s.n. (lectotype K! [K000310894], selected here).

Epilobium gorgoneum Lowe ex Haussk. (Haussknecht 1884: 58) **nom. invalid.**

Perennial herb, 0.7–1.5 m tall, subligneous in lower part. *Stem* erect, terete, glabrous to glabrescent proximally, villosulous distally, trichomes 0.25–0.6 mm long, mixed with shorter glandular trichomes 0.1–0.2 mm long. *Leaves* pure green or light green in vivo, very narrowly elliptic to linear, longest slightly falcate, 14–140 × 5–13 mm, length to width ratio 8:1 to 14:1, decussate, sessile; base ± clasping to cuneate; adaxial side glabrous to glabrescent; abaxial side glabrescent to faintly villosulous on the limb, trichomes 0.2–0.35 mm long, villosulous on primary and secondary veins, trichomes 0.2–0.5 mm long, mixed with shorter glandular trichomes 0.1–0.15 mm long; margin serrulate, tooth with basal side retroflexed, apical side concave and glandular structure at the apex, c. 0.5 mm long, shape quite regular and spacing irregular; apex acute to acuminate. *Inflorescence* erect, raceme to panicle. *Bract* narrowly elliptic to narrowly lanceolate, 12–66 × 1–7 mm, slightly clasping to cuneate. *Flower* hermaphrodite, erect, pedicel 4–10 mm long. *Sepals* 4, green in vivo, narrowly triangular, 5–9 × 1.5–2 mm, apiculate, erect and pressed up against the petals; connate at the base and forming a short calyx-tube, 2–2.5 mm diam. and c. 1.5 mm deep; abaxial surface of sepals and calyx-tube villosulous to villose, trichomes 0.2–0.3 mm long, mixed with shorter glandular trichomes 0.1–0.15 mm long; adaxial surface of sepals glabrous. *Petals* 4, rose, white at the base, obovate, 6.5–9.5 × 7–8 mm, margin premorse, apex notched up to 1–1.5 mm, glabrous. *Stamens* 8, in 2 unequal whorls, 4 long + 4 short; anthers 2–2.5 mm long; filaments white, longer c. 5 mm long, shorter 1.5–2 mm, glabrous. *Style* white, 7–8 mm long; stigma tetrafid, deeply lobed, spread-out above the anthers at the anthesis, lobes 1.5–2 mm long. *Capsules* greenish often flushed purple, (43 –) 53–91 mm long, c. 1.5 mm diam., linear, ± tetragonal, villosulous, trichomes 0.3–0.6 mm long, mixed with glandular-puberulent indument. *Seeds* dark brown, elliptic to obovoid, 0.75–1 × 0.3–0.5 mm, base acute, surface papillose, coma white translucent, 2–7 mm long, easily detached (Fig. 1A, C – E).

DISTRIBUTION. Endemic to the Cabo Verde archipelago, found only in the mountainous areas of the two largest southern islands of the archipelago: Fogo and Santiago (Map 1).

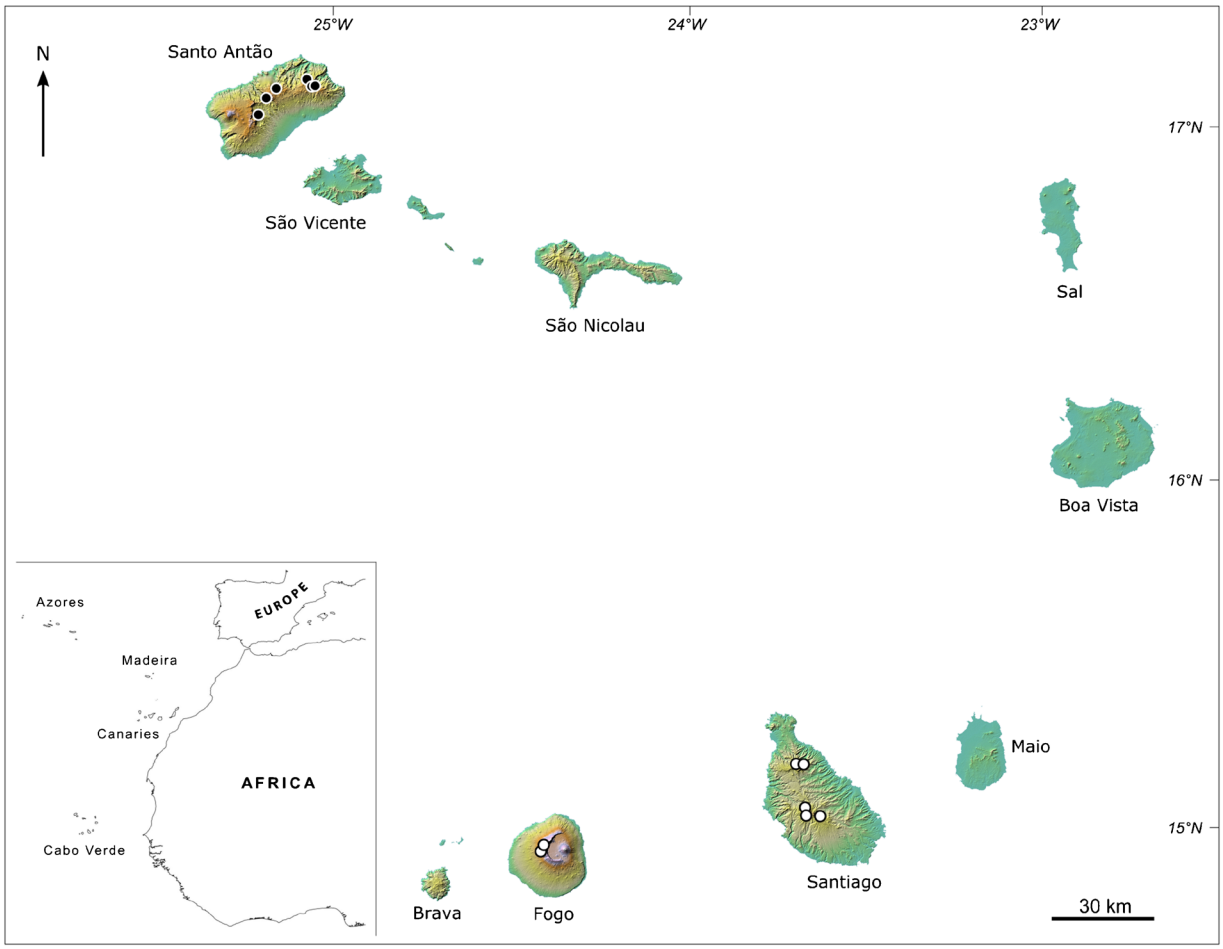
SPECIMENS EXAMINED. CABO VERDE. Fogo: Monte Nhuco, *Lowe* s.n., 24 March 1864 (BM); Chão da Relva, *Lowe* s.n., 15 Feb. 1866 (BM); sulle Chã, 28 April 1898, *Fea* s.n. (GDOR); Chã das Caldeiras, 24 July 1934, *Chevalier* 45017 (P); Fonte Águadinha, 26 March 2018, *Gardère* 1627 (K, LISC, P); Monte Liso da Fonte, 26 March 2018, *Gardère* 1630 (P, CECV). **Santiago:** Ponta da Cruz, Rui Vaz, 15 July 1934, *Chevalier* 44610 (COI, K, P); Fonte da Lapa Preta do Monte do Pico da Antónia, 31 Dec. 1955, *Barbosa* 6154 (COI, LISC); entre Caniche e S. João Batista, 21 March 1961, *Barbosa* 9201 (COI, LISC); Serra Malagueta, 1 Oct. 1979, *Lobin* 809

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Fig. 1. A, C – E *Epilobium gorgoneum*: **A** plant habit; **C** leaves; **D** fruits (capsules); **E** flower. **B, F – H** *E. hirsutum*: **B** plant habit; **F** leaves; **G** fruits (capsules); **H** flower. PHOTOS: M. L. GARDÈRE.

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Map 1. Current distribution map of the genus *Epilobium* in Cabo Verde archipelago: *E. gorgoneum* (white circles) and *E. hirsutum* (black circles).

(COI, FR); Ribeira de Barca, 4 Feb. 1983, *Barbosa, Matos & Silva* 14412 (CECV, LISC); São Jorge dos Órgãos, 9 May 1983, *Barbosa & Silva* 14517 (CECV, LISC); Ribeira Principal, Fonte Tim-Tim, 26 Aug. 2013, *Gardère* 279 (P); Ribeira Principal, Covão Riba, 26 Aug. 2013, *Gardère* 283 (CECV, LISC, P); Ribeira Gongon, 25 Aug. 2016, *Gardère* 1346 (CECV, LISC, LPA, P); Água Grande, 31 Aug. 2016, *Gardère* 1363 (CECV, P); Ribeira Longueira, 27 Oct. 2016, *Gardère* 1431 (CECV, LISC, P). Without locality: s.d. ["1857" date of receipt], *Bocandé* s.n. (FI-Webb).

HABITAT. Rupicolous species restricted to humid areas in high-altitude, at the bottom of valleys (ribeiras), close to springs (fontes), on seeping rocks (chupadeiros), or in narrow ravines alongside indigenous fern species; between 450 and 2300 m a.s.l.

CONSERVATION STATUS. The species is known from 18 herbarium specimens. One collection (*Bocandé* s.n.) was not included in this evaluation due to the absence of locality information for georeferencing. The sites where the species is found are fragile wetlands. Eight occurrences (*Barbosa* 9201, *Barbosa, Matos & Silva* 14412, *Chevalier* 44610, *Chevalier* 45017, *Fea* s.n., *Lobin* 809, *Lowe* s.n. [1866]) including the lectotype (*Lowe* s.n. [1864]), are considered extirpated since field investigations between 2012 to 2023 by the author were unsuccessful in locating *Epilobium gorgoneum* in these areas. The extirpation of these occurrences is probably due to agricultural activity, the introduction of invasive species, and the building of water-retaining devices in the springs and on the seeping rocks. While the first two threats no longer appear to impact other populations today, the building of water-retaining devices is still ongoing. Nine collections plus two author's observations in 2023 on the islands of Santiago (Ribeira Fundão) and Fogo (Fonte Hortelão), representing 11 total occurrences. Five of these are directly threatened

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by human activity, specifically the building of water-retaining devices. The EOO of *E. gorgoneum* is limited to 709.593 km^2 falling within the limits of the Endangered status for criteria B1. Its AOO is 24 km^2, also falling within the limits of Endangered status for criteria B2. The 11 existing occurrences represent 10 "locations" sensu IUCN (2024), with respect to the main threat of habitat destruction, the building of water-retaining devices, falling within the limits of the Vulnerable status according to criteria B. In light of the observed continuous decline of its area of occupancy and occupation, the quality of its habitat, and of the number of localities and mature individuals, status of *E. gorgoneum* is evaluated as Vulnerable (VU) B1ab (i, ii, iii, iv, v) + 2ab (i, ii, iii, iv, v).

PHENOLOGY. Flowers and fruits all year, with the most flowering occurring from November to February, just after the rainy season lasting from August to October.

ETYMOLOGY. The name *gorgoneum* is a reference to the Cabo Verde archipelago. From the ancient Greek "Gorgones" or "Gorgades", an imaginary group of islands in Greek mythology where magical evil creatures called Gorgons lived. In his *Naturalis Historiae*, Pliny the Elder (Jan & Mayhoff 1906: VI.31) placed the islands off the coast of West Africa, which was followed by some geographers and botanists to designate the islands of the Cabo Verde archipelago (Webb 1849; Bolle 1852; Stearn 1992).

NOTES. In his two botanical expeditions to the archipelago in 1864 and 1866 (Lowe 1866), Lowe collected four specimens of *Epilobium*, stored in BM and K: two from the island of Santo Antão in the same locality in Tarrafal (1) in 1864 (K000310893!) and (2) in 1866 (BM014615453!) and two from the island of Fogo, (3) in 1864 in Monte Nhuco (BM014615452!, K000310894!) and (4) in 1866 in Chão da Relva (BM014615454!). All of these specimens were named "*E. gorgoneum* Lowe" (ms.) by Lowe, without any mention other than the collection dates and localities. It seems that only the specimens from K were examined by Haussknecht for which he left a single determinavit in his handwriting, not attached and currently on the specimen K0000310893, indicating "E. hirsutum f. stenophylla micrantha (Haussk.)". From this heterogeneous material, Haussknecht (1884) undertook in a short paragraph in commentary on the treatment of *E. hirsutum*, the laconic description of *E. gorgoneum*. Here is the transcription of the diagnosis: "forma glabrescens viridis longifolia parviflora adenocarpa". However, this name was not validly published by Haussknecht (1884) as he considered it a synonym of *E. hirsutum* (Art. 36.1(b), Turland *et al.* 2018). Several years later, the name was accepted in *Index Kewensis* by Jackson (1895), citing Haussknecht's validating description that had been previously and effectively published (Art. 38.1(a), Turland *et*

Table 1. Comparison of the main characters distinguishing *Epilobium gorgoneum* from *E. hirsutum*. The data provided for *E. hirsutum* is based on the characteristics of Cabo Verdean populations.

Characters	*E. gorgoneum*	*E. hirsutum*
Plant size (m)	0.7–1.5	0.6–1.2
Leaf shape	very narrowly elliptic to linear, longest slightly falciforms	elliptic to narrowly elliptic
Leaf length/width ratio	8:1 to 14:1	3:1 to 6:1
Leaf size (mm)	14–140 × 5–13	14–135 × 5–33
Leaf indumentum of adaxial side	glabrous to glabrescent	villosulous to villous on the limb, denser on main veins
Leaf indumentum of abaxial side	glabrescent to faintly villosulous on the limb, villosulous on main nerves	villosulous to villous on the limb, denser on main nerves
Leaf serration	tooth shape quite regular and spacing irregular	tooth shape and spacing irregular
Tooth of leaf margin, shape and length (mm)	basal side retroflexed, apical side concave, apex with glandular structure, 0.4–0.5	basal side concave, apical side concave, apex with glandular structure, 0.2–0.8
Bract shape	narrowly elliptic to very narrowly elliptic	elliptic to narrowly elliptic
Bract size (mm)	12–66 × 1–7	9–70 × 2–16
Petal size (mm)	6.5–9 × 6.5–7	10–11 × 7–8
Petal apex	erect, margin premorse, notched up to 1–1.5	slightly recurved to recurved, margin entire, notched up to 0.5–1
Petal colour	rose, white at the base	purplish-rose, white at the base
Sepal size (mm)	8–9 × 1.5–2	6–7 × 2
Long/short anther lengths (mm)	7–8/4–4.5	6–7/3–4
Style + stigmatic lobes lengths (mm)	8–9 + 1.5	7.5–9 + 1
Capsule length (mm)	(43 –) 53–91	17–55 (– 63)

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al. 2018). The author citation should be "Lowe ex Jacks." because Jackson (1895) ascribed the name to Lowe, by writing "*gorgoneum* Lowe" (Art. 46.3, Turland *et al.* 2018) but the validating description was unequivocally associated with Haussknecht (1884) (Art. 46.5 and Art. 46 Note 4, Turland *et al.* 2018).

Erroneously reported by Jackson (1895) as from the island of Madeira, according to Haussknecht (1884), the distribution of *Epilobium gorgoneum* covered the islands of Fogo and Santo Antão. In the present study, the *E. gorgoneum* concept is modified by fixing its distribution to the islands of Fogo and Santiago (Map 1) i.e. where the populations that best fit the validating description made by Haussknecht (1884) occur. Indeed, the populations from the south of the archipelago are the only ones that display very narrowly elliptic to linear leaves (ratio from 8:1 to 14:1), glabrous to glabrescent on adaxial side and flowers with petal size of 6.5–9 × 6.5–7 mm. Whereas the populations from the island of Santo Antão, identified here as *E. hirsutum* (Fig. 1B, F – H), display elliptic to narrowly elliptic leaves (ratio from 3:1 to 6:1), villosulous to villous on the adaxial side and flowers with petal size 10–11 × 7–8 mm. In the archipelago, the distribution of *E. hirsutum* is currently limited to this island (Map 1). The main distinctive morphological features between *E. gorgoneum* and *E. hirsutum* are compared above (Table 1). As already pointed out by Haussknecht (1884), *E. gorgoneum* resembles certain forms of *E. hirsutum* (*Epilobium foliosum* Hochst. nom. nud.) found in Ethiopia. However, within the genus, *E. gorgoneum* displays a unique combination of diagnostic morphological features: the size and shape of its leaves, and the size of its fruits.

Therefore, a lectotype of *Epilobium gorgoneum* must be selected. Among the syntypes, the specimen from Santo Antão (K000310893), identified here under *E. hirsutum*, is in conflict with Haussknecht's diagnosis (1884) and is excluded from the retained material. Only the specimen from Fogo in K fits the description and is thus designated here as the lectotype for *E. gorgoneum*. As the specimens in BM do not seem to have been seen by Haussknecht, they are not included among the syntypes. No specimen from BM is considered as a paralectotype nor as an isolectotype. Furthermore, although collected in the same location (Fogo, Monte Nhuco) and on the same date (24 March 1864) as lectotype from K (K000310894), the specimen from BM (BM014615452), identified here as *E. gorgoneum* seems to be from a different collection.

Although *Epilobium gorgoneum* is recorded in IPNI (2024), POWO (2024) and WFO (2024), these online databases do not constitute effective publications (Art. 29.1, Turland *et al.* 2018). Since Jackson (1895), this name has been completely forgotten or ignored in all regional floristic and taxonomic works (Chevalier 1935; Fernandes & Fernandes 1957; Raven 1967; Lobin 1986; Brochmann *et al.* 1997; Gonçalves 2002) and checklists (Sunding 1973; Erikson *et al.* 1974, 1979; Sánchez-Pinto *et al.* 2005). Thanks to field observations and extensive bibliographic research, it is still possible to exhume a long-forgotten name even within a small insular flora yet already well-studied.

In this study, the reassessment of *Epilobium gorgoneum* is exclusively based on morphological characters. Molecular analyses are necessary to confirm its taxonomic status. Due to limited molecular markers, the previous phylogenies of *Epilobium* are poorly resolved, all with sampling restricted to lineages from North America, Eurasia, or Oceania (Baum *et al.* 1994; Rahimi *et al.* 2022; Kundakçi *et al.* 2023). Adding African and Macaronesian species in a new comprehensive phylogenetic analysis will allow for investigating the phylogenetic relationships of *E. gorgoneum* and its close relatives.

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Declarations

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Conflict of Interest The author declares that he has no conflict of interest.

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