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***Vicia voggenreiteriana* (Fabaceae) a new species from the island of La Gomera (Canary Islands)**

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RESUMEN: Se describe e ilustra *Vicia voggenreiteriana* J. Gil, R. Mesa & M.L. Gil (Fabaceae), una nueva especie y endemismo de la isla de La Gomera, islas Canarias, perteneciente al subg. *Cracca* Peterm., sect. *Cracca* Dumort. Se encuentra relacionada y es comparada con *Vicia nataliae* U. Reifenger & A. Reifenger y *Vicia cirrhosa* C. Sm. ex Webb & Berthel., ambas especies endémicas del archipiélago Canario.

Palabras clave: *Cracca*, Taxonomía, Canarias Occidentales, Macaronesia, África.

ABSTRACT: *Vicia voggenreiteriana* J. Gil, R. Mesa & M.L. Gil (Fabaceae), a new species of subg. *Cracca* Peterm., sect. *Cracca* Dumort. is described and illustrated from the island of La Gomera, Canary Islands, north-west of Africa. It is related to and compared with *Vicia nataliae* U. Reifenger & A. Reifenger and *Vicia cirrhosa* C. Sm. ex Webb & Berthel., two endemic species from the Canary Islands.

Key words: *Cracca*, Taxonomy, Western Canaries, Macaronesia, Africa.

INTRODUCTION

The genus *Vicia* L. (Fabaceae) is primarily distributed in the temperate zone of the Northern Hemisphere and non-tropical South America (Gunn, 1979). The number of species recognized in the genus ranges from about 140 accepted by Kupicha (1976), up to 180-210 estimated by Hanelt & Mettin (1989).

Until now, 10 species were considered to be endemic on Macaronesian Archipelagos: *Vicia dennesiana* H.C. Watson – already estimated extinct – from the Azores (Silva *et al.*, 2010); *Vicia capreolata* Lowe, *Vicia costae* Hansen and *Vicia ferreirensis* Goyder from Madeira (Hansen & Sunding, 1993; Goyder, 1994; Jardim & Menezes de Sequeira, 2008); *Vicia chaetocalyx* Webb & Berthel., *Vicia cirrhosa* C. Sm. *ex* Webb & Berthel., *Vicia filicaulis* Webb & Berthel., *Vicia nataliae* U. Reifemberger & A. Reifemberger, *Vicia scandens* R.P. Murray and *Vicia vulcanorum* J.Gil & M.L. Gil from the Canaries (Acebes Ginovés *et al.*, 2010; Gil *et al.*, 2012).

During the field work in the island of La Gomera for the ‘Seguimiento de Poblaciones de Especies Amenazadas (SEGA)’ project, a sample of seeds of *Vicia* were collected in the spring of 2010 by R. Mesa in the cliffs of La Galga, Alajeró (Fig. 1), where is confined a relict population of the Canarian endemic species *Dorycnium eriophthalmum* Webb & Berthel. (Mesa, 2010). In order to preserve them for further studies, these seeds were stored in the Seed Reference Collection of the University of Las Palmas de Gran Canaria (ULP/SRC).



Fig. 1.- General view of type locality of *Vicia voggenreiteriana*. In the background, the cliffs of La Galga and Palochirme on whose foothills the new species has been discovered. Foreground, *Phoenix canariensis*.



Fig. 2.- Ventral view of seeds from: **a.** *Vicia voggenreiteriana* [ULP/SRC-618]; **b.** *Vicia scandens* [ULP/SRC-611]; **c.** *Vicia vulcanorum* [ULP/SRC-614]; **d.** *Vicia nataliae* [ULP/SRC-617]; **e.** *Vicia cirrhosa* [ULP/SRC-609] & **f.** *Vicia filicaulis* [TFMC/PV-6471]. Scale bar: 1 mm.

In the last decades seed characters have been evaluated in *Vicia* for identification purposes and several keys for determination of the species have been proposed, mainly on a regional basis (Gunn, 1971; Perrino *et al.*, 1984; Chernoff *et al.*, 1992). Because of this, during the preparatory work for the description of *V. vulcanorum* external seed characteristics of all available accessions of the genus *Vicia* in the ULP/SRF were studied following Lersten & Gunn (1982).

Features of the seeds from the cliffs of La Galga, in La Gomera, were very different from those exhibited by the seeds of the endemic *V. cirrhosa*, *V. filicaulis*, *V. nataliae*, *V. scandens* and *V. vulcanorum* itself (Fig. 2). Those related to seed shape and length, hylum shape and lens distance to hylum were exceptional.

In order to evaluate the stability of such intriguing characters, seeds removed from the original collection were sowed in the island of Lanzarote under very different edaphoclimatic conditions. Plants resulting not only retained the special characteristics of the seeds but also showed floral and vegetative characters different from the other Canarian endemic species of the genus *Vicia*.

Both, plants from *ex horto* as those from the *locus classicus* were checked in the herbaria FI, ORT, TFC and TFMC, and against 'A Manual Flora of Madeira' (Lowe, 1868), 'Flora of Madeira' (Goyder, 1994), 'Flora Iberica' (Romero Zarco, 1999), 'Nouvelle Flore de l'Algérie' (Quezel & Santa 1962), 'Flora of Lybia' (Jafri, 1980), 'Flora of Egypt' (Boulos, 1999) and 'Flora Palaestina' (Zohary, 1987). Endemic *Vicia* from Morocco, belonging to subgenus *Cracca* were carefully studied on the basis of their original descriptions, digitalized specimens provided by the herbaria of Universitat de Barcelona (BCN), Muséum National d'Histoire Naturelle (P) and Université Montpellier 2 (MPU) and 'Monographie et Iconographie du Genre *Vicia* L. au Maroc (Raynaud, 1976).

As result of this work we concluded that the specimens collected in La Gomera represent a new species.

It is rather probable that due to its short-life cycle, aptitude to blend with the environment and confinement to inaccessible and unstable cliffs, this new species of *Vicia* has not been noted until now despite the intense botanical research carried out across the island in the past decades (Kunkel, 1977; Santos & Fernández, 1979; Voggenreiter, 1997). However, the new taxon may have been overlooked by previous collectors, who confused it with *V. cirrhosa*.

Only a small population of this new species has been found so far, totaling less than 10 individuals. It is not far away from inhabited nucleus and shepherding areas, but the main threat to this plant is the collapse of unstable cliff faces after heavy downpours.

MATERIAL AND METHODS

All morphological data presented and used in the description of the new species were directly observed by the authors. Morphological characters traditionally used in the description of *Vicia* species were evaluated following 'Flora Iberica' (Romero Zarco, 1999) and Lersten & Gunn (1982); in order to determine their stability seeds gathered at the classical locus of the new species were sowed under very different edaphoclimatic conditions. Features of gross morphology were examined under a binocular stereoscopic microscope and stylar features with a transmitted light microscope. The measurements were made with a Mitutoyo slide caliper. The new species was compared with *V. nataliae* and *V. cirrhosa*.

RESULTS

Vicia voggenreiteriana J. Gil, R. Mesa & M.L. Gil, **sp. nova** (Fig. 3-5).

Annual herb, intricately branched, slightly pilous. Stems angled, slender, numerous, to 2.25 m or more high, climbing. Leaves subglabrous, parapinnate, 36-55 mm long (excluding the tendril), with (3-) 4 pairs of alternate, remote leaflets, with branched (usually bi- or trifid) or simple (rare) twining tendrils; Leaflets 18-42 mm long, 1.9-3.1 mm wide, linear to linear-lanceolate, mostly apiculate, petiolulated (to *ca.* 1 mm), petiolule pilous. Stipules quite visible from the early stages of growth, semi-sagittate, cuspidate. Racemes (2-) 5-8 (-10)-flowered, usually aristate, shorter than the leaves, rare \pm equalling the leaves, peduncles to 50 mm long, sparsely pilous. Flowers slightly pendent, 14.3-14.5 mm long; pedicels pilous, *ca.* 2.5 mm long at anthesis, provided with minute (*ca.* 0.5 mm), subulate, deciduous bractlets. Calyx sparsely pilous at base, *ca.* 3.7 mm. long, turbinate to campanulate, slightly compressed, scarcely gibbous at base, weakly zygomorphic, with fine unequal teeth; the two upper minute, acuminate, their points singularly curving upwards; intermediate and lowest elongate-triangular, essentially equal, about half as long as the tube or less, the later narrower, nearly subulate, acute. Corolla glabrous, *ca.* 4 times as long as calyx, mostly white, rose-purple tinged; standard 12-13.4 mm long, pandurate with the limb curving upwards, deeply emarginated with indigo veins; wings a little longer than standard, 12.7-13.5 mm long, lamina oblong, deeply auriculate at base, claw very slender, nearly filiform, a little shorter than lamina; keel shorter than wings, 9.1-10.5 mm long, lamina *ca.* 2 times shorter than claw, dark purple at the apex, the latest minutely apiculate. Androecial sheath oblique at apex. Style abaxially bent at anthesis, laterally compressed, with encircling spreading hairs beneath the stigma, shorter and scattered on the adaxial surface. Legume stipitate (*ca.* 2 mm), glabrous, not flattened, turning red with dark red pigmented suture while maturing in full sunlight, straw colored when ripe, 45-52.7 (-54.1) mm long, 4.5-5.4 (-5.6) mm wide, 3.1-3.6 mm thick, oblong, cuneate at base, oblique at apex, twisting loosely during



Fig. 3.- Habit of *Vicia voggenreiteriana* [ex horto El Huerto, Villa de Teguis, Lanzarote, Canary Islands, 12.II.2013, J. Gil 6873 and Dupl. (TFMC/PV)]. Scale bar: 10 cm.

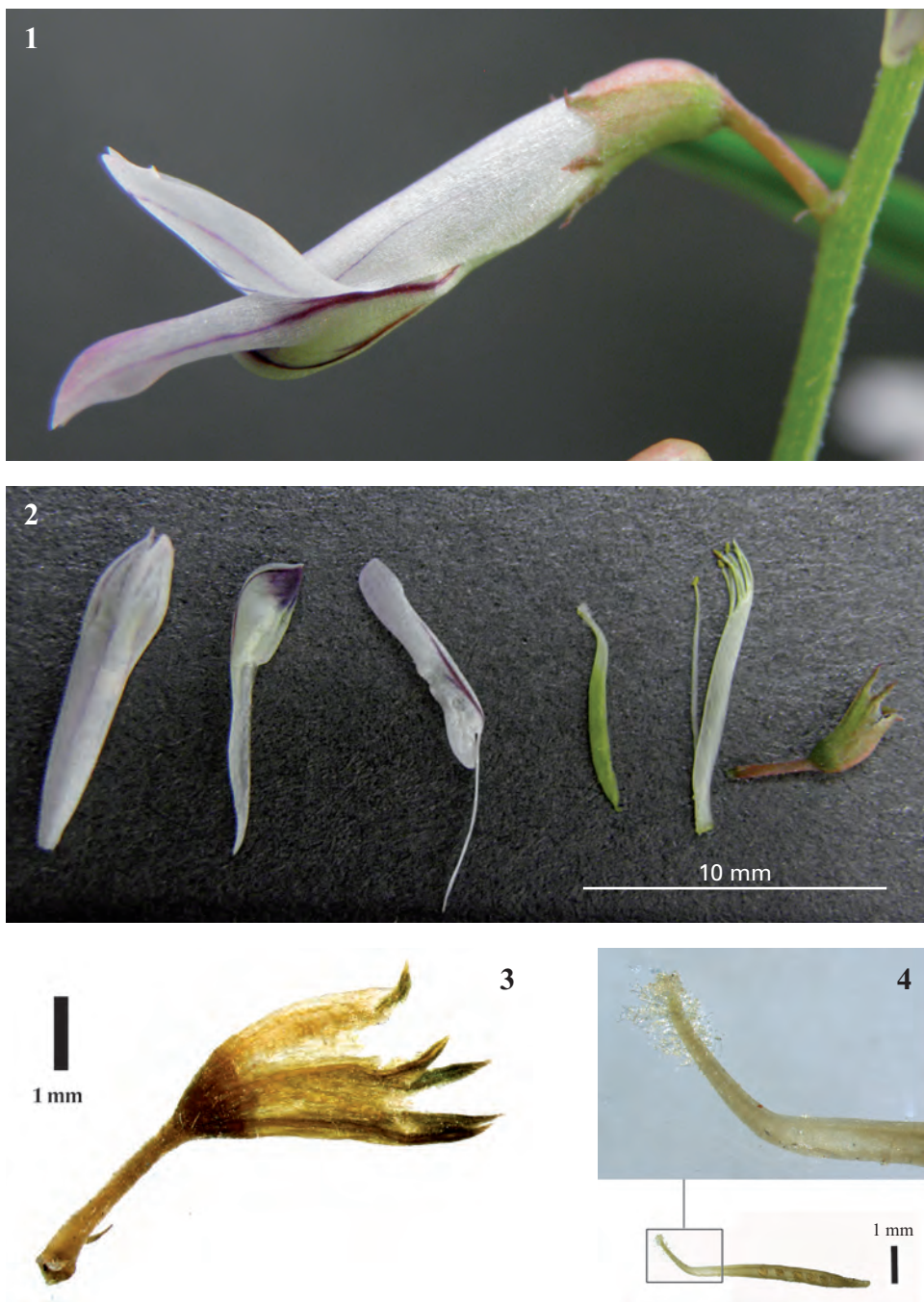


Fig. 4.- Floral features in *Vicia voggenreiteriana*. **1.** Fresh flower in the field. **2.** Detailed floral dissection on fresh flower **3.** Dry Calyx. **4.** Dry Style.



Fig. 5.- Legume characteristics in *Vicia voggenreiteriana* **1.** Fresh legume in the field showing the red outer surface of the valves and the deeply pigmented suture. **2.** Inner surface of the valves and immature seeds.

dehiscence, with (3-) 4-6 seeds, not compressed with each other. Seeds (sub)rhombohedral, smooth, grey and ivory marble and densely mottled with black dots and spots, 3.9-5.5 (-6) mm long, 2.7-3.4 mm wide, 2-2.7 mm thick; hilum linear (5 to 8 times longer than wide), slightly wedge shaped, 1.8-2.5 long, extending 1/5-1/7 of the seed circumference, with nearly parallel margins and a discolored area surrounding it; lens inconspicuous, with raised center about (1-) 1.1-1.8 mm from hilum.

Type: Canary Islands, La Gomera, Alajeró, Barranco de Guarimiar, spreading over *Dorycnium eriophthalmum* Webb & Berthel., 630 m, 27.IV.2013 R. Mesa Coello, C. Hernández Montañez & M.L. Gil González 6872 (holotype:TFMC/PV).

Paratypes: Canary Islands, Lanzarote, Teguiise, *ex horto* El Huerto, 12.II.2013, J. Gil 6873 and Dupl. (TFMC/PV).

DISCUSSION

V. voggenreiteriana is endemic to La Gomera island, in the central part of the Canary Islands (Fig. 6). The Canary archipelago is located off the north-western coast of Africa and it is included in the biogeographical region of Macaronesia. *V. voggenreiteriana* occurs at the base of cliffs of the western margin of Barranco de Guarimiar in the south of the island, ca. 630 m a.s.l.

V. voggenreiteriana shares habitat with rupicolous and transition scrubs vinculated to Canarian thermophile forest and hygrophilous species characteristics of canals, ditches, waterways and seeps. Associated species include *Ageratina adenophora* (Spreng.) R. M. King & H. Rob., *Asparagus plocamoides* Webb ex Svent., *Atalanthus canariensis* (Boulos) A. Hansen & Sunding, *Aeonium subplanum* Praeger, *Bituminaria bituminosa* (L.) C. H. Stirt., *Convolvulus floridus* L. f., *Crambe gomerae* Webb ex Christ, *Cuscuta planiflora* Ten., *Dorycnium eriophthalmum* Webb & Berthel., *Kleinia neriifolia* Haw., *Micromeria lepida* Webb & Berthel., *Scirpus holoschoenus* L. and *Sonchus* cf. *hierrensis* (Pit.) Boulos.

It has been observed growing inside the structure of *Dorycnium eriophthalmum*, spreading over the branches of *Kleinia neriifolia* together with *Cuscuta planiflora*.

Flowers and fruits were observed in February-May.

The new species was named *Vicia voggenreiteriana* on account of the late Dr. Volker Voggenreiter [1941-2002], a German botanist who devoted much of his professional life to study the vegetation of the Canary Islands, specially Tenerife and La Gomera.

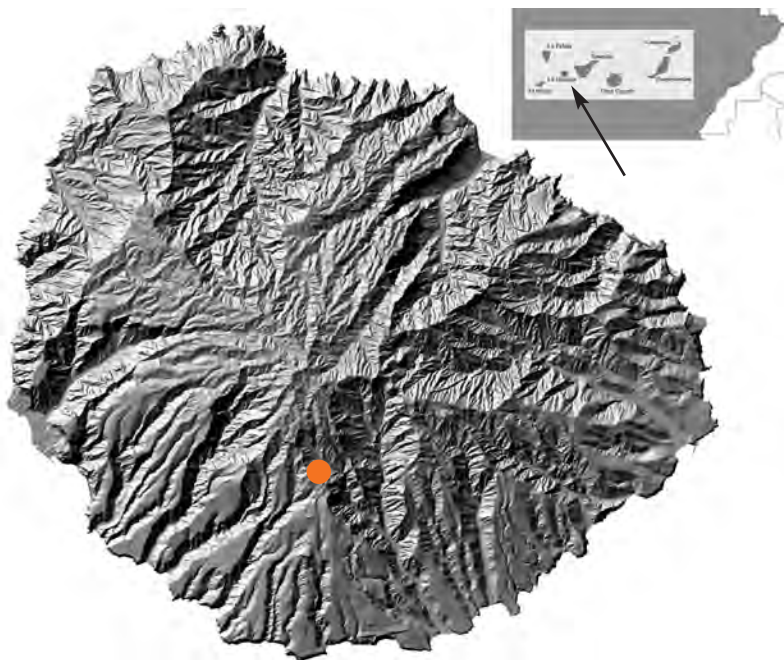


Fig. 6.- Map showing the small area in the south of La Gomera where *Vicia voggenreiteriana* occurs.

Similar species

V. voggenreiteriana belongs to subg. *Cracca* Peterm., sect. *Cracca* Dumort., and it is characterized by having a platynychioid vexillum and the style laterally compressed and evenly hairy all round. The most similar species are: *V. nataliae*, an endemic from the island of La Gomera (Canary Islands), which has flowers with more gibbous and campanulate calyces, obtuse and shorter leaflets and shorter seeds provided with wider hylums and more prominent lens; *V. cirrhosa* from the western Canary Islands of La Gomera, El Hierro, La Palma, Tenerife & Gran Canaria, which has smaller stipules, peduncles usually longer than the subtending leaf (sometimes twice as long or more) and longer and thinner pods containing more and smaller seeds provided with shorter hylums. Table 1 summarizes the characters differentiating these three species and Figure 6 illustrates their seed features.

Additional specimens examined

—*Vicia capreolata* Lowe: Archipelago of Madeira, Madeira, Pico Grande, 06.VI.1837, *Lemann 049858* (FI/Herbarium Webbianum). —*Vicia cirrhosa* C. Sm., ex Webb & Berthel.: Canary Islands, Tenerife, Granadilla, Las Vegas, 11.IV.1978, *R. Mesa Coello 562* (GIL); Canary Islands, Tenerife, Güímar, El Escobonal, Barranco Chimaje, 600 m a.s.l., 19.III.1986, *R. Mesa Coello 560* (GIL); Canary Islands, Tenerife, Arico, Las Eras, 17.III.1988, *R. Mesa Coello 609* (ULP/SRC); Canary Islands, Tenerife, Arico, Barranco de

Characters	<i>V. voggenreiteriana</i>	<i>V. nataliae</i>	<i>V. cirrhosa</i>
Number of leaflet pairs per leaf	(3-)4	4	(2-)4
Leaflet apex shape (mostly...)	apiculate	obtuse	apiculate
Leaflet length (mm) measured in the fertile part of stem (max.)	-42	-18	-32
Number of flowers in a raceme	(4-) 6-8 (-10)	8-18	(1-) 7-14 (-18)
Legume length (mm)	45-52.7 (-54.1)	40-50	(33-) 39-53
Legume width (mm)	4.5-5.4 (-5.6)	5	2.9-4.3
Number of seeds per pod	(3-) 4-6	7-9	8-12
Seed shape	(sub)rhombohedral	compressed ellipsoid	(sub)cuboidal / subovoidal
Seed length (mm)	3.95-5.5 (-6)	3-3.5	1.8-3.3
Hylum shape	linear	oblong	oblong / cuneiform
Hylum length (mm)	1.8-2.5	1.7-2.1	0.6-1.3
Hilum length relative to the length of the seed circumference	1/6-1/7	1/5	1/7-1/10
Lens distance to hylum (mm)	(1-) 1.1-1.8	0.5-0.7	0.5-0.9

Table 1.- Comparison between *Vicia voggenreiteriana* and its most closely related endemic *Vicia* from Canary Islands Archipelago.



Fig. 7.- Ventral, lateral and zenithal views of seeds from: **a.** *Vicia voggenreiteriana* [TFMC/PV-6872]; **b.** *Vicia nataliae* [ULP/SRC-621]; **c.** *Vicia cirrhosa* [ULP/SRC-620]. Scale bar: 1 mm.

Tamadaya, 1400 m a.s.l., 13.IV.1990, *R. Mesa Coello 2870* (TFMC/PV); Canary Islands, Tenerife, Güímar, La Medida, Barranco del Calvario, 24.II.1991, *R. Mesa Coello 2911* (TFMC/PV); Canary Islands, Tenerife, Arico, Barranco de Icor, 3.III.1991, *R. Mesa Coello 3064* (TFMC/PV); Canary Islands, Isle of Tenerife, Güímar, Barranco Arriba, 4.II.1993, *R. Mesa Coello 6622* (TFMC/PV); Canary Islands, Tenerife, Granadilla, Malpaís de Chimiche, 150 m a.s.l., 4.IV.1993, *R. Mesa Coello 561* (GIL); Canary Islands, Tenerife, Fasnía, Barranco del Volcán, 22.I.1994, *R. Mesa Coello 6597* (TFMC/PV); Canary Islands, Tenerife, Los Silos, Montaña de Taco, 23.V.1995, *V. Lucía Sauquillo 39422* (TFC/PV); Canary Islands, Tenerife, Güímar, sobre el Barranco del Agua, 28.XI.1998, *A. Díaz & J.A. Reyes-Betancort 42604* (TFC); Canary Islands, Tenerife, Adeje, al sur de Las Moraditas, 350 m a.s.l., 13.II.2002, *J.A. Reyes-Betancort, S. García Ávila & M.V. Cabrera Lacalzada 49912* (TFC); Canary Islands, Tenerife, Güímar, Barranco al Sur de los túneles de Güímar, 27.III.2010, *R. Mesa Coello 548* (GIL); Canary Islands, Tenerife, Adeje, Roque Bento, 19.II.2011, *R. Mesa Coello 877479* (BC); Canary Islands, Tenerife, Arico, Barranco de Vijigua, 400 m a.s.l., 8.III.2011, *R. Mesa Coello 913549* (BC); Canary Islands, Tenerife, Adeje, Tijoco Alto, 23.III.2011, *J. Gil et al. 877437* (BC); Canary Islands, Tenerife, Arico, Barranco de la Magdalena, 8-10.IV.2011, *R. Mesa Coello 918152* (BC); Canary Islands, Tenerife, Arico, Barranco del Río, 630 m a.s.l., 19.IV.2012, *R. Mesa Coello 550 + Dupl.* (GIL); Canary Islands, Tenerife, Barranco de Erques, c. 450 m a.s.l., 08.II.2013, *S.J. Lamdin-Whymark 987* (GIL); Canary Islands, Tenerife, Adeje, Taucho, La Quinta, c. 1000-1100 m a.s.l., 23.II.2013, *S.J. Lamdin-Whymark 989* (GIL); Canary Islands, Tenerife, Guía de Isora, Barranco de Guairía, ca. 1000 m a.s.l., 25.II.2013, *S.J. Lamdin-Whymark 988* (GIL); Canary Islands, Tenerife, Güímar, Punta Prieta, 10.III.2013, *M.L. Gil 555 + Dupl.* (GIL); Canary Islands, Tenerife, Arico, Barranco de Alonso, 27.IV.2013, *R. Barone & F. Hernández 6814* (TFMC/PV); Canary Islands, Tenerife, Arico, Barranco de Bijagua o de los Abejones, 28.III.2013, *R. Barone & F. Hernández 6816* (TFMC/PV); Canary Islands, Tenerife, Adeje, Barranco del Infierno, 20.V.2013, *R. Mesa Coello 620* (ULP/SRC). ***Vicia dennesiana* H.C. Watson:** Archipelago of Azores, St. Michael, ??.184?, *T.C. Hunt 049940* (FI/Herbarium Webbianum).—***Vicia ferreirensis* Goyder:** Archipelago of Madeira, Porto Santo, Pico de Ana Ferreira, ?IV.1940, *Costa 2523* (MADM); Archipelago of Madeira, Porto Santo, Pico de Ana Ferreira, 100 m a.s.l., 19.III.2007, *L. Medina et al. 757844* (MA). — ***Vicia filicaulis* Webb & Berthel:** Canary Islands, Gran Canaria, La Aldea de San Nicolás, Barranco de La Aldea, 250 m a.s.l., 21.IV.1990, *R. Mesa Coello 2717* (TFMC/PV); Canary Islands, Gran Canaria, Ayagaures, 19.V.2010, *R. Mesa Coello 6471* (TFMC/PV); Canary Islands, Gran Canaria, Barranco Arguineguín, 450 m a.s.l., 19.V.2010, *R. Mesa Coello 913551* (BC). — ***Vicia nataliae* U. Reifenberger & A. Reifenberger:** Canary Islands, La Gomera, Lomo de La Culata, 350 m a.s.l., 11.II.1996, *U. Reifenberger & A. Reifenberger 41356* (holo: TFC); Canary Islands, La Gomera, Agulo, Camino Real Agulo-Las Rosas, 29/III/1996, *R. Mesa Coello & J.P. Oval 553* (GIL); Canary Islands, La Gomera, Vallehermoso, Lomo de La Culata, 11.II.1996, *U. Reifenberger & A. Reifenberger 621* (ULP/SRC); Canary Islands, La Gomera, Agulo, Túnel de Agulo, 27.III.2002, *R. Mesa Coello & J.P. Oval 620* (ULP/SRC). — ***Vicia scandens* R.P. Murray:** Canary Islands, Tenerife, Güímar, Fuga Cuatro Reales, Cabeceras del Barranco de Badajoz, 1050-1100 m a.s.l., 16.V.1981, *W. Wildpret, P. L. Pérez & M. Del Arco 1440* (TFMC/PV); Canary Islands, Tenerife, La Orotava, Aguamansa, 10.VI.1990, *M.L. Gil &*

M.M. Rivas 559 (GIL); Canary Islands, Tenerife, Santa Úrsula, 24.VIII.1993, *R. Mesa Coello 611* (ULP/SRC). — *Vicia vulcanorum* **J. Gil & M.L. Gil**: Canary Islands, Lanzarote, Haría, Malpaís de La Corona, 27.IV.2011, *J. Gil 6430, 6431, 6432* (TFMC/PV); Canary Islands, Lanzarote, Haría, Malpaís de La Corona, primavera de 2011, *J. Gil & M. Peña 614* (ULP/SRC); *ex horto* Centro de Agrodiversidad de La Palma, Buenavista, Breña Alta, La Palma, Canary Islands, 24.II.2012, *M.L. Gil 913552* (BC); *ex horto* Centro de Agrodiversidad de La Palma, Buenavista, Breña Alta, La Palma, Canary Islands, 13.III.2012, *J. Gil 6469* (TFMC/PV); Canary Islands, Lanzarote, Haría, Malpaís de La Corona, 03.II.2013, *J. Gil & M.L. Gil 50876* (TFC).

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REFERENCES

- ACEBES GINOVÉS, J. R.; LEÓN ARENCIBIA, M. C.; RODRÍGUEZ NAVARRO, M. L.; ARCO AGUILAR, M. del; GARCÍA GALLO, A.; PÉREZ DE PAZ, P. L.; RODRÍGUEZ DELGADO, O.; MARTÍN OSORIO, V. E. & WILDPRET DE LA TORRE, W. 2010. Spermatophyta. In: Arechavaleta, M.; RODRÍGUEZ, S; ZURITA, N. & GARCÍA, A. (Eds.), *Lista de especies silvestres de Canarias. Hongos, plantas y animales terrestres*. 2009. Gobierno de Canarias: 122-172.
- BOULOS, L. 1999. *Flora of Egypt* 1. Azollaceae-Oxalidaceae. Al-Hadara Publishing. Cairo.
- CHERNOFF, M.; PLITMANN, U. & KISLEV, M.E. 1992. Seed characters and testa texture in species of the Viciae: their taxonomic significance. *Israel Journal of Botany* 41: 167-186.
- GIL, J.; GIL, M.L.; MORALES, J. B. & MESA, R. 2012. *Vicia vulcanorum* (Fabaceae) a new species from the island of Lanzarote (Canary Islands). *Collectanea Botanica* 31:19-27.
- GOYDER, D. A. 1994. *Vicia* L. In: Press, J. R. & Short, M. J. (Eds.), *Flora of Madeira*. The Natural History Museum, London: 162-167.
- GUNN, Ch. R. 1971. Seeds of native and naturalized vetches of North America. *USDA Agriculture Handbook* 392. 42 pp.
- GUNN, Ch. R. 1979. Genus *Vicia* with notes about tribe Viciae (Fabaceae) in Mexico and Central America. *USDA Technical Bulletin* 1601. 41 pp.

- HANELT, P. & METTIN, D. 1989. Biosystematics of the genus *Vicia* L. (Leguminosae). *Ann. Rev. Ecol. System.* 20:199-223.
- JAFRI, S. M. H. 1980. Fabaceae. In: Jafri, B. M. H. & El-Gadi, A. (Eds.), *Flora of Lybia* 86. Al-Faateh University, Tripoli: 1-304.
- HANSEN, A. & SUNDING, P. 1993. Flora of Macaronesia. Checklist of vascular plants. 4th. revised edition. *Sommerfeltia* 17: 1-295.
- JARDIM, R. & MENEZES DE SEQUEIRA, M. 2008. List of vascular plants (Pteridophyta & Spermatophyta). In: Borges, P. A. V.; Abreu, C.; Aguiar, A. M. F.; Carvalho, P.; Jardim, R.; Melo, I.; Oliveira, P.; Sérgio, C.; Serrano, A. R. M. & Vieira, P. (Eds.), *A list of the terrestrial fungi, flora and fauna of Madeira and Selvagens archipelagos*. Direcção Regional do Ambiente da Madeira and Universidade dos Açores, Funchal and Angra do Heroísmo: 179-208.
- KUNKEL, G. 1977. Inventario florístico de la laurisilva de La Gomera, Islas Canarias. *Naturalia Hispanica* 7, ICONA, Madrid, 137 pp.
- KUPICHA, F. K. 1976. The infrageneric structure of *Vicia*. *Notes Roy. Bot. Gard. Edinb.* 34(3): 287-326.
- LERSTEN, N. R. & Gunn, Ch. R. 1982. Testa characters in tribe Vicieae, with notes about tribes Abreae, Cicereae, and Trifolieae (Fabaceae). *USDA Technical Bulletin* 1667. 40 pp.
- LOWE, RH. T. (1868). A Manual Flora of Madeira. Vol. 1. London. 618 pp.
- MESA, R. (2010). *Dorycnium eriophthalmum* Webb & Berthel. Seguimiento de poblaciones de especies amenazadas. Viceconsejería de Medio Ambiente. Consejería de Medio Ambiente y Ordenación Territorial. Gobierno de Canarias. 50 pp. Documento inédito.
- PERRINO, P.; YARWOD, M.; HANELT, P. & POLIGNANO, G.B. (1984). Variation of seed characters in selected *Vicia* species. *Kulturpflanze* 32: 103-122.
- QUEZEL, P. & SANTA, S. (1962). *Nouvelle flore de l'Algérie et des régions désertiques méridionales*. Tome 1. Editions du Centre National de la Recherche Scientifique.
- RAYNAUD, Chr. 1976. Monographie et iconographie du genre *Vicia* L. au Maroc. *Bul. Inst. Sci.* 1: 147-172.
- ROMERO ZARCO, C. 1999. *Vicia* L. In: Talavera, S.; Aedo, C.; Castroviejo, S.; Romero Zarco, C.; Sáez, L.; Salgueiro, F. J. & Velayos, M. (Eds.), *Flora ibérica* VII (I). Real Jardín Botánico, Madrid: 360-416.
- SANTOS, A. & FERNÁNDEZ, M. (1979). Plantae in loco natali ab Eric R. Sventenius inter annos MCMXLIII-MCMLXXI, lectae, in Herbario ORT Instituto Nationalis Investigationum Agrarium (Hortus Acclimationis Plantarum Arautapae) sunt III. Plantae Canariae: Spermatophyta (Ranunculaceae-Leguminosae) *Index Sem. Hort. Acclim. Plant. Arautapae*. Cat. INIA n° 11: 67-140. Puerto de la Cruz. Tenerife (1978).
- SILVA, L.; MOURA, M.; SCHAEFER, H.; RUMSEY, F. & DIAS, E. F. 2010. List of Vascular Plants. In: Borges, P. A. V.; Costa, A.; Cunha, R.; Gabriel, R.; Gonçalves, V.; Martins, A. F.; Melo I.; Parente, M.; Raposeiro, P.; Rodrigues, P.; Santos, R.S.; Silva, L.; Vieira, P. & Vieira, V. (Eds.), *A list of the terrestrial and marine biota from the Azores*. Príncipe, Parede: 117-146.
- VOGGENREITER, V. 1997. Contribuciones al atlas fitocorológico UTM 1 km x 1 km de La Gomera (Islas Canarias). Bonn. Xeroxed manuscript.
- ZOHARY, M. (1987). *Flora Palaestina* 2. Platanaceae-Umbelliferae. The Israel Academy of Sciences and Humanities. Jerusalem.