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Typification of five names in the tribe Antirrhineae (Plantaginaceae)

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Abstract. The typification of five names in tribe Antirrhineae (Plantaginaceae): *Antirrhinum crassifolium* (≡ *Chaenorhinum crassifolium*), *Chaenorhinum crassifolium* var. *parviflorum, C. flexuosum* var. *hispanicum* (≡ *C. crassifolium* subsp. *cadevallii*), *C. formenterae*, and *Linaria serpyllifolia* (≡ *C. serpyllifolium*) is discussed. The names are lectotypified using specimens from MA, LAU, COI, LY, and C, respectively.

Keywords. *Antirrhinum*, *Chaenorhinum*, lectotype, *Linaria*, nomenclature, original material.

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Introduction

Plantaginaceae tribe Antirrhineae as revised by Sutton (1988) comprises about 30 genera that have undergone significant taxonomic changes in recent years. The members of the genus *Chaenorhinum* (DC.) Rchb. have previously been recognized at sectional rank under *Linaria* (Chavannes, 1833; Boissier, 1879) but are currently treated as belonging to a distinct genus with three sections: *Chaenorhinum* sect. *Chaenorhinum*, sect. *Microrrhinum* (Endl.) D.A. Sutton, and sect. *Hueblia* (Speta) D.A. Sutton (see Sutton, 1988). The species of *Chaenorhinum* are mostly native to Turkey and the Mediterranean region.

The tribe Antirrhineae has been taxonomically revised for the "Flora iberica" (Benedí & Güemes, 2009), but the types of many names remain unclear. Some of them have recently been typified (Ferrer-Gallego *et al*., 2013, 2018, 2021; Fernández-Mazuecos *et al*., 2018; Ferrer-Gallego & Güemes, 2020; Ferrer-Gallego, 2021; Ferrer-Gallego & Fabado, 2021). Following these works, five more names in the genus *Chaenorhinum* are typified in this paper.

Chaenorhinum crassifolium (Cav.) Lange is a morphologically variable species distributed in S and E Spain and the Balearic Islands (Benedí & Güemes, 2009). Local populations have been recognized at various taxonomic ranks by different authors (Lange in Willkomm & Lange, 1870; Font Quer, 1921). *Chaenorhinum serpyllifolium* (Lange) Lange s.l. (incl. subsp. *lusitanicum* R. Fern.) is a species endemic to central Spain and SW Portugal. According to Lange (1863), *C. serpyllifolium* is an intermediate species between *C. origanifolium* (L.) Kostel. and *C. rubrifolium* (Robill. & Castagne ex DC.) Fourr. The study of the morphology of *C. crassifolium* and *C. serpyllifolium* has been published by Sutton (1988) and Benedí & Güemes (2009). *Chaenorhinum formenterae* Gand. is an annual species that have been associated within *C. rubrifolium* (Fernandes, 1971; Sutton, 1988), although it is now accepted as a separate taxon (Benedí, 1991; Benedí & Güemes, 2009). The study of the morphology of *C. crassifolium*, *C. formenterae* and *C. serpyllifolium* has been published by Sutton (1988), Benedí (1991) and Benedí & Güemes (2009). However, from the nomenclatural point of view, these names are untypified and are here examined.

The purpose of this paper is to contribute to the stability of the nomenclature by the typification of the names: *Antirrhinum crassifolium* (currently accepted as *Chaenorhinum crassifolium*), *Chaenorhinum crassifolium* var. *parviflorum* (currently a synonym of *C. crassifolium*), *C. flexuosum* var. *hispanicum* (currently treated as *C. crassifolium* subsp. *cadevallii*), *C. formenterae*, and *Linaria serpyllifolia* (currently as *Chaenorhinum serpyllifolium*).

Materials and Methods

This work is based on the analysis of the respective protologues, the examination of relevant literature and on the study of the specimens conserved in several

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herbaria: BM, C, COI, K, LAU, MA (acronyms are according to Thiers 2022 [continuously updated]). In typifying names of taxa, we strictly followed the International Code of Nomenclature for algae, fungi, and plants, ICN onwards (Turland *et al*., 2018). The identity of the designated types has been verified with the current use of their respective names. The names are arranged in chronological order, the homotypic synonyms are indicated with the symbol ≡, the heterotypic synonyms are indicated with the symbol =. Currently accepted names are set in bold italics typeface.

Results and Discussion

Antirrhinum crassifolium

The protologue of *Antirrhinum crassifolium* includes a brief diagnosis under the number "123", "ANTIRRHINUM foliis oppositis, ovatis, crassiusculis, limbo reflexo: floribus laxe spicatis: fauce pervia", followed by two synonyms "Orontium saxatile thymifolio, flore rubella" from Barrelier (1714: [illustration] 1313 "Orontium Saxat. thyme fol. flore rubella") and "Antirrhinum saxatile, foliis serpilli" from Bauhin (1623: 212), a complete description followed by the provenance "Habitat passim in montibus Sagunti, Saetabis, Sucronis, Valldignae, et Enguerae"; a comment, "Floret tota aestate"; an excellent illustration of this plant and its explanation, and a relevant note "Obs. Inter Barrelierii Orontia quae ad Antirrhinum reduxit Linnaeus quatuor notantur designata tabulis 598, 1102, 1103, 1313, quae in unum hic coniunxit, nominavitque *Antirrhinum origanifolium*, addens plantam esse polymorpham, variantem foliis ovatis et lanceolatis, atque fortasse filiam Antirrhini minoris. An huius celeberrimi Botanici probandae semper sunt et opinions et coniecturae, quando de pantis praesertim agitur in Hispania crescentibus, quae foliis discrepare videntur nunc crassis glabris ovatis limboque revoluto, nunc lanceolatis et glutinosis?" (Cavanilles, 1793: 11–12, tab. 114).

The drawing included in the protologue (Cavanilles, 1793: tab. 114) illustrates a complete plant, with leaves, flowers and fruits, including several details of the flowers and seeds. Cavanilles's excellent illustration is part of the original material of *A. crassifolium* and matches with the traditional concept of the name. Furthermore, the illustration published by Barrelier (1714: ic. 1313) (image available at https://bibdigital.rjb.csic.es/viewer/10708/?offset=1#page=492&viewer=picture&o=bookmark&n=0&q=) cited in the protologue also constitutes original material used by Cavanilles to describe his species.

Sutton (1988: 103) mentioned the "type" of *A. crassifolium* as "Type: Spain: "*Antirrhinum crassifolium* S. Spain", 1803 *Cavanilles s.n.* (iso. BM!)". According this indication, this material is therefore post-protologue and cannot be treated as original material.

In the herbarium of the Royal Botanic Garden of Madrid at MA there is a sheet of this species (with barcode MA 111001) that is part of the original material (Figure 1). The sheet MA 111001 bears several (9–10) plants, with leaves, flowers, and fruits, and several labels. An original label handwritten by Cavanilles is annotated as "Antirrhinum crassifolium. flore / albo / Sta Ana de la Llosa aprili 1792". The sheet also bears two labels with the same information that the Cavanilles's label (Figure 1). This specimen is undoubtedly original material (see Ferrer-Gallego & Guara, 2011), the collection date "1792" and the provenance annotated in the original label handwritten by Cavanilles "Sta Ana de la Llosa" [La Llosa de Ranes, Xátiva, Valencia] matches with the locality cited in the protologue as "Saetabis" (Saetabi Augustanorum).

Garilleti (1993: 193) stated that the specimen MA 111001 was "Material tipo" [type material], which might be taken as a designation of type. However, Garilleti (1993) stated in the introduction to his work that his aim was to study the Cavanilles Herbarium and not to designate types. He wrote: "Nuestro objetivo ha sido estudiar el herbario de A.J. Cavanilles, en ningún caso se ha concretado una lectotipificación de sus táxones" [Our aim was to study the herbarium of A.J. Cavanilles, in no case has materialized a lectotypification of his taxa] (Garilleti, 1993: 5). Inadvertent lectotypifications were permitted and common before 2011, usually when a specimen mistakenly believed to be a holotype was by that statement accidentally designated as a lectotype (ICN Art. 9 Ex. 11). However, Garilleti's work is unusual in bearing an explicit statement that the work was to contain no lectotypifications. Further, "type material", as opposed to "type specimen," could refer to one or multiple syntypes or original material, so does not indicate that a single specimen mentioned was considered to be the type. Therefore, subsequent authorities have interpreted his mentions of "type material" as not constituting effective typifications (e.g., Knapp, 2007; Buira *et al*., 2015; Iamonico & Valdés, 2017; Ferrer-Gallego *et al*., 2018). Because similar mentions were made for over 1000 taxa, if those were to be interpreted as unintended typifications, it would be very disruptive to nomenclature. Therefore, we follow established practice in considering that no effective designation of type has been made.

In conclusion, the original material of *Antirrhinum crassifolium* includes the herbarium sheet with barcode MA 111001 and the illustrations published by Cavanilles, (1793: tab. 114) and Barrelier (1714: ic. 1313), which have equal priority for purposes of typification. Therefore, the specimen MA 111001 is designated here as the lectotype of the name *A. crassifolium*. This specimen is the best and most complete and informative material, which matches with the traditional concept and current use of the name (see e.g., Sutton 1988; Bolòs & Vigo, 1996; Benedí & Güemes, 2009).

Antirrhinum crassifolium Cav., Icon. 2: 11, tab. 114. 1793

≡ ***Chaenorhinum crassifolium*** (Cav.) Lange, Prodr. Fl. Hispan. 2: 579. 1870

≡ *Chaenorhinum origanifolium* subsp. *crassifolium* (Cav.) Rivas Goday & Borja in Anales Inst. Bot. Cavanilles 19: 451. 1961

Figure 1. Lectotype of *Chaenorhinum crassifolium* (Cav.) Lange, MA (barcode MA 111001) (Photograph courtesy of Herbarium MA; reproduced with permission).

≡ *Linaria origanifolia* subsp. *crassifolia* (Cav.) O. Bolòs & Vigo in Mem. Real Acad. Ci. Barcelona ser. 3, 38: 8. 1967

Lectotype (designated here): Spain, Santa Ana de la Llosa [La Llosa de Ranes, Xátiva, Valencia], April 1792, *Cavanilles s.n.*, MA (barcode MA 111001) (Figure 1).

Chaenorhinum crassifolium var. *parviflorum* Lange

In the protologue of *Chaenorhinum crassifolium* β [var.] *parviflorum* was included an unpublished name "*Linaria saetabensis* Leresche" and a brief description of the plant: "β. parviflorum! (Linaria saetabensis Leresche mscr. in sched. pl. exs.!) corolla parvula, pallice carnea v. lutescens, striis violaceis".

According to Sutton (1988: 103): "The reference to the name by Lange (1870) [var. *parviflorum*] apparently derives from a specimen at C (SPAIN: 14-15 vi 1862 Leresche s.n. (C, microfiche IDC-2204/115/2!)".

As indicated by the curator of herbarium C, Olof Ryding, on May 12, 2022, a microfiche is preserved in this herbarium in which an image of a sheet of this species appears that belongs to a Leresche collection. The image shows abundant material and three labels, one of them original from Leresche: "L. Leresche. Voyage in Spain in 1862 /Herb. John Lange / Linaria Saetabensis mihi / In rupibus calcareis / San Felipe de Jativa. Collines, July 14-15, 1862. / June". In addition, the sheet bears another label from the Lange herbarium. Also, on the sheet is written "L. crassifolia Cav."

This is the specimen Sutton is referring to, but unfortunately, this material is not currently in Herbarium C (Olof Ryding, pers. comm.) or at least it has not been possible to locate it within the collection. Nor does it appear in the material loan records that this fold has been sent out of Herbarium C for study. Unfortunately, this specimen, which is undoubtedly the best candidate to be designated the lectotype, cannot be selected for that purpose.

Fortunately, our search for duplicates of specimen C that correspond to the same collection by Louis Leresche has allowed us to discover the existence of two specimens preserved at LAU herbarium, one of them relevant. The sheet LAU 0123305 bears material of *C. crassifolium* var. *parviflorum* (six very well preserved and very complete plants, with leaves, flowers and fruits), and two labels: "Herbier du Musée de Lausanne (Suisse) / Collection léguée par Louis Leresche (1808–1885)", and "L. Leresche. Voyage en Espagne en 1862 / Linaria / Collines calcaires audessus de la ville / San Felipe de Jativa. Collines, 14-15 juillet 1862 / Juin" (Figure 2). This specimen is a duplicate of the one preserved at C, and a good candidate to be selected as the lectotype.

On the other hand, another specimen of this species was collected by Leresche and is preserved at LAU. This sheet, LAU 0123304, bears a complete and well preserved plant, and two labels: "Herbier du Musée de Lausanne (Suisse) / Collection léguée par Louis Leresche (1808–1885)", and "Côte orientale d'Espagne. Herborizations en juin 1881, par MM. Emile Burnat et L. Leresche. / Linaria Saetabensis. Leresche / Chaenorrhinum crassifolium / β parviflorum. Lge in / Willk et Lge fl. Hisp. 2. p. / 580 / San Felipe de Jativa. / rochers et vieux murs de la / citadelle / 17 Juin / Leresche". However, this material was a post-1870 addition to the collection and, as a consequence, is neither part of the original material of the name nor eligible to serve as lectotype.

In conclusion, among the candidate elements, specimens at LAU and C, we designate as lectotype of the name *Chaenorhinum crassifolium* var. *parviflorum* the specimen preserved at LAU, with LAU 0123305. This specimen is the most complete and informative original material available, and it matches well with the current usage and concept of the name as a synonym of *Chaenorhinum crassifolium* (Cav.) Lange.

Chaenorhinum crassifolium β [var.] *parviflorum* Lange in Willk. & Lange, Prodr. Fl. Hisp. 2: 580. 1870

"Valent. (in rupibus calcareis ad S. Felipe de Jativa, Leresche!)"

Lectotype (designated here): Spain, Xàtiva (Alicante province), San Felipe, 14-15 June 1862, *Leresche s.n.* (LAU, 2-code LAU 0123305) (Figure 2); **isolectotype**: C perhaps missing? (an image of the sheet is available at: microfiche IDC-2204/115/2).

= ***Chaenorhinum crassifolium*** (Cav.) Lange, Prodr. Fl. Hispan. 2: 579. 1870

Chaenorhinum flexuosum var. *hispanicum* Lange

Lange (1870: 580) published the name *Chaenorhinum flexuosum* β. [var.] *hispanicum* followed by a complete description and diagnosis in Latin, and the provenance and two gatherings "In rupibus, raro hucusqne in Hispania inventum: Catal. Montserrat (Costas de Garraf) Csta.! (nomine L. origanifoliae in hb. Wk.!, forma superne villosa), Arag. (Aranda del Conde, Calavia in hb. Wk.!) (forma fere omnino glabra). ♃ Maj.-Jun. (v.s.)".

Bolòs (1967: 8) indicated "*Linaria origanifolia* (L.) DC. subsp. *cadevallii* O. Bolòs et J. Vigo, nom. nov. = *Chaenorrhinum flexuosum* (Desf.) Lange var. *hispanicum* Lange in Willkomm et Lange, Prodromus florae hispanicae II: 580, Stuttgart 1870 = "*Linaria flexuosa*" Cadevall et auct. catal. p. max. p., non Desf.", and therefore created a new name based from the combination published by Lange.

Sutton (1988: 102) mentioned two probable original specimens as type: "Types: Spain: *Barcelona*; Cataluña, Montserrat, Costas de Garraf *Csta*. (syn. COI?): *Zaragoza*?; Aragon, Aranda del Conde *Calavia* (syn. COI?)". According to Sutton, the material that Lange consulted was originally part of Willkomm's herbarium and is probably at COI.

We have found three relevant specimens in the Willkomm herbarium at COI, with barcodes COI 00042434, COI 00042435, and COI 00042444. The specimens COI 00042434 and COI 00042435 are mounted on a single herbarium sheet. In the upper half are two plants, both with leaves and an abundant number of flowers. This material is accompanied by a label with

Figure 2. Lectotype of *Chaenorhinum crassifolium* β [var.] *parviflorum* Lange, LAU (2-D code LAU 0123305) (Photograph courtesy of Herbarium LAU; reproduced with permission).

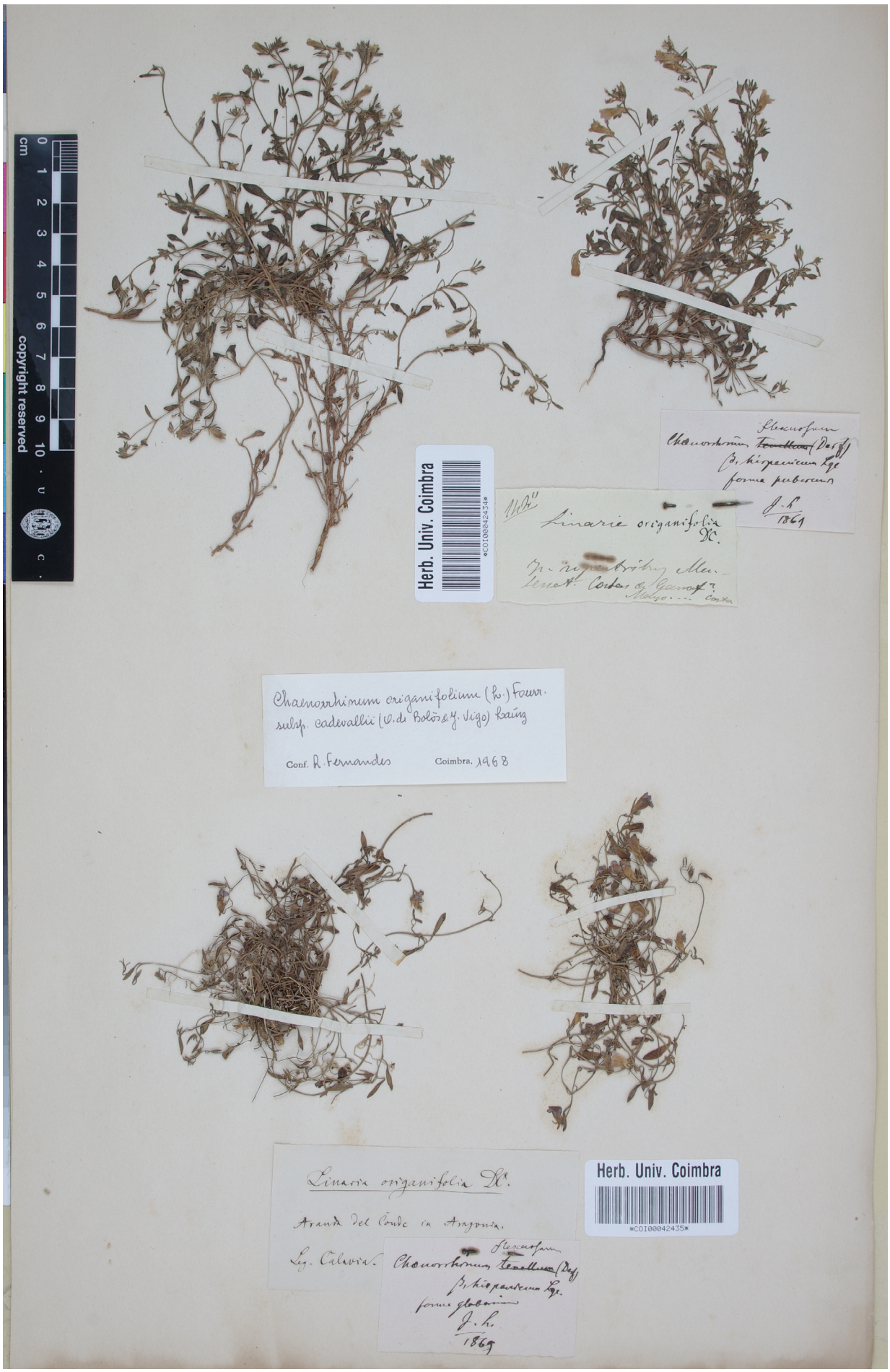

Figure 3. Lectotype of *Chaenorhinum crassifolium* subsp. *cadevallii* (O. Bolòs & Vigo) Güemes, COI (barcode COI 00042434) (Photograph courtesy of Herbarium COI; reproduced with permission).

Figure 4. Lectotype of *Chaenorhinum formenterae* Gand., LY (barcode LY 0813681), the lectotype is the plant mounted on the far right of the sheet, the largest of all (Photograph courtesy of Herbarium LY; reproduced with permission).

the herbarium barcode COI 00042434 and two labels, one handwriting by A.C. Costa and Willkomm, and annotated as: "Linaria (m. Costa) origanifolia DC. (m. Willkomm) / In rupestribus Mon / serrat. Costas de Garraf? / Mayo... Costa (m. Costa)". The other one label is handwriting by J. Lange: "Chaenorrhinum tenellum flexuosum (Desf.) / ß hispanicum Lge / forma pubescens / J.L / 1861" (Figure 3). In the middle of the sheet there is a handwriting revision label: "Chaenorrhinum origanifolium (L.) Fourr. / subsp. cadevallii (O. de Bolòs & Vigo) Laínz / Conf. R. Fernandes Coimbra, 1968". In the lower half of the herbarium sheet there are two other plants, with several leaves and flowers, accompanied by two handwritten labels: "Linaria origanifolia DC. / Aranda del Conde in Aragonia / Leg. Calavia.", handwriting by M. Willkomm, and the other one label handwritten by J. Lange: "Chaenorrhinum tenellum flexuosum (Desf.) / ß hispanicum Lge. / forma glaberrima / J.L / 1869" (Figure 3). Both specimens can be considered as original material.

On the other hand, the specimen with barcode COI00042444 belong to the same collection that the specimen COI 00042435. The sheet bears a single plant accompanied by a label handwritten by M. Willkomm: "Linaria crassifolia Kze. / Aranda del Conde in Aragonia / Leg. Calavia, 1863" (image available at https://coicatalogue.uc.pt/index.php?t=results_specimen&q=COI00042444&orderby=relevance&orderdirection=DESC&size=10&page=0).

This material belongs to two different gatherings mentioned by Lange in the protologue, and therefore these three specimens can be treated as syntypes. In all cases the material matches with the traditional and current use of the name *C. crassifolium* subsp. *cadevallii* (e.g., Sutton 1988, Bolòs & Vigo, 1996; Benedí & Güemes, 2009). We selected the specimen barcoded COI 00042434 as the lectotype of the name because it is the most complete and informative material.

≡ *Chaenorhinum flexuosum* β [var.] *hispanicum* Lange in Willk. & Lange, Prodr. Fl. Hispan. 2: 580. 1870 [syn. subst.]

"In rupibus, raro hucusqne in Hispania inventum: Catal. Montserrat (Costas de Garraf) Csta.! (nomine L. origanifoliae in hb. Wk.!, forma superne villosa), Arag. (Aranda del Conde, Calavia in hb. Wk.!) (forma fere omnino glabra)"

≡ *Linaria langei* Nyman, Consp. Fl. Eur. 3: 541. 1881 [nom. nov.]

≡ *Linaria origanifolia* subsp. *cadevallii* O. Bolòs & Vigo in Mem. Real Acad. Ci. Artes Barcelona ser. 3, 38(1): 8. 1967 [nom. nov.]

≡ *Chaenorhinum origanifolium* subsp. *cadevallii* (O. Bolòs & Vigo) M. Laínz, Aport. Fl. Gallega 6: 27. 1968

≡ *Linaria cadevallii* (O. Bolòs & Vigo) Masclans & Batalla in Collect. Bot. (Barcelona) *8: 93. 1972*

≡ *Chaenorhinum cadevallii* (O. Bolòs & Vigo) Holub, Preslia 45(4): 359. 1973

≡ *Chaenorhinum langei* (Nyman) Holub in Folia Geobot. Phytotax. 11(1): 82. 1976

≡ ***Chaenorhinum crassifolium*** subsp. ***cadevallii*** (O. Bolòs & Vigo) Güemes in Castrov. & al. (eds.), Fl. Iber. 13: 175. 2009

Lectotype (designated here): Spain, "In rupestribus Monserrat [Montserrat]. Costas de Garraf?", Mayo, *Costa 144*, COI (barcode COI 00042434) (Figure 3)

Note: *Linaria langei* Nyman (≡ *Chaenorhinum langei* (Nyman) Holub) is based on the same type material that *C. flexuosum* var. *hispanicum*. Nyman indicated "71. L. Langei nob. Chaenorrh. flexuosum β hispanicum Lge. in Wk. Lge II. 580. – Catal. (Montserrat). Arrag. (r.).". Therefore, if the taxon is recognized as species rank (see e.g., Nyman, 1881; Mascláns & Batalla, 1972) the correct combination within *Chaenorhinum* is *C. langei* (Nyman) Holub.

Chaenorhinum formenterae Gandoger

Gandoger's protologue for *Chaenorhinum formenterae* includes a diagnosis: "Facies C. rubrifolii cui accedit, sed ab eo facile secernitur caule nano (3–5 cent. alto), apice thyrsum parvum confertum subsphaericum […], followed by the provenance: "Hab. copiose in dunis maritimis ad "La Sabina" et ad salinas versus lagunam interiorem", which is in Formentera, Balearic Islands, Spain (Gandoger 1900: 140). The protologue also includes a comment "Plantam hanc pulchellam cum speciminibus *C. rubrifolii* ab ipsissimo Castagne Massiliae die 7 maii 1813 lectis et in herbario meo asservatis sedulo comparavi" [I compared this beautiful plant with specimens of *C. rubrifolii* from Castagne at Marseilles on May 7, 1813, and carefully kept them in my herbarium].

Benedí (1991: 103) mentioned that the type material is probably preserved at LY herbarium, but he did not see it. Michel Gandoger (1850–1926) was a French botanist, and his herbarium is currently kept at LY with duplicates in many herbaria (Stafleu & Cowan, 1976). Rosselló & Sáez (2000) did not locate original material of *Chaenorhinum formenterae*. Fortunately, we have found an original specimen for this name at LY. In this herbarium there is a sheet with two barcodes, LY 0813680 and LY 0813681, and two handwritten labels. A label is associated with the barcode LY 0813680, and the handwritten by Gandoger is associated with the barcode LY 0813681 (Figure 4). The sheet bears five complete and well-developed plants, with leaves, flowers, and fruits.

The handwritten label by Gandoger is annotated as: "M. Gandoger - Flora Hispanica Exsiccata / Chaenorrhinum rubrifolium Rob. Cast. / Insulae Baleares: Formentera, La Sabina: in / arenosis maritimis. / Legi: 3 maii 1899 / M. Gandoger, Arnas, Rhône, par Villefranche: France.". The second one label associated with the barcode LY 0813680 is annotated as: "Formentera / S. Francisco, La Sabina / 4.5.98".

Unfortunately, these five plants are not identified as belonging to either of these two labels, so it is not possible to know if the material belongs to the 1899 or 1898 collection. However, since these two collections

Figure 5. Isolectotype of *Chaenorhinum serpyllifolium* (Lange) Lange, C (barcode C 10018912) (Photograph courtesy of Herbarium C; reproduced with permission).

Figure 6. Lectotype of *Chaenorhinum serpyllifolium* (Lange) Lange, C (barcode C 10018910) (Photograph courtesy of Herbarium C; reproduced with permission).

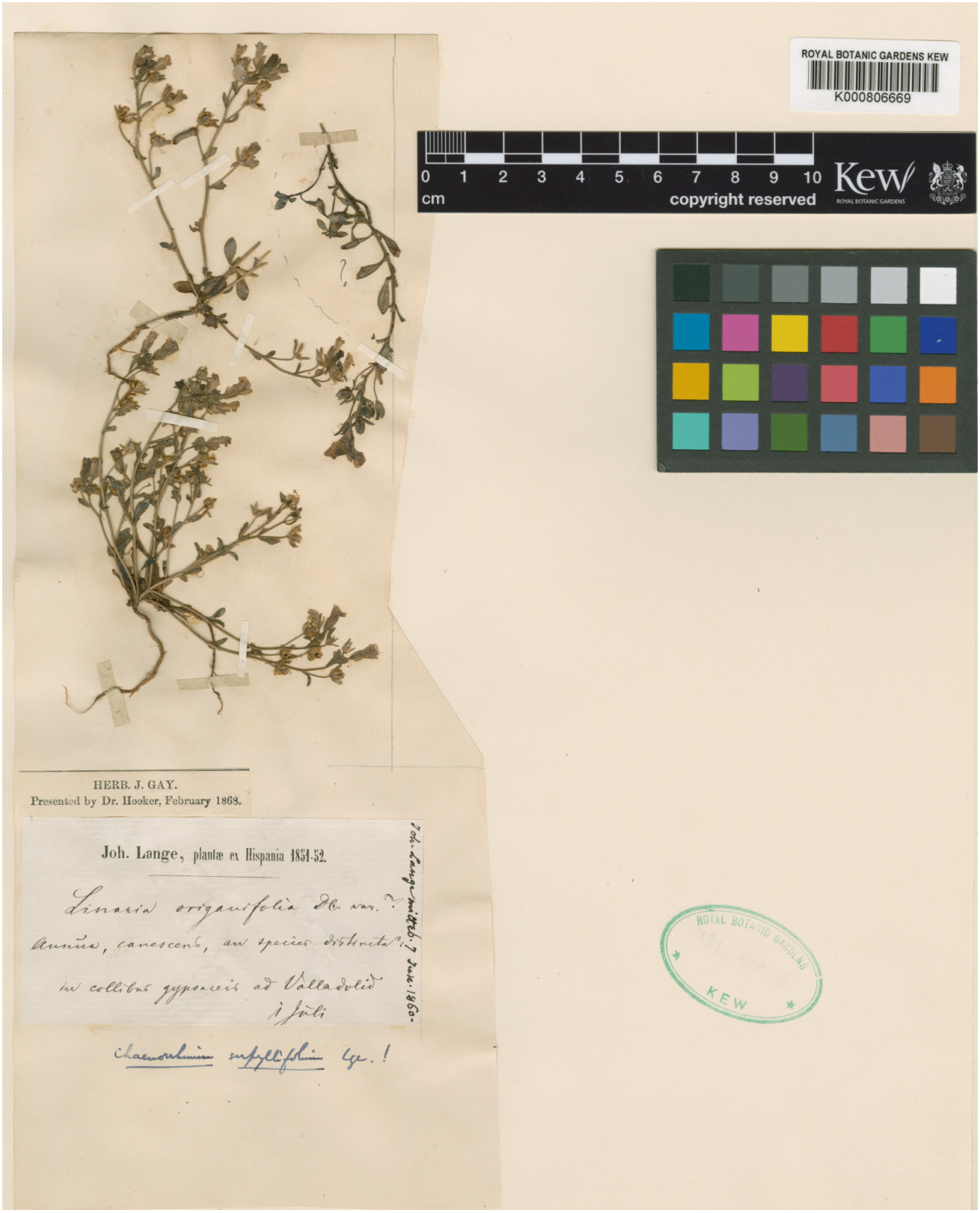

Figure 7. Original material of *Chaenorhinum serpyllifolium* (Lange) Lange, K (barcode K 000806669) (Photograph courtesy of Herbarium K; reproduced with permission).

predate the protologue and come from the locality cited by Gandoger in the protologue, and no collector or date is cited in the protologue, all the material can be considered original. However, to avoid possible errors in the designation of the lectotype due to a possible mixture between the plants with regard to their collection date, we restrict the lectotype of the name *Chaenorhinum formenterae* to the plant mounted on the far right of the sheet, the largest of all (with basal leaves, flowers, and fruits), which probably belongs to the gathering barcoded as LY 0813681. This specimen clearly represents the traditional concept and current usage of the name (Sutton, 1988; Bolòs & Vigo, 1996; Benedí & Güemes, 2009).

Chaenorhinum formenterae Gand. in Bull. Soc. Bot. France 47: 140. 1900

"Hab. copiose in dunis maritimis ad "La Sabina" et ad salinas versus lagunam interiorem"

≡ *Chaenorhinum rubrifolium* subsp. *formenterae* (Gand.) R. Fern. in Bot. J. Linn. Soc. 64: 227. 1971

≡ *Linaria rubrifolia* subsp. *formenterae* (Gand.) O. Bolòs & Vigo in Collect. Bot. (Barcelona) 14: 97. 1983

Lectotype (designated here): Spain, Balearic Islands, Formentera, La Sabina, in arenosis maritimis, 3 May 1899, *M. Gandoger s.n.* (LY, barcode LY 0813681) [the lectotype is the plant mounted on the far right of the sheet, the largest of all] (Figure 4).

Linaria serpyllifolia **Lange**

Lange (1863: 39) published the name *Linaria serpyllifolia through* a complete description and diagnosis. The protologue also includes two gatherings, indicated as: "In campis arenosis ad Encinillas (Oct.), in collibus gypsaceis ad Valladolid, 1 Jul. c. fl. et fr.!".

Sutton (1988: 111) mentioned as type: "Typus: Spain: *Burgos*; In campis arenosis ad Encinillas, 18.x.1852 *Lange s.n.* (syn. C, microfiche IDC 2204/115/34!): *Valladolid*; in collibus gypsaceis ad Valladolid, 1 vii 1852 *Lange s.n.* (syn. C, microfiche IDC 2204/115/3-4!, isosyn.? K!).". Effectively, this material, specimens preserved at C and K herbaria, are syntypes because Lange mentioned these two gatherings in the protologue. However, in the lectotype designation, a single specimen must be designated from these syntypes.

There are several specimens belonging to the two gathering cited by Lange in the protologue. In the herbarium of Lange at C there are two herbarium sheets that contain two syntypes. A sheet bears the specimens with barcodes C 10018912 and C 10018913, the specimen C 10018912 (identified with the number "1" annotated at the top) is a complete plant (with leaves and flowers) and is annotated "1. Encinillas in campis arenosis 18/10/52". The specimen C 10018913 (identified with the number "2" annotated at the top) is also a complete plant (with leaves and flowers) and is annotated "2. Valladolid in coll. calcar. 1/7/52" (Figure 5). The second sheet at C contains also two specimens, with barcodes C10018910 and C10018911. The specimen C 10018910 bears two complete plants (with leaves and flowers) and is identified with the number "1", and annotated on the label handwritten by Lange "1. In campis arenosis ad Encinillas / (prov. Burgos) 18 Oct. 1852" (Figure 6). The specimen C 10018911 are three complete and well-developed plants, is identified with the number "2" and annotated on the label handwritten by Lange as "2. In collibus gypsaceis ad Valladolid / 1 Jul. 1852".

On the other hand, there is a sheet at K that bears also original material, with barcode K 000806669. This sheet bears two complete plants, with leaves and flowers, and an original label handwritten by Lange "Joh. Lange, plantae ex Hispania 1851-52. [printed] / Linaria origanifolia DC. var.? / annua, canescens, an species distincta? / in collibus gypsaceis ad Valladolid / 1 Juli" (Figure 7). We have been unable to locate any further original material.

In conclusion, among the candidate specimens syntypes (C 10018910, C 10018911, C 10018912, C 10018913, and K 000806669), we designate the specimen C 10018910 as the lectotype of *Linaria serpyllifolia*. This material is the most complete and informative original material available and it matches with the traditional concept and current use of the name (e.g., Sutton, 1988; Bolòs & Vigo, 1996; Benedí & Güemes, 2009).

Linaria serpyllifolia Lange in Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn 1863: 39. 1863

≡ *Chaenorhinum serpyllifolium* (Lange) Lange in Willk. & Lange, Prodr. Fl. Hispan. 2: 578. 1870

Lectotype (designated here): Spain, Burgos, "in campis arenosis ad Encinillas", 18 October 1852, *Lange s.n.*, C (barcode C 10018910) (Figure 6); isolectotype: C 10018912 (Figure 5).

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Authorship contribution

PPFG: Design and Writing; JF: Analysis of the original elements and their interpretation, Literature and Text review; JG: Literature and Text review; LSG: Analysis of the original elements and their interpretation, Literature and Text review.

Conflict of interest

None.

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