

W. De Leonardis, G. Giardina & A. Zizza

***Linaria multicaulis* (L.) Miller subsp. *humilis* (Guss.) De Leonardis, Giardina & Zizza, comb. et stat. nov., a taxon growing in Sicily**

**Abstract**

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The status of the *Linaria* growing in southern Sicily and taxonomically near *L. multicaulis* subsp. *multicaulis* is discussed. Despite this entity being very distinct from the subspecific type, there has been a tendency to overlook it in recent literature. Previous descriptions of this entity, originally named *L. stricta* (L.) Miller var. *humilis* Guss. (b. *humilis* in the protologue), do not sufficiently reflect its natural variability. We provide a new description better defining its characteristics in its natural populations, and present the new combination *Linaria multicaulis* subsp. *humilis* with the lectotypification by a specimen preserved in NAP from Gussone's original material. We also show that this taxon is distinct from similar ones not described at the time of formulation of the basionym.

**Introduction**

The entity originally described by Gussone as *Linaria stricta* var. *humilis* Guss. (Gussone 1828: 166) has had an unstable taxonomic and nomenclatural history. Recently, the taxon has tended to be forgotten in the current lists of accepted taxa, probably due to its rarity and to its scarcity in the larger herbaria.

A few years after its publication, Gussone gave it the rank of species as *L. humilis* (Guss.) Guss. (Gussone 1843: 123). Shortly afterwards, Bertoloni (1844: 354) appeared to agree with this opinion, but he considered both the Gussone's names as synonyms of *Antirrhinum supinum* Sibth. & Sm. Similarly, Nyman (1878: 538) and Cesati, Passerini, Gibelli (1886: 348) accepted, though doubtfully, Gussone's new taxonomy. A return to Gussone's original view was expressed by Caruel, who, however, proposed the new combination, *L. heterophylla* Desf. var. *humilis* (Guss.) Caruel (Caruel in Parlato 1883: 636). This last name was preserved by Fiori (1926: 333), but without mentioning Caruel as the author of the combination. In Pignatti's Flora (Pignatti 1982: 544), the entity was omitted. Chater & al. (1972) in *Flora europaea* did not mention this subspecies, or

justify the omission of this well-known entity. In 1978, in the monographic work on *Linariae* with wingless seeds in the western Mediterranean by J. Viano (1978), this entity reappeared as "*Linaria heterophylla* Desf. subsp. *stricta* (Guss.) Viano var. *humilis* (Fiori) Viano comb. nov.", a variety distinct from the one growing in northern Sicily (of equal rank), i.e., according to Viano, "*L. heterophylla* Desf. subsp. *stricta* var. *stricta*". So Viano substantially confirmed Caruel's choice, though erroneously attributing the priority to the name to Fiori. But Viano's re-evaluation was based exclusively on literature sources without a critical review of herbarium specimens. In the most recent work by Sutton (1988) on the tribe *Antirrhineae* the author opted to forget the taxon.

We came across this entity by pure chance at Madonna del Piano in the territory of Grammichele (Sicily) in the summer of 1996. On that occasion one of us (Giardina) discovered a population of individuals characterized by their shortness (30 cm), flowers at anthesis with a short spur (8-9 mm) and loosely distributed along the stem (arranged in raceme) and capsules relatively large.

We believe it is now opportune to re-evaluate this taxon.

Based on an accurate analysis of material in the field, comparison of herbarium specimens and a review of the most recent literature, we found Gussone's original taxonomy correct, but following the recent revision of Sutton (1988), we believe it must be attributed to *Linaria multicaulis*, as a subordinate taxon.

#### **Individual variability in *Linaria multicaulis* subsp. *humilis***

Field-gathered specimens gave rise to a problem of variability. When we returned in April 1997 to the same locality as July 1996 (Madonna del Piano), we found a population of *Linaria* composed of rather tall individuals (55-60 cm) mixed with some much shorter ones. After comparing the summer entity with the spring specimens, we concluded that they were identical in seed morphology and were in considerable agreement with various other characters. We suspected that we were observing a single entity which showed variability in height attributable to the ecological conditions of its habitat. Our hypothesis was confirmed by a later discovery at Contrada Molara di Santo Pietro on 4 May 1997, not far from the classic localities of Gussone's *Linaria*, where the height of individuals also varied considerably, ranging from 5 to 60 cm with a frequency peak of 15 cm.

It is clear that Gussone collected a set of samples that was not truly representative of the variability of the natural populations since he unintentionally selected only short and very short specimens. As a result, the description inserted by the author after the protologue is incomplete and a distorted picture of the natural variability of the populations.

On the contrary, Lojacono Pojero (1904: 129) selected only the tallest individuals from a natural population at Madonna del Piano, assigning them to a new variety of *L. stricta*, that should have included some populations growing at Capaci and in some other localities around Palermo and Trapani. This variety, which he named *L. stricta* Sibth. & Sm. var. *gussonei*, appeared to differ from the type by its narrower leaves, the flowers always yellow (the type has flowers that range from chrome-yellow on Mt. Etna to pale-yellow in the Palermo and Trapani areas) and its lower height. Since only one species of *Linaria* - which is very variable in height - belonging to sect. *Versicolores* exists at Madonna del Piano, and this is Gussone's taxon, it is clear that Lojacono was dealing with

an entity already described, at least when referring to populations of Madonna del Piano. We looked for specimens of this in PAL, CAT and FI, in order to find a nomenclatural type. Only in PAL did we find sheets containing specimens gathered in places quoted in the protologue (syntypes). So we have selected a specimen from Madonna del Piano for the lectotype of *L. stricta* Sibth. et Sm. var. *gussonei* Lojac.

*L. stricta* Sibth. & Sm. var. *gussonei* Lojac. in Fl. Sic., II (2): 129, 1904. —  
*Lectotypus*: “*Linaria stricta* = non reticulata, Madonna del Piano, 13 aprile 1824, s.l.”  
 in Fasciculo secundo, folio secundo *Linariae strictae*, in Herbario Siculo (PAL).

*L. stricta* Sibth. & Sm. var. *gussonei* Lojac. is nowadays a synonym of *Linaria multicaulis* subsp. *humilis*. The specimens from Catania, Trapani, Palermo, Marsala and Messina, also quoted in Lojac. ’s protologue, are a mixture of specimens matching exactly the variation of the subspecific type *Linaria multicaulis* subsp. *multicaulis*, and ones resembling a forma little different from the type. In any case we do not want here to deal with the problem of their taxonomical framing.

*Observation.* — It is singular that in his diagnosis (and in the subsequent description) of *Linaria stricta* subsp. *humilis* (protologue in Gussone 1828: 166), Gussone does not give details of the calyx-lobes. Later, however, in *Fl. Sic. Syn.* Gussone (1843: 123) gives his entity species status and redescribes it adding “*calicinis laciniis immarginatis*” (this feature was then adopted by all later authors in their descriptions). In contrast, direct observation in the field shows that individuals with calyx-lobes without winged, or quasi-winged, edges are extremely rare and found only in populations that continue to flower until late summer, when the plants are at the end of their annual biological cycle. The Gussone specimens, on the contrary, all collected in April when growth is luxuriant and preserved in NAP, all (!) have calyx-lobes with evident, large winged edges, exactly like our recently collected specimens. Although inexplicable, the incongruity of the phrase “*calicinis laciniis immarginatis*” is in any case secondary, at least from a formal taxonomic viewpoint, because the author did not apply it to the protologue of our entity but to a later “status novus”, which was not acknowledged as sufficiently justified by several subsequent authors (Caruel in Parlato 1883, Fiori 1926, Viano 1978) and ourselves.

## Taxonomy

For the taxonomy of our entity we refer to the recent revision of Sutton (1988) of the tribe *Antirrhineae* (which includes the genus *Linaria*). This author demonstrates, on the basis of a publication of Linnaeus in 1737 (Hort. Cliff. 1737 quot. in Sutton 1988), that the latter used a descriptive phrase that was identical to the one later found in *Species Plantarum* in 1753 (quot. in Sutton 1988: 445) in the diagnosis of *Antirrhinum multicaule*. From this fact one can infer that in these two works he was talking about the same entity. From the datum regarding its distribution “*creciscit in Sicilia, circa Panormum & alibi*” one can deduce that he had in mind the entity of Boccone in *Icones Descr.* (Boccone 1674) which Boccone had already described with the phrase *Linaria sicula multicaulis, molluginis folio*. Therefore, taking into account the revision by Miller in

1768, the correct name for the *Linaria* currently known as *Linaria heterophylla* Desf. or *Linaria stricta* Sibth. & Sm. is *Linaria multicaulis* (L.) Miller 1768 (Sutton 1988).

This entity, according to Sutton (1988), can be divided into four taxa at the subspecific level:

*Linaria multicaulis* (L.) Miller subsp. *multicaulis*, from Sicily and Calabria;

*Linaria multicaulis* (L.) Miller subsp. *heterophylla* (Desf.) D. A. Sutton, from Algeria, Morocco and Tunisia;

*Linaria multicaulis* (L.) Miller subsp. *galioides* (Ball) D. A. Sutton, from Morocco;

*Linaria multicaulis* (L.) Miller subsp. *aurasiaca* (Pomel) D. A. Sutton, from Algeria and Tunisia.

Our subsp. *humilis*, despite having some characteristics resembling the latter two subspecies, is clearly a distinct entity due to the different seed morphology (see Sutton 1988: 447). The subsp. *galioides* has a marked vegetative reproduction, fertile branches often with verticillate leaves and an inflorescence dense in fruit. The subsp. *aurasiaca* is well differentiated by its small capsule, short pedicels and glabrous calyx-lobes. These latter are noticeably pubescent, even on the interior face, in our entity. Subsp. *humilis* also differs from both subsp. *multicaulis* and subsp. *heterophylla* in several other morphological features, as we report below. It is, therefore, a distinct subspecific entity.

More recently, Dobignard (1997) has published two new subspecific taxa:

*L. multicaulis* subsp. *gigantea* (Dobignard & D. Jordan) Dobignard from Morocco;

*L. multicaulis* subsp. *pseudosupina* (Ball) Dobignard from Morocco.

The additional data do not change our conclusions because of the strong affinities of the subsp. *gigantea* with *L. multicaulis* subsp. *heterophylla* and subsp. *pseudosupina* with *L. multicaulis* subsp. *galioides*.

#### The original material of the Gussonean basionym

Our entity was never described at the subspecific level. However, we accept the historical *datum* represented by the epithet "*humilis*" contained in the original basionym *Linaria stricta* Sibth. et Sm. var. *humilis* Guss. Fl. Sic. Prodr. II, 1828 p. 166. We have therefore assigned it to a stat. nov., so that the new name becomes *Linaria multicaulis* (L.) Miller subsp. *humilis* (Guss.) De Leonardis, Giardina & Zizza. The protologue of the basionym var. *humilis* Guss. does not give a nomenclatural type, even in the form of a figure. However the protologue includes a reference to a plate that was never published by the author ("Ic. Fl. Sic. t. 308", ref. Gussone, 1828: 166). The quoted publication (Ic. Fl. Sic.) is probably related to *Flora Sicula sive descriptiones et icones plantarum rariorum Siciliae ulterioris Francisci I Borbonii jussu edita*, a work being compiled at that time but never finished, of which only the first 16 pages, not including the genus *Linaria*, were printed in 1829 (quot. in Pasquale 1871: 28) and whose manuscripts were perhaps lost. In addition, the protologue makes no reference whatsoever to field specimens. It contains only some collection localities (Vittoria, Comiso and Dorillo). A search in the Naples Herbarium (NAP) allowed us to find in the section Erbario Gussone Sicilia some folders containing *Linaria multicaulis* subsp. *humilis* (sub *Antirrhinum strictum* b. *humile*) from Vittoria and Comiso (there are no specimens collected at Dorillo). Data on the collector and the date of gathering are totally absent on these folders (and on sheets inside) but, since Gussone normally cited the collector when this latter was

not himself (La Valva 1993, Pasquale 1871), it is logical to presume that he personally collected all these specimens. This hypothesis is corroborated by the absence of labels by other authors and by the autographic handwriting on the existing labels. The collection date is absent because the specimens were almost certainly collected before 1824 (according to Pasquale (1871), the year in which Gussone began to register the exact collection dates). Examination of two unpublished manuscripts by Gussone, kept in the library of the Facoltà di Agraria of Naples at Portici, revealed that some specimens of an unpublished (new) *Linaria* were collected on 21 Apr 1819 in Vallone Scarparello, between Comiso and Vittoria. It is quite likely that it was the same species we are discussing here. According to Pasquale's report (cited here and confirmed by the above-mentioned manuscripts), the 1819 field-trip was the only occasion on which Gussone gathered *Linariae* at Vittoria and Comiso (taking into account that on his next - and last - trip in 1820, mentioned by Trotter (1948), there was no evidence of any further gathering of *Linariae*). But even in the improbable case of two separate collections, the extreme homogeneity of the collected material is undeniable. This observation forces us to believe that all the specimens known were taken into account by the author when writing his protologue. In conclusion, since this material was collected from the localities cited in the protologue, it is correct to assert that *it is the original collection of Gussone's syntypes*, and so can and must be used for the procedure of lectotypification.

The best preserved specimen that most corresponds to the diagnosis of the protologue, collected at Comiso, was selected as the lectotype, being marked to distinguish it from the others on the same sheet, on 4 Dec 1997, under the new combination of *Linaria multicaulis* subsp. *humilis*. We mailed new specimens from our new collections (topotypes) to the herbaria of CAT, PAL, NAP, FI and K, with the aim of giving interested scholars the possibility of examining the morphology of this taxon without having to consult the section Herbarium Gussone Sicilia in NAP. We present a new description of the taxon below, based on our field observations of many specimens, illustrating the natural variability of all important characters ignored or barely mentioned in Gussone's description.

***Linaria multicaulis* (L.) Miller subsp. *humilis* (Guss.) De Leonardis, Giardina & Zizza**  
**comb. & stat. nov.** (*Iconographia* — Fig. 1 the whole plant in G and only drawings in the left side of particulars A, B, C, D, F - *here*).

*Basionymus* — *Linaria stricta* Sibth. et Sm. var. *humilis* Guss., Fl. Sic. Prodr., 1828. — *Lectotypus* (selected here, label without date – only the month – and without collector – likely Gussone): Comiso, *s.d., s.l.*, “*Antirrhinum strictum b. humile, quondam A. supinum, Apr. Comiso*”. Folium quartum fasciculi *Linariae strictae b. humilis* Herbarii Gussonei Siciliae (NAP).

*Tota collectio Gussone* — in Herbarium Gussone Sicilia (NAP) there are five folders containing specimens of *Linaria multicaulis* subsp. *humilis*. They are, according to the succession established by Gussone: a) Vittoria and Comiso, in April, 4 specimens. *Manu Gussonei* “*Vittoria, Comiso, Apr.*”; b) a folder which is a copy of the previous (a),

without any information about date, locality, collector, with 3 specimens; c) Comiso in April with 2 specimens. *Manu Gussonei* "Comiso, Apr."; d) Comiso in April, with 5 specimens (this folder contains the lectotypified specimen, already quoted); e) Vittoria in April, with 9 specimens *Manu Gussonei* "Vittoria, Apr."

*Synonymi* — *Linaria humilis* Guss., Fl. Sic. Syn., 1843 — *Linaria heterophylla* Desf. subsp. *humilis* (Guss.) Caruel in Parlatore, Fl. It., 6, 1883. — *Linaria stricta* Sibth. & Sm. var. *gussonei* Lojac., Fl. Sic., II (2), 1904.

*Description* — Annual, 5-60 cm, with a fusiform root truncated at the top, bearing numerous sterile branches and some fertile stems. Sterile branches lying on ground, up to 25 cm long of various leaf types: with very long, linear and 4-verticillated leaves; with short, large and 4-verticillated leaves; with long and not verticillated leaves. Flowering stems 5-60 cm, little branched, glabrous, with scattered leaves up to 5.4 cm long. Inflorescence a long raceme, 25 cm at anthesis with flowers not compactly but loosely scattered on stem, with flower buds showing long calyx-lobes. Ripe fruits regularly and loosely arranged on the stem, with an average distance between pedicels of 4.5-7 mm. Bracts at the base of flower not growing during ripening, c. 9 mm long with simple and glandular hairs. Pedicels up to 11 mm in ripe fruit, but 9 mm in flower, with simple and glandular hairs. Calyx 6 mm, lobes with herbaceous central part and membranaceous wings, the herbaceous part enlarging towards the top and the winged part contracting, simple and glandular hairs present, also on the internal face of lobes. Corolla yellow, with adaxial lip surrounded by very large lobes with central parallel axes. Abaxial lip (palato) with two crests spotted orangey-red very close together on the gibbose part. Total length of corolla 20-21 mm, of which 8-9 mm attributable to the spur. The small lobe in the middle part of abaxial lip triangular with a large base. Ripe capsule very large, 9 mm, 20-30 seeds, asymmetric and retuse with two apical convexities, the largest of which slightly curved. Seeds with a furrowed structure in which furrows are circonvoluted, shallowly, forming large mammellar structures compactly faceted with small shining facets dark violet-brown to almost black.

#### **Differentiation of *L. multicaulis* subsp. *humilis* from subsp. *multicaulis***

*L. multicaulis* subsp. *humilis* differs from *L. multicaulis* subsp. *multicaulis* by the following characters: sterile branches with flat leaves without a central nerve, lanceolated, (3)-4-(5) verticillated; in the type variant, leaves with elliptical section, slight central nerve, linear and 5-6-(7) verticillated. Sterile branches with frequent leaf-verticils and rare scattered leaves; in the type sterile branches with rare leaf-verticils and frequent scattered leaves. Stem leaves up to 2 mm wide; in the type up to 1.5 mm. Fruit pedicels 9 cm long; in the type 7 mm. Leaf bract 10 mm long, broader at the top, quasi-acute-spatulate; in the type, 8 mm long and with regularly lanceolate outline. Calyx larger (9 mm) with large membranaceous wings of lobes; in the type smaller (8 mm) with narrower membranaceous wings. Ripe capsule large (7 mm), bilobed at the apex with larger lobe slightly curved; in the type capsule smaller (6 mm), bilobed with larger lobe more curved. Corolla with spur about 8 mm; in the type 10 mm. Lobes of the corolla (adaxial lip) with parallel axes; in the type, divergent. Small triangular lobe in the abaxial lip with a narrow base; in the type broad. Crests in the gibbose part of the corolla nearest one another; in the type less so. Seeds with crests less smoothed and more numerous (on average) than in the type.

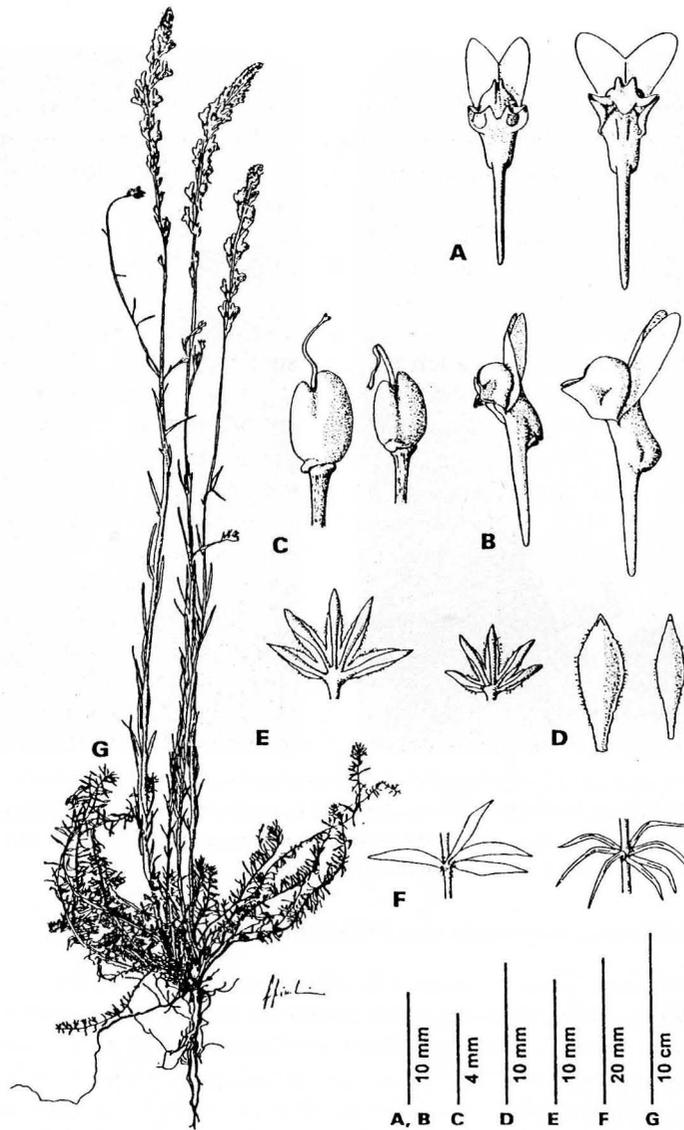


Fig. 1. Morphological comparison between *Linaria multicaulis* subsp. *humilis* and *L. multicaulis* subsp. *multicaulis* (for each feature *L. multicaulis* subsp. *humilis* is on the left, *L. multicaulis* subsp. *multicaulis* on the right): **A**, frontal view of the corolla; **B**, side view of the corolla; **C**, capsule; **D**, bract of the flower pedicel; **E**, open calyx; **F**, leaves of sterile branches; **G**, the whole plant of *L. multicaulis* subsp. *humilis* in an individual about 57 cm high.

**Note:** 1. the divergence of the lobes of the corolla in *L. multicaulis* subsp. *multicaulis* in opposition to their parallelism in *L. multicaulis* subsp. *humilis*, the different distance between the corolla crests, the different base in the central lobe of the abaxial lip; 2. the difference in the opening of the corolla base; 3. the cornered corolla base in *L. multicaulis* subsp. *multicaulis*; 4. the different shape of the pedicellar bract with a quasi-spatulate outline in *L. multicaulis* subsp. *humilis*; 5. the different shape of the superior right lobe of the capsule; 6. in the part G of the figure, the erect character of the stems (not supino-ascending), as well as the lax distribution of fruits along the high part of the stem. The part G of the figure was drawn from a specimen collected at Contrada Molara on 04 May 1997 quoted here in *Specimens seen*.



Fig. 2. On the left side *Linaria multicaulis* subsp. *multicaulis* and on the right one *L. multicaulis* subsp. *humilis*. **Note:** the inflorescence very dense in *L. multicaulis* subsp. *multicaulis* and lax in *L. multicaulis* subsp. *humilis*, the lobes of the corolla more divergent and the spur longer in the first one. Note also the slight curvature of the spur in the latter one.

#### **Differentiation from *L. multicaulis* (L.) Miller subsp. *heterophylla***

*L. multicaulis* subsp. *humilis*, despite its overall resemblance to *Linaria multicaulis* subsp. *heterophylla*, differs from the latter chiefly for the loose character of its fruiting branches (dense in *L. multicaulis* subsp. *heterophylla*) and for the considerable length of its fruiting pedicels (sometimes almost non-existent in *L. multicaulis* subsp. *heterophylla*). A more detailed comparison between these entities is shown in the synoptic Table 1.

Differentiation between the two entities is summarized by the fact that the racemes of *L. multicaulis* subsp. *heterophylla* are much more compact and dense than those of *L. multicaulis* subsp. *humilis* and the fruits of the former are frequently almost sessile (these differences appear iconographically in Fig. 4). Finally, in Fig. 5 we show some differences between seeds of the three entities from the group *L. multicaulis* under examination. We note, however, that comparison between the number of ridges or furrows of the seeds of *L. multicaulis* subsp. *multicaulis* and *L. multicaulis* subsp. *humilis* must be done on a statistical basis.

#### **The problem of *Linaria viscosa* (L.) Chaz.**

In 1972 Chater, Valdes & Webb (1972) suggested the sicilian populations of *Linaria* (L.) Miller already under *Linaria heterophylla* Desf. would be better classified if included under *L. viscosa* (L.) Dum.-Courset (nowadays, also known as *L. viscosa* (L.) Chaz.).

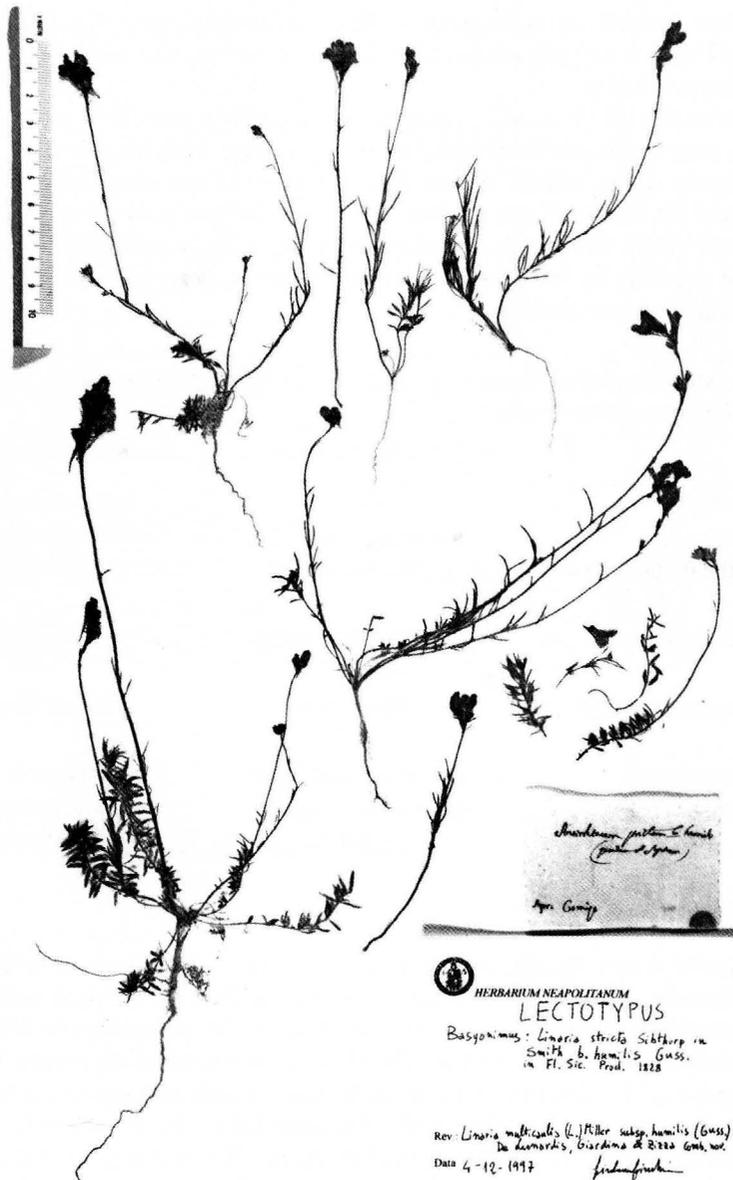


Fig. 3. Photo of the sheet of the original Gussonean material containing the specimen of *Linaria multicaulis* subsp. *humilis* lectotypified on 4 Dec 1997. This sheet is saved at the Herbarium of Naples (section Herbarium Gussone Sicilia) (NAP). The original label *manu gussonei* not showing the complete date of gathering, but only the locality (Comiso) and the month (April) can be seen. The lectotype is the specimen at the bottom on the left.

Both Viano (1978) and Sutton (1988) disagreed with this approach. We attempted to verify this problem. We examined a set of specimens of *L. viscosa* preserved in Spanish

and Portuguese herbaria, as reported below. From our analysis, we concluded that *Linaria viscosa* (L.) Chaz. is strongly differentiated from *L. multicaulis* subsp. *humilis* for the following characteristics:

*Linaria viscosa* (L.) Chaz. also supine with considerable branching at the base in all individuals, even when growth is limited by stress, whereas branching in short individuals of *L. multicaulis* subsp. *humilis* occurs only at the top of the stem (basal branching is inexistent) and the habitus is erect. In the former, the fruiting pedicels are very long and the bracts very small, whereas in *L. multicaulis* subsp. *humilis* pedicels and bracts are of almost equal size (Fig. 6). From a taxonomic and systematic viewpoint the two entities are well segregated from one another.

Table 1. Notable character differences between *Linaria multicaulis* subsp. *humilis* and *L. multicaulis* subsp. *heterophylla*.

Character	subsp. <i>humilis</i>	subsp. <i>heterophylla</i>
Spur length (mm)	up to 10	up to 10.5-11
Capsule size	identical in both taxa	identical in both taxa
Scattering of capsules on the stem	2.3 capsules / cm	3.2 up to 3.9 capsules / cm
Length of calyx-lobes	exceeding the capsule (about 1/8)	long as the capsule
Length of capsule pedicels (mm)	6 up to 6.5	2.8 up to 4
Shape of the capsule	identical in both taxa	identical in both taxa
Length of capsule bract (mm)	about 4 (less than the pedicel)	up to 4 (equalling the pedicel)

### Ecology

*L. multicaulis* subsp. *humilis* grows on the edge of garrigue and in arid meadows moderately disturbed. It frequently occurs in the ecotone between garrigue and cultivated fields. It is restricted to sandy soils, previously disturbed by ploughing. At Madonna del Piano it is scarcely present in garrigue with *Helichrysum siculum* (Sprengel) Boiss. and *Cymbopogon hirtus* (L.) Janchen, but it becomes predominant and almost exclusive along the edge of the garrigue in contact with cultivated fields. Its behaviour is similar at Contrada Molara of Caltagirone and at Dorillo. At the first site it grows on a substrate composed of yellow Pliocene sands, at the second on sands originating from mediterranean "terre rosse". Both these media are siliceous (decalcified).

### Distribution

In Fig. 7 we show the distribution of the most important taxa quoted in the text, namely: *Linaria multicaulis* subsp. *galioides*, *L. multicaulis* subsp. *heterophylla*, *L. multicaulis* subsp. *aurasiaca*, *L. multicaulis* subsp. *multicaulis*, *L. multicaulis* subsp. *humilis* and *L. viscosa*.

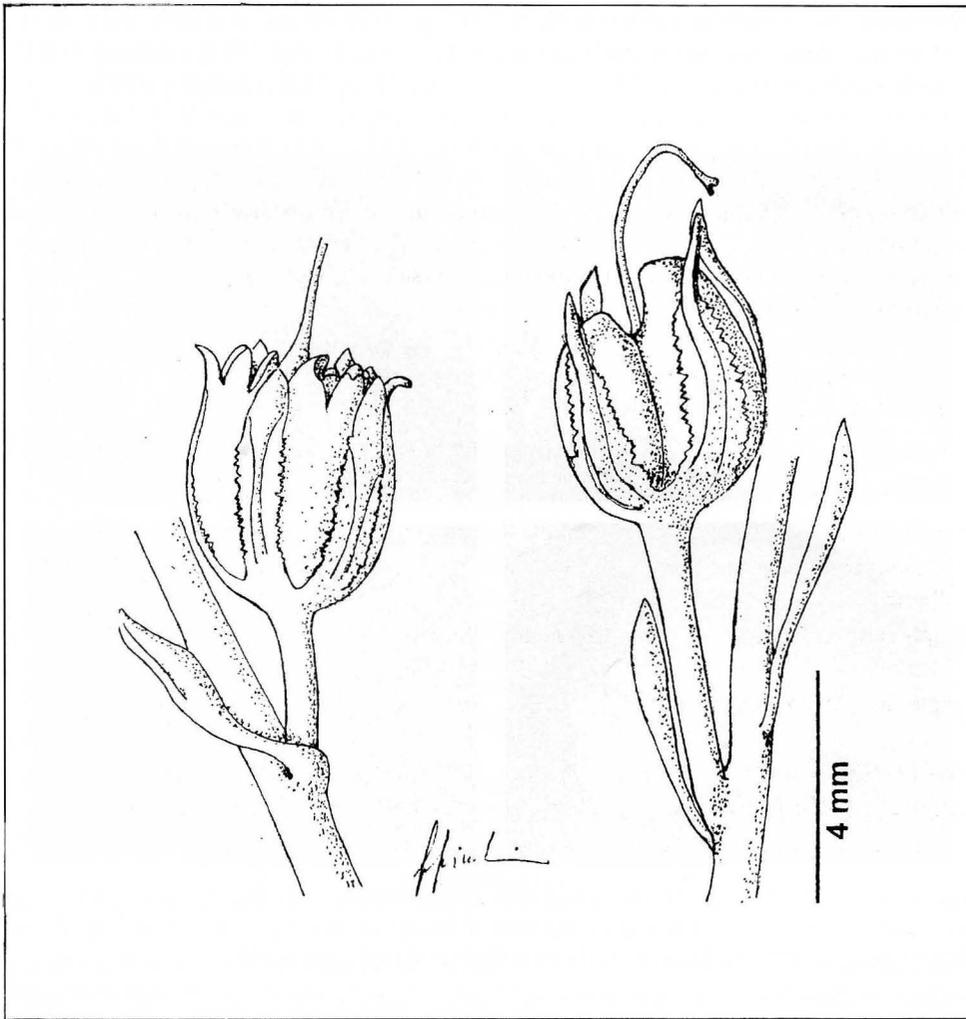


Fig. 4. Ripe capsule of: **left**, *Linaria multicaulis* subsp. *heterophylla*; **right**, *L. multicaulis* subsp. *humilis*. This figure shows the different lengths of the flower pedicel and calyx-lobes in relation to capsule size. (Drawings from specimens on 10 Oct 1886, Herb. Cosson (P) (subsp. *heterophylla*) and on 04 May 1997 collected by *Giardina* at Contrada Molara (CAT) (subsp. *humilis*); both are quoted in *Specimens seen*).

#### Specimens seen

(apart from Collectio Gussone, already quoted)

*Linaria multicaulis* subsp. *multicaulis*: Italy, Sicily, Giarre, Piazzola di sosta su Autostrada CT-ME, c/o Uscita Giarre, 21 May 1991, *Giardina* (CAT); Italy, Sicily, Paternò, Strada Paternò-Ragalna km 2, 10 Apr 1992, *Giardina* (CAT); Italy, Sicily,

Trapani, Autostrada TP-PA km 4 da TP, 24 Apr 1995, *Giardina* (CAT); Italy, Sicily, Adrano, Strada Paternò-Adrano c/o campo di calcio, 10 Apr 1997, *Giardina* (CAT); Italy, Sicily, Monreale, San Martino delle Scale, 12 May 1997, *Giardina* (CAT).

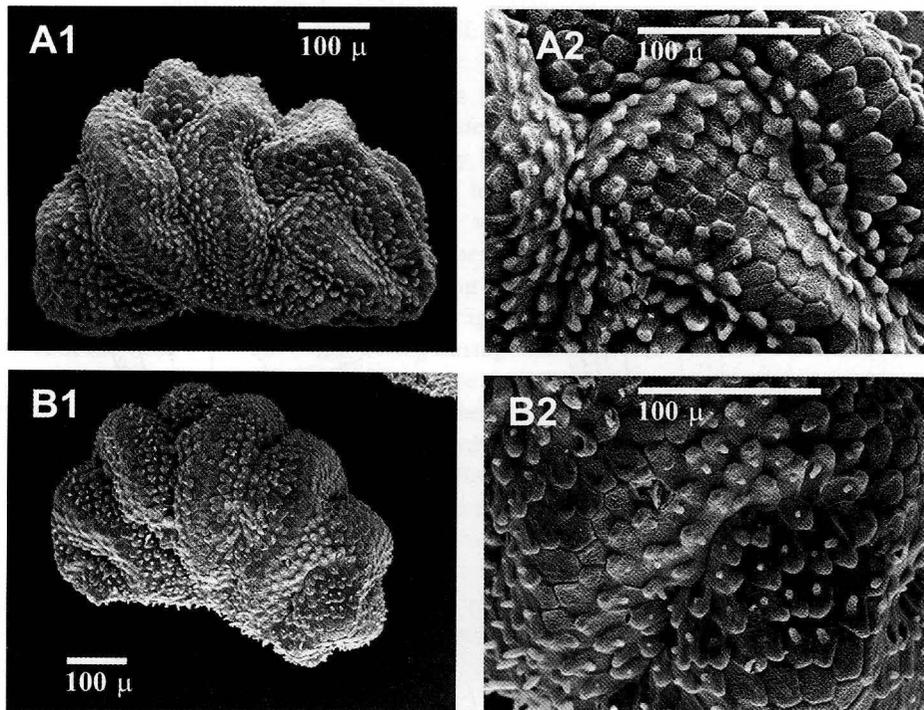


Fig. 5. Seeds of: **A1, A2**, *Linaria multicaulis* subsp. *humilis*; **B1, B2**, *L. multicaulis* in SEM vision. On average the seed of the former has less smooth ridges and deeper furrows than the latter. Differences in micromorphology are not appreciable.

*Linaria multicaulis* subsp. *humilis*: Italy, Sicily, Madonna del Piano, Grammichele, 02 Aug 1996, *Giardina* (PAL, CAT); Italy, Sicily, Madonna del Piano, Grammichele, 01 Apr 1997, *Giardina* (PAL, CAT); Italy, Sicily, Madonna del Piano, Grammichele, 15 Apr 1997, *Giardina* (FI, CAT); Italy, Sicily, Contrada Molara di Caltagirone, 4 May 1997, *Giardina* (PAL, CAT, NAP); Italy, Sicily, Madonna del Piano, Grammichele, 16 May 1997, *Giardina* (K, CAT); Italy, Sicily, Vallata Dirillo, Contrada Dirillo di Acate, 29 Sep 1991, *Giardina* (CAT).

*Linaria multicaulis* subsp. *heterophylla*: Algeria, Ain Sefra: *in dumetis et pascuis montis* "Djeb. Mekter", 1500-1800 m, 3 Jun 1899, *L. Chevalier* in Herbarium Cosson /Sez. *Plantae Saharae Algeriensis*, sub *Linaria heterophylla* (P); Algeria, Blidah: *aux glaciers laval*, alt. 1200 m, 10 Oct 1886, *Luizet* in Herb. Mus. (Herbier D. Luizet) sub *Linaria heterophylla* (P).



Fig. 6. Photo of the inflorescence of *Linaria viscosa* from specimen P 33242 in LISU. Note the extremely reduced size of the bract of the floral pedicel.

*Linaria viscosa* (L.) Chaz.: Portugal, Margem do Guardiana, em frente do Pornarao, Jun 1913, *Parhinha, Navel & Mendes*, P33242, Herbario de Portugal (LISU); Portugal, Algarve: Faro (o areias de S. Jso da Venda) e Tavira (areiaes de S.ta Luzia), Apr 1912, *Parhinha & Mendes*, P33243, Herbario de Portugal (LISU); Portugal, Alto Alemt.: entre Redondo e Reguengos, Herdade de Casa Bianca, May 1909, *Parhinha & Mendes*, P33245, Herbario de Portugal (LISU); Portugal, S.ta Anna Serpa, 02 Mar 1880, *Ficalho & Daveau* (desumputs ex già Erbario Ficalho & Daveau), P33246, Herbario de Portugal (LISU); Portugal, S. Thiago de Caçem, Apr 1886, *Daveau* (desumputs ex Erbario Lusitanicum - Alemtajo Littoral - Daveau), P33250, Herbario de Portugal (LISU); Portugal, Odemira, Apr 1905, *Sanpaio*, P33252, Herbario de Portugal (LISU); Portugal, Alfeite, May 1886, *Dos Santos*, P33256, Herbario de Portugal (LISU); Portugal, Alemtajo - Mara, May 1914, *Dos Santos*, P56549, Herbario de Portugal (LISU); Spain, Badajoz: Mârda, Calamonte, 295 DQ 20, cuneta arenosa de la carretera, 09 Nov 1982, *Castroviejo*, 6158SC (MA); Spain, en prados secos sobre

esquistos de Sierra Nevada, Majada Raspa, pr. Cortijo Haza de la Mora, WG 10.02, 1900 m a Laujar, Almeria, *s.l.*, (MA); Spain, pr. Malaga, "El Chorro", Vich. Gran., 09 May 1926, *s.l.*, n. 82 (BC); Spain, Sevilla: Gaudul, Vich. Gran., 24 Mar 1969, *s.l.* (BC); Spain, Campanario, Pico orient. 1560 m, 03 Jul 1925, *s.l.*, (BC); Spain, Serrata (Macizo de Mâgisca) calcares, 20 Jul 1925, *Cuatr.* (BC); Spain, Granada, Albuñuelas, Los Becardes, 1320 m, in sabulosis dolomiticis, 10 Jun 1977, VF 3587, Muñoz Garmendia, (BC);

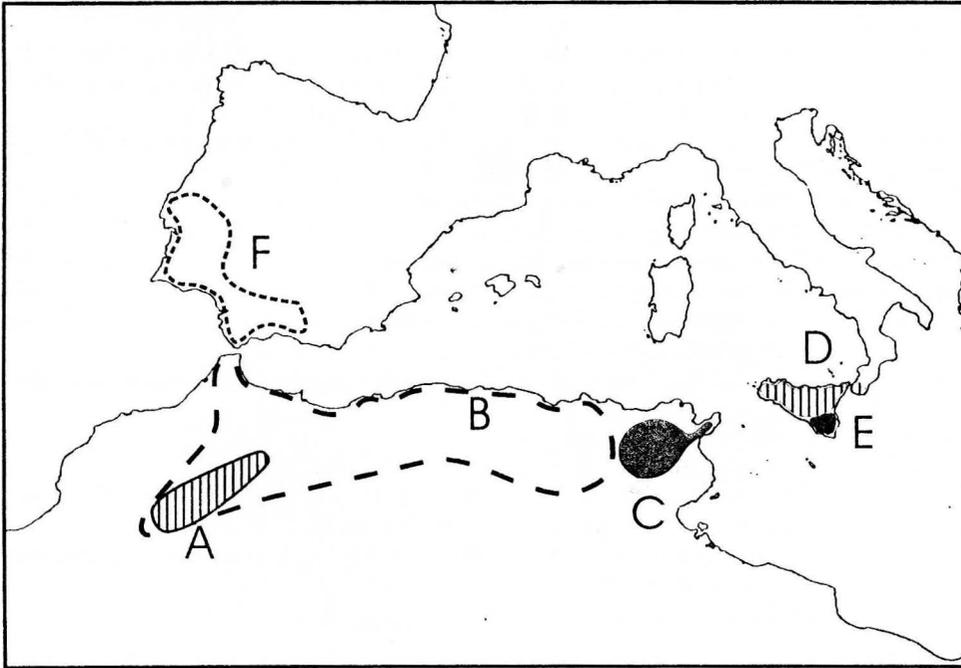


Fig. 7. Distribution of the most important taxa quoted in the text: **A**, *Linaria multicaulis* subsp. *galioides*; **B**, *L. multicaulis* subsp. *heterophylla*; **C**, *L. multicaulis* subsp. *aurasiaca*; **D**, *L. multicaulis* subsp. *multicaulis*; **E**, *L. multicaulis* subsp. *humilis*; **F**, *L. viscosa*.

*Linaria stricta* var. *gussonei*: Italy, Sicily, Grammichele, Madonna del Piano, *s.d.*, *s.l.*, "Linaria stricta S. et S. = non reticulata", 1<sup>st</sup> folder 3<sup>rd</sup> sheet of "Linaria stricta" (PAL); Italy, Sicily, Grammichele, Madonna del Piano, 13 Apr 1824, *s.l.*, "Linaria stricta S. et S. = non reticulata", 2<sup>nd</sup> folder 2<sup>nd</sup> sheet of "Linaria stricta" (PAL).

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### References

- Bertoloni, A. 1844: *Flora Italica* **6**. — Bononiae.
- Boccone, S. 1674: *Icones et Descriptiones rariorum plantarum Siciliae, Melitae, Galliae et Italiae*. — Oxford.
- Cesati, V., Passerini, G. & Gibelli, G. 1886: *Compendio della Flora Italiana, parte 2<sup>a</sup>, Dicotiledoni*. — Milano.
- Chater, A. O., Valdés, B. & Webb, D. A. 1972: *Linaria* Miller. — Pp. 226-236 in: Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M. & Webb, D. A. (ed.), *Flora Europaea*, **3**. — Cambridge University Press.
- Dobignard, A. 1997: Nouvelles observation sur la flore du Maroc. — *Candollea* **52**: 134-136.
- Fiori, A. 1926: *Nuova Flora Analitica d'Italia* **2(3)**. — Firenze.
- Gussone, J. 1828: *Florae Siculae Prodrromus* **2**. — Neapolis.
- 1843: *Florae Siculae Synopsis*, **2**. — Neapolis.
- La Valva, V. 1993: *La Collezione Gussone Sicilia*. — *Webbia* **48**: 515-537.
- Lojacono Pojero, M. 1904: *Flora Sicula* **2(2)**. — Panormi.
- Nyman, C. F. 1878: *Conspectus Florae Europaeae*, **1**. — Örebro.
- Parlatore, F. 1883: *Flora Italiana*, **6**. — Firenze.
- Pasquale, G. A. 1871: *Documenti biografici di Giovanni Gussone* — *Atti Acc. Pontaniana Napoli*: 1-55.
- Pignatti, S. 1982: *Flora d'Italia*, **2**. — Bologna.
- Sutton, D. 1988: *A revision of the tribe Antirrhineae*. — Oxford & London.
- Trotter, A. 1948: *Notizie botaniche, storiche e biografiche intorno a Giovanni Gussone ed al suo tempo desunte dai suoi manoscritti inediti*. — *Delpinoa* **18-19**: 75-108.
- Viano, J. 1978: *Les linaires à graines aptères du bassin méditerranéen occidental. I. Linaria sect. Versicolores*. — *Candollea* **33(1)**: 43-88.

#### Address of authors:

Walter De Leonardis & Antonina Zizza, Dipartimento di Botanica, Via Antonino Longo 19, I-95100 Catania, Italy.

Girolamo Giardina, Via Lorenzo Bolano 40, I-95122 Catania, Italy.