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Typification of seven critical Mediterranean *Gagea* Salisb. (Liliaceae) taxa

Lorenzo Peruzzi & Jean-Marc Tison

Abstract

PERUZZI, L. & J.-M. TISON (2007). Typification of seven critical Mediterranean *Gagea* Salisb. (Liliaceae) taxa. *Candollea* 62: 173-188. In English, English and French abstracts.

Gagea chrysantha Schult. & Schult. f., *Gagea dubia* A. Terracc., *Gagea dubia* var. *foliosa* A. Terracc., *Gagea durieui* Parl., *Ornithogalum fibrosum* Desf. (basionym of *Gagea fibrosa* (Desf.) Schult. & Schult. f.), *Ornithogalum granatellii* Parl. (basionym of *Gagea granatellii* (Parl.) Parl.) and *Gagea mauritanica* Durieu are typified. Comments on the taxonomic value of the seven taxa are given.

Key-words

LILLACEAE – *Gagea* – Typification

Résumé

PERUZZI, L. & J.-M. TISON (2007). Typification de sept taxons critiques méditerranéens du genre *Gagea* Salisb. (Liliaceae). *Candollea* 62: 173-188. En anglais, résumés anglais et français.

Gagea chrysantha Schult. & Schult. f., *Gagea dubia* A. Terracc., *Gagea dubia* var. *foliosa* A. Terracc., *Gagea durieui* Parl., *Ornithogalum fibrosum* Desf. (basionyme de *Gagea fibrosa* (Desf.) Schult. & Schult. f.), *Ornithogalum granatellii* Parl. (basionyme de *Gagea granatellii* (Parl.) Parl.) et *Gagea mauritanica* Durieu sont typifiés. La valeur taxonomique de chacun de ces sept taxons est discutée.

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Gagea chrysantha Schult. & Schult. f., Syst. Veg. 7(1): 545. 1829.

≡ *Ornithogalum chrysanthum* Jan, Elench. Hort. Parm.: 5. 1827 [nomen nudum].

Lectotypus (here designated): ITALY. Sicily: Ficuzza, 1825, Jan s.n. (G!) (Fig. 1).

Ornithogalum chrysanthum firstly appeared as a simple name in a list of plants cultivated at the Botanical Garden of Parma, where the naturalist Giorgio Jan (1791-1866) was professor of botany from 1817 to 1842. The new species was instead validly published, as *Gagea*, by SCHULTES & SCHULTES (1829) who cited "*Ornithogalum chrysanthum* Jan Elench." as a synonym. After the description, the authors wrote "*Ad specimina a clo Jan in Sicilia prope Ficuzza lecta*". STROH (1937: 488) mentioned as type one specimen conserved at B ("prope Ficuzza, Jan s.n."), today destroyed. We found however at G one Sicilian collection which can be considered as original material and is therefore here designated as lectotype.

Taxonomic discussion. – In its typical sense, *G. chrysantha* is a single, large, certainly clonal population exhibiting evident difformities, currently producing in cultivation abnormal inflorescences with fasciations and/or foliaceous tepals. Two "normal" morphologically close taxa, *G. sicula* Lojac. and *G. lojaconoi* Peruzzi (≡ *G. longifolia* Lojac. nom. illeg.), are known in the same locality; the relations between these three *Gagea* remain unclear (PERUZZI & TISON, 2004, 2005). Plants of *G. chrysantha* s.str., coming from *locus classicus* have been proved to have $2n = 36$ chromosomes (a triploid level very common in sect. *Didymobulbos*), unlike *G. sicula*, diploid with $2n = 24$.

Gagea dubia A. Terracc. in Boll. Soc. Ort. Palermo 2(3): 6. 1904.

Lectotypus (here designated): TURKEY: Tokat, 6-700 m, IV.1893, *Bornmüller* 3535 (W!, individual at the left top; iso-: G!, K!) (Fig. 2).

= *Gagea dubia* var. *foliosa* A. Terracc. in Bull. Herb. Boissier ser. 2, 5: 1128. 1905. **Lectotypus** (here designated): TURKEY: Amasia, in apricis, 4-600 m, 3.IV.1889, *Bornmüller* 677 (W!, individual at the bottom; iso-: K!) (Fig. 3).

In the protologue, three syntypical collections are cited: **1.** "*Costantinople (exs. in herb. kewensi)*"; **2.** "*Asia Minor, ad Tokat, 6-700 m. (aprili 1893, leg. Bornmüller! iter persico-turcicum 1892-93; exs. n. 3535, sub G. foliosa, in herb. genuensi et vindobonensi)*"; **3.** "*Amasia, in apricis, 4-600 m. (3 aprili 1889, leg. Bornmüller! pl. exs. Anatoliae orientalis a. 1889; exs. n° 677, sub G. foliosa Freyen)*"; the author affirms also that: "*In herbariis cum nomine G. Granatelloides determinavi*".

The collection n° 1 is no more present at K. The collection n° 2 was traced at G and W (a duplicate can be found also at K). The specimen at G, surprisingly, bears no annotation from the author, as instead does the specimen at W, labelled "*G. Granatelloides*" manu Achille Terracciano. The latter specimen can be considered as original material. As far the collection n° 3 is concerned, the author does not indicate any herbarium. However, we traced at W (one duplicate is at K) one specimen of this collection, labelled "*Gagea Granatelloides*". This specimen can be considered as original material, too.

One year later the description of *G. dubia*, TERRACCIANO (1905a) published the name *G. dubia* var. *foliosa* A. Terracc., exactly referring to the same collection *Bornmüller* 677 ("*ex herb. vindobonensi*") corresponding also to the original collection n° 3 of *G. dubia* s.str. He distinguished this variety in having "*foliis caulinis alternis, inferiore etiam pedunculum floralem gerente*". In the same work, where the typical *G. dubia* is not cited, he listed two more varieties (var. *prolifera* A. Terracc., with bulbils, and var. *alboffii* A. Terracc., of reduced size) and a number of specimens seen; among them, neither Costantinople (original collection n° 1 of *G. dubia* s.str.) nor Tokat (original collection n° 2 of *G. dubia* s.str.) are cited. According to this matter, we can infer that in Terracciano's mind the typical *G. dubia* had strictly opposite cauline leaves, no bulbils and a rather robust habit.

All things considered, we here select as the lectotype of *G. dubia* one well-developed individual of the collection *Bornmüller* 3535 (Tokat) at W (Fig. 2), while the best-developed individual of the collection *Bornmüller* 677 (Amasia) at W is selected instead as the lectotype of *G. dubia* var. *foliosa* (Fig. 3).

Taxonomic discussion. – *Gagea dubia* was known for a long time as an Eastern Mediterranean species, morphologically intermediate between *G. granatellii* (Parl.) Parl. and *G. villosa* (M. Bieb.) Sweet (TERRACCIANO, 1904; RICHARDSON, 1980). However, it exhibits unusual plicate (v-shaped) basal leaves, also visible on the lectotypical collection. Though the typical Turkish plants have to be experimentally studied, we already cultivate, since more than 10 years, Greek samples fully agreeing with the lectotype of *G. dubia* and clearly different from both *G. granatellii* and *G. villosa*. Similar populations were discovered in Sicily ("*G. ramulosa* A. Terracc.": PERUZZI & TISON, 2004), Sardinia, central Italy (PERUZZI & BARTOLUCCI, 2006), Spain and Morocco ("*G. maroccana* (A. Terracc.) Sennen & Mauricio": TISON, 2004a, 2004b); no evident variation was detected across this large area. According to these data, *G. dubia* appears as a taxonomically rather isolated Mediterranean (and not only Eastern Mediterranean) orophyte. Its known chromosome numbers, $2n = 24$ and $2n = 48$, are uncommon in *Gagea* sect. *Didymobulbos*. *Gagea dubia* var. *foliosa* and other varieties described by A. Terracciano must be regarded as stages of the standard ontogenic sequence:

in *G. dubia* and most of other bulbiferous species of sect. *Didymobulbos*, the flowering bulb theoretically produces firstly few-flowered, occasionally bulbiferous inflorescences with alternate to subopposite cauline leaves (immature stage), then many-flowered, long-pedunculate inflorescences with close or

subopposite cauline leaves (adult stage), and finally many-flowered, short-pedunculate inflorescences with remote cauline leaves (senile stage). Accordingly, we consider here *G. dubia* var. *foliosa* as fully synonymic with *G. dubia* s.str.

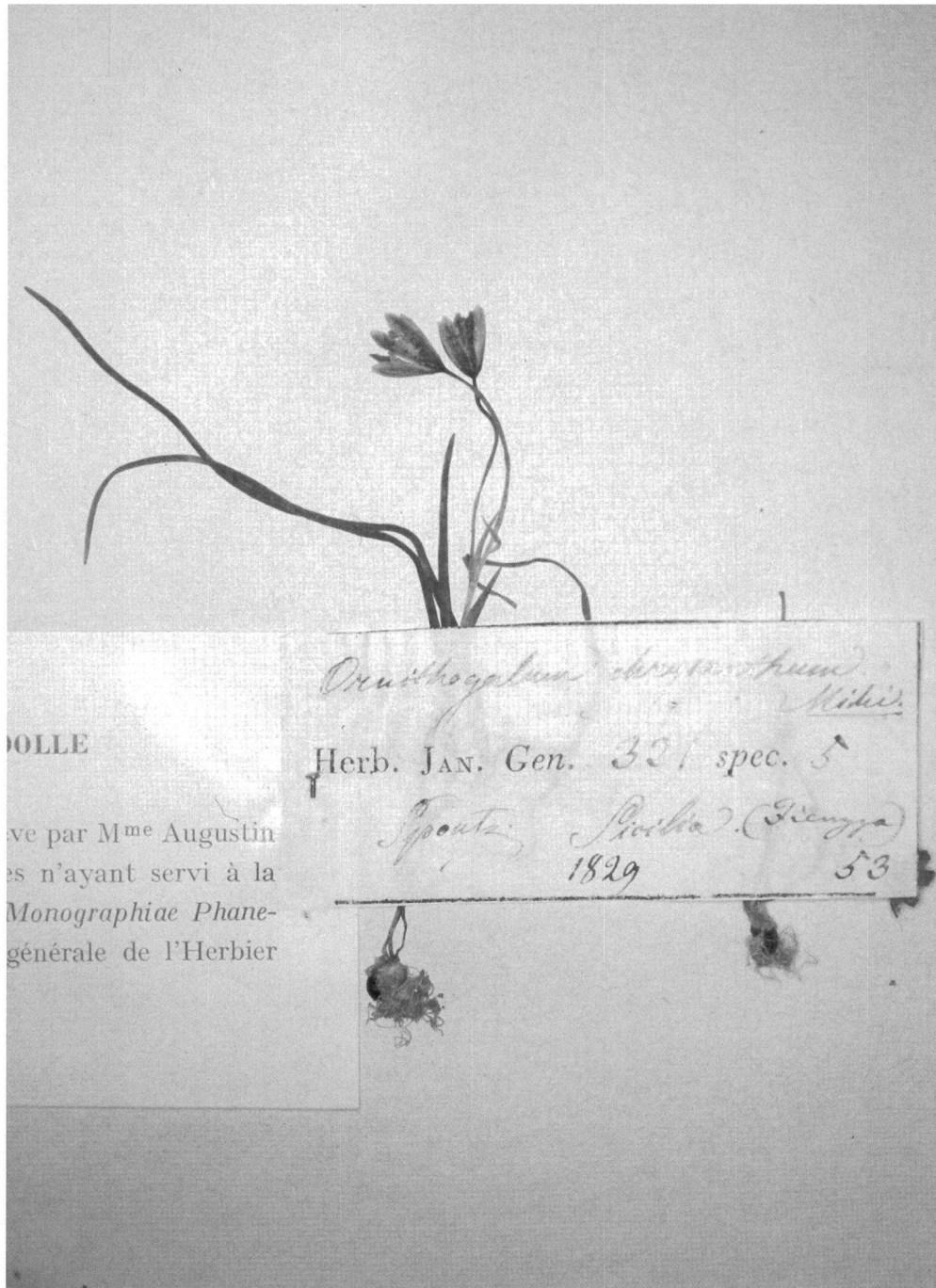


Fig. 1. – Lectotypus of the name *Gagea chrysantha* Schult. & Schult. f.
[Jan s.n., G] [© Conservatoire et Jardin botaniques de la Ville de Genève]

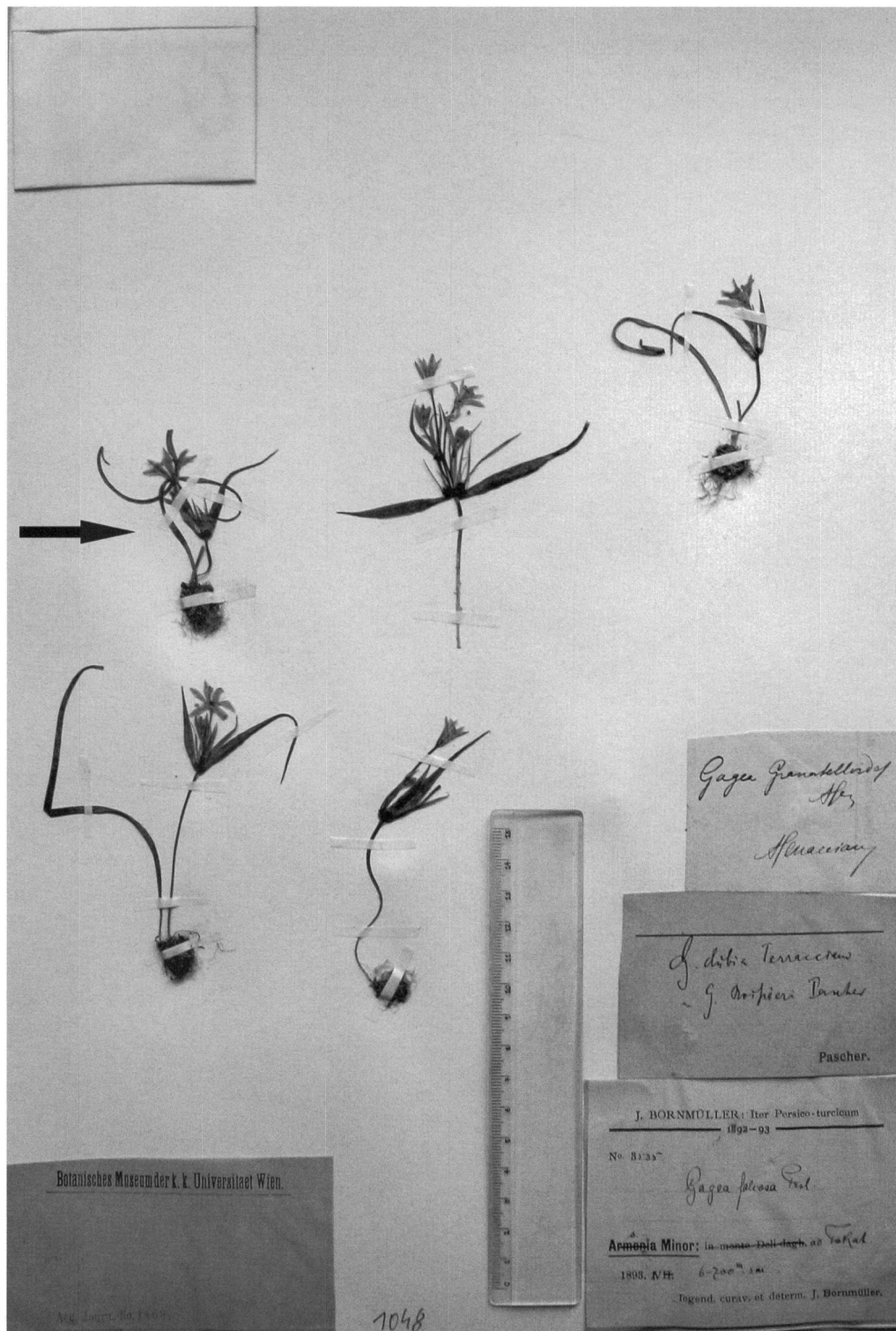


Fig. 2. – Lectotypus of the name *Gagea dubia* A. Terracc.
[Bornmüller 3535, W] [© Naturhistorisches Museum Wien. Reproduced with permission]



Fig. 3. – Lectotypus of the name *Gagea dubia* var. *foliosa* A. Terracc. [Bornmüller 677, W] [© Naturhistorisches Museum Wien. Reproduced with permission]

Gagea durieui Parl., Fl. Ital. 2: 426. 1857, *in obs.*

≡ *G. chrysantha* Durieu, Expl. Sci. Algérie Atlas: tab. 45bis, fig. 2 (1849) non Schult. & Schult. f.

Lectotypus (here designated): tab. 45bis, fig. 2, inchoavit Vaillant (DURIEU DE MAISONNEUVE, 1849) (Fig. 4, arrow B).

Epitypus (here designated in support of the above cited lectotypus): ALGÉRIE: *Gagea chrysantha*, Grand ravin d'Oran (Algérie), III.1852, *Balansa s.n.* (FI!, individual on the left) (Fig. 5).

The citation of PARLATORE (1857: 426) is: “La *Gagea chrysantha* della flora di Algeria è una specie nova che io propongo di chiamare *Gagea Durieui*”. Although the expression “*Gagea chrysantha* della flora di Algeria” does not explicitly refer to Durieu, this reference does exist in the index of the book, where “*G. chrysantha* Durieu” is quoted for the same page (p. 426). Moreover, we can read one page before (p. 425): “Uno studio diligente che ho potuto fare su questa specie [*G. foliosa* (J. & C. Presl) Schult. & Schult. f.] e sulla seguente che ho raccolto vive in Sicilia [*G. chrysantha* Schult. & Schult. f.] mi ha indotto a farle considerare non solo come distinte tra loro, ma ancora dalla *Gagea polymorpha* e *amblyopetala* di Boissier, dalla *Gagea chrysantha* di Durieu, e da altre specie affini”. It must be logically concluded that the “Flora of Algeria” cited by Parlatore is Durieu’s work, where “*Gagea chrysantha*” appears only in the tab. 45bis (Fig. 4, arrow B). In this way, *G. durieui* Parl. is a valid name referring to this image (art. 42.3, see McNEILL & al., 2006), which is also original material here selected as the lectotype for this taxon.

Subsequently to Parlatore’s work, *G. durieui* was apparently forgotten till 1895, when it reappeared, with a description, in Battandier and Trabut’s Flora of Algeria. For this reason, it is usually cited as “*G. durieui* Parl. ex Battandier & Trabut, Fl. Alger. Monocot.: 73 (1895)” – a superfluous reference, since Parlatore himself had no doubt about the differences between the Sicilian and the Algerian taxa.

Few further original material is known. Durieu’s own parts cited by TERRACCANO (1905b) – “Oran, legit Durieu! (ex herb. parisiensi); Djebel Santo, 11 martii 1842, legit Durieu! (ex herb. parisiensi)” – and STROH (1937) – “Durieu, Oran” – were not found presently at P. Moreover, nothing allows to assume that Parlatore knew any *exsiccatum* from this author. On the contrary, at least one collection from Balansa at FI was known to Parlatore before 1957: an herbarium sheet of this collection was sent to him by Cosson in 1855. Since the lectotypical drawing does not give many details, this specimen is here selected as an epitype, supporting the lectotype cited above (art. 9.7 and 9.18, see McNEILL & al., 2006).

Taxonomic discussion. – According to BAYER & LÓPEZ GONZÁLEZ (1991) and TISON (2004a, 2004b), this unit is a good

species, endemic to the W Mediterranean area (Spain, Morocco and Algeria), related to *G. polymorpha* Boiss. and possibly to *G. soleirolii* F. W. Schultz. This species is mostly sub-atlantic and appears especially common in Morocco, a somewhat less-known country for the botanists of the XIXth century; its Oranese classic localities represent the extreme eastern part of its range.

Gagea fibrosa (Desf.) Schult. & Schult. f., Syst. Veg. 7(1): 552. 1829.

≡ *Ornithogalum fibrosum* Desf., Fl. Atlant. 1: 294. 1798.

Lectotypus (here designated): *Ornithogalum fibrosum*, s.d., *Desfontaines s.n.* (P!, left specimen) (Fig. 6).

In the protologue, after the binomial, DESFONTAINES (1798) immediately cites “Tab. 84” (Fig. 7), which can, therefore, be regarded as original material. In the “Herbier de la Flore Atlantique” of Desfontaines at P, there is one specimen labelled as “*Ornithogalum fibrosum*” (Fig. 6), which is original material also. Both drawing and specimen well represent this taxon and we choose the latter as the lectotype, which moreover, is conserved at P together with the original autograph description of this species (Fig. 6). This choice is also in accordance with previous typification processes of four other Desfontaines names (PERUZZI & PASSALACQUA, 2004). We particularly select the well preserved individual on the left as the lectotype (Fig. 6). Incidentally, HEYN & DAFNI (1971: 227) treated the same collection at P as typical material.

Taxonomic discussion. – The typical material of *G. fibrosa* and the plant drawn in *Flora Atlantica* – coming from Kairouan (Tunisie) (“*in arenis prope Kerwan*”) represent immature stages, while typical material of *G. reticulata* subsp. *africana* A. Terracc. is composed by mature well developed plants of this species: the two taxa are very likely synonymic (TISON, 2004b; PERUZZI, 2006). Adult plants bear a long-peduncle and umbellate inflorescence with several flowers. The condensed habitus of the original material explains the usual confusion with the north-eastern Mediterranean *G. rigida* Boiss. & Spruner, which belongs to a different section of the genus (*Gagea* sect. *Graminifoliae*, cfr. LEVICHEV & TISON, 2004). “*G. reticulata* subsp. *africana*” is very common in the subdesertic parts of eastern Maghreb and it is the only species of *Gagea* in this region, showing very variable morphologies (including condensed inflorescences) according to the age of the bulb. Its equality with *G. fibrosa* is unquestionable. The hypothesis that Desfontaines, during two winters in Algeria and Tunisia, saw only immature or young adult plants, is plausible: in semi-arid or arid regions, the propagules of *Gagea* often sprout only once or twice per decade, producing whole generations of plants at the same stage (I. G. Levichev, *pers. comm.*).

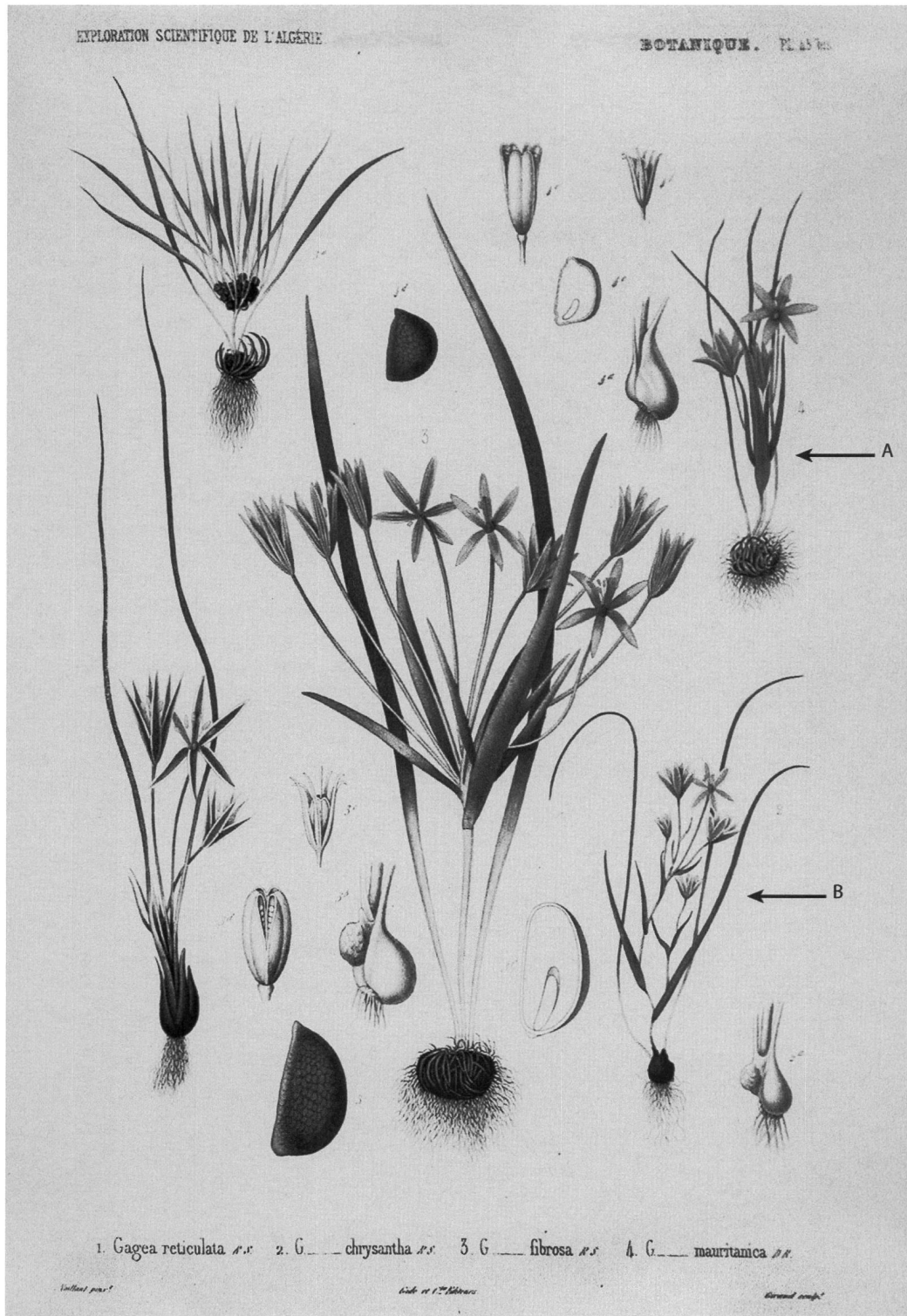


Fig. 4. – Original plate in DURIEU DE MAISONNEUVE (*Exploration Scientifique de l'Algérie Atlas: tab. 45bis*), showing the lectotypes (iconotypes) of the names *Gagea mauritanica* Durieu (arrow A; fig. 4 in the plate) and *Gagea durieui* Parl. (arrow B; fig. 2 in the plate). [Library of the Conservatoire et Jardin botaniques de la Ville de Genève]

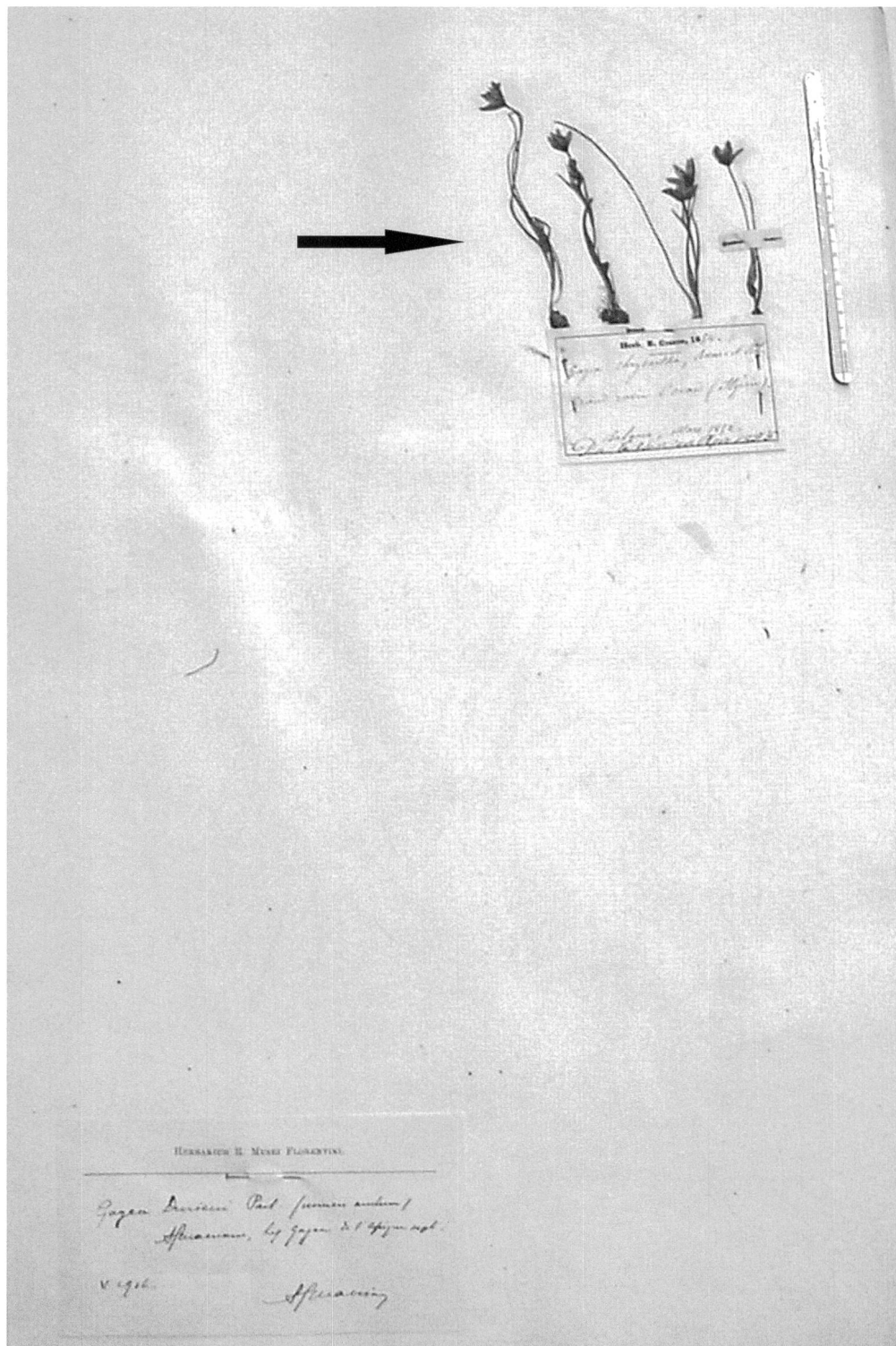


Fig. 5. – Epitypus - in support of the plate shown in Fig. 4 - of the name *Gagea durieui* Parl.
[Balansa s.n., FI] [© Museo di Storia Naturale, Florence. Reproduced with permission]

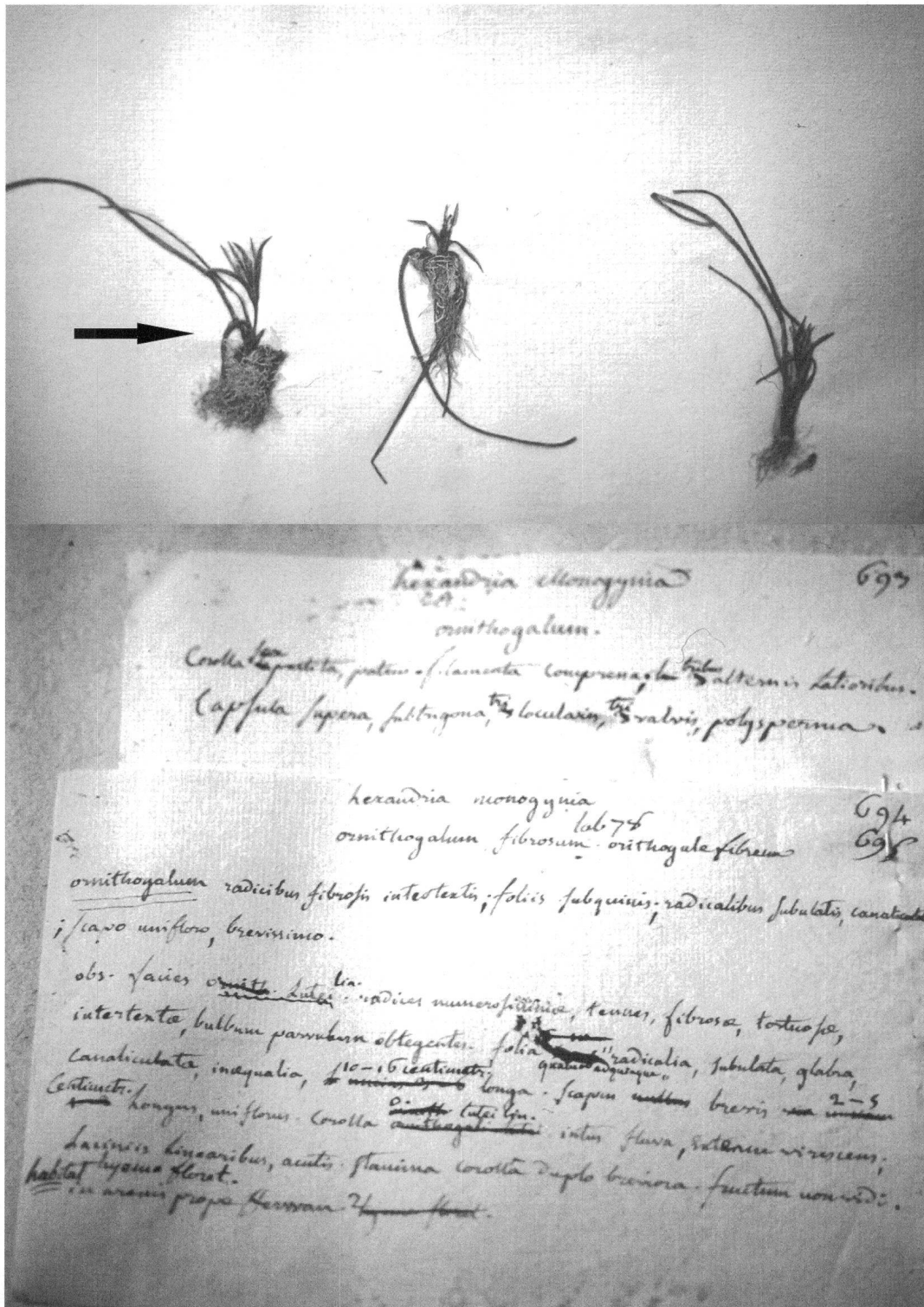


Fig. 6. – Lectotypus of the name *Ornithogalum fibrosum* Desf.
 [Desfontaines s.n., P] [© Museum National d'Histoire Naturelle, Paris. Reproduced with permission]

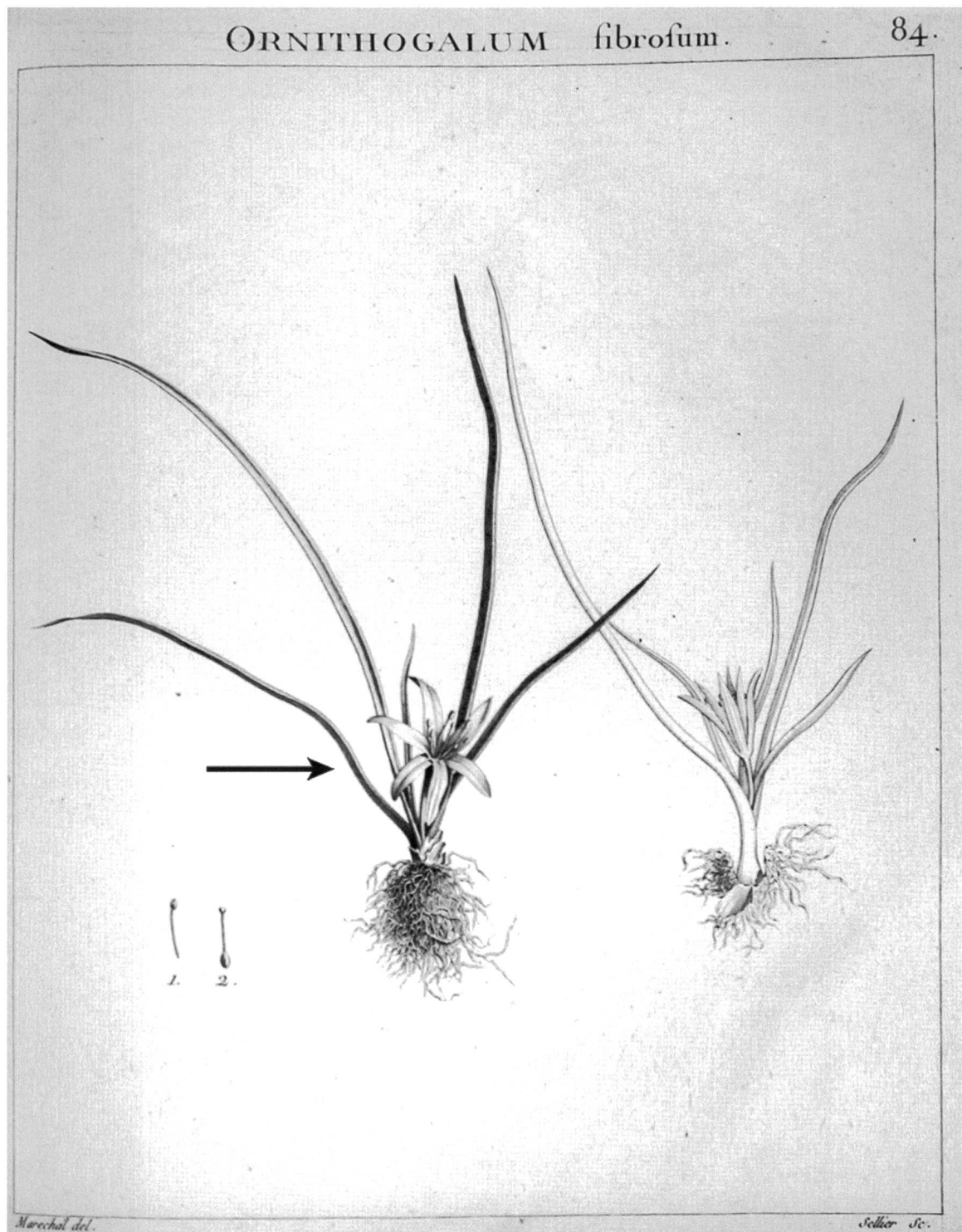


Fig. 7. – Original iconography of *Ornithogalum fibrosum* Desf. in DESFONTAINES (*Flora Atlantica*: tab. 84).
[Library of the Conservatoire et Jardin botaniques de la Ville de Genève]

Gagea granatellii (Parl.) Parl., Fl. Palerm. 1: 376. 1845.
 ≡ *Ornithogalum granatellii* Parl. in L'Occhio 2(11): 85.
 1839.

Lectotypus (here designated): *Ornithogalum Granatelli*, inchoavit G. Ghilardi (PARLATORE, 1839: 85) (Fig. 8).

Epitypus (here designated in support of the above cited lectotypus): **ITALY. Sicily:** In pascuis montosis et in campis aridis. Panormi al Caputo. Monte Busambra, III-IV.1840, *Parlatore s.n.* (G!) (Fig. 9).

In the protologue (PARLATORE, 1839), *Ornithogalum granatellii* (“*Granatelli*”) is described from Sicily, on plants collected in the area near Palermo: “*Panormi nel chiuso di Villafranca, in luoghi scoperti in un giardino presso le falde di M. Pellegrino, al Caputo*”. This species was dedicated by the author to Francesco Maccagnone, prince of Granatelli (1807-1857), a noble literate and poet from Palermo. Although several specimens collected by Parlatore himself have been traced, no one of the herbaria consulted (including FI, notoriously holding most of Parlatore's material) shows any specimen interpretable as original material. For this reason, we are forced to select as lectotype the iconography published together with the diagnosis (Fig. 8). Since this drawing is of average quality and does not show all the diagnostic features of the species, we prefer here to select also an epitype (Fig. 9), in order to avoid ambiguities in the application of the name (according to *art. 9.7 and 9.18*, see MCNEILL & al., 2006). The selected specimen is complete and signed by Parlatore; it well agrees also with localities and other indications (ecology, phenology) cited in the protologue.

Taxonomic discussion. – *Gagea granatellii* sensu lato is a Western Mediterranean complex (TISON, 1998) well-characterized by several features: very thick ageotropic roots; broad ribbon-like, thick basal leaves with duplicated central vascular bundles; cauline leaves with underground basis; incomplete ontogenic sequence including a very short (0-2 years) adult stage with an usually irregular, bulbilliferous, immature-like inflorescence. Several taxonomically uncertain units may be distinguished inside this complex. *Gagea granatellii*, in its narrowest sense, seems restricted to the southern Italy and Sicily and takes place in a series of isolated populations morphologically intermediate between the North African *G. chaberti* A. Terracc. and the Western Mediterranean *G. lacaitae* A. Terracc. (TISON, 2004b). The taxonomic status of these taxa needs further study.

Specimina visa altera. – **ITALY. Sicily:** Busambra, 1841, *Parlatore s.n.* (FI-Webb!, n° 183423); *ibidem* (K!); *ibidem*, s.d., *Parlatore s.n.* (K!); Busambra Sicilia, III.1842, *Parlatore s.n.* (FI!); Girato Villafranca, VI.1843, *Parlatore s.n.* (FI! sub *Gagea granatelli*); Palermo, s.d., *Parlatore s.n.* (RO!); *ibidem* (K!).

Gagea mauritanica Durieu, Expl. Sci. Algérie Atlas: tab. 45bis, fig. 4. 1849.

Lectotypus (here designated): tab. 45bis, fig. 4, inchoavit Vaillant (DURIEU DE MAISONNEUVE, 1849) (Fig. 4, arrow A).

Epitypus (here designated in support of the above cited lectotypus): **ALGÉRIE:** environs d’Oran, II.1842, *Durieu de Maisonneuve s.n.* (P!), upper left specimen (Fig. 10).

The name *G. mauritanica* was published without a diagnosis, together with an illustration (DURIEU DE MAISONNEUVE, 1849). That original iconography (Fig. 4, arrow A), which serves also as formal diagnosis (*art. 42.3*, see MCNEILL & al., 2006) is here selected as the lectotype. A former typification was effected by STROH (1937: 491) on (possibly original) material [Algerie occid. et merid., 1842, *Durieu* (B)], today however destroyed. The collection we traced at P includes five well-developed plants; among them three are well-preserved. Durieu himself wrote only “*Gagea Mauritanica* Dur. – février”. A second hand added: “*Environs d’Oran. Algérie. Durieu de Maisonneuve. 1842*”. The “2” of “1842” is separated from the rest of the number and seems to have been added by one more writer. For the same reasons discussed above for *G. durieui*, one well-preserved individual of this specimen is chosen as epitype, supporting the lectotype (iconotype) cited above (*art. 9.7 and 9.18*, see MCNEILL & al., 2006).

Taxonomic discussion. – *Gagea mauritanica* is a remote relative of the *G. granatellii* taxonomic complex, characterized by very narrow basal leaves, anatomically similar to those of immature plants of *G. granatellii*: this feature must be interpreted as a neotenic divergence (LEVICHEV & KRASOVSKAYA, 2005: 309). In its current sense, this species is known only from five isolated areas in the range of the complex: north-western Algeria (Oranese region [Oran, Mostaganem, Tlemcen]: TERRACCIANO, 1905b), southern Italy (Puglia) and Sicily (PIGNATTI, 1982; FORTE & al., 2002; PERUZZI & AQUARO, 2005), Mallorca (RITA & al., 1985) and southern France (MOLINA & al., 1998). Very recent investigations in North Africa allowed to confirm the Oranese area, but no further African populations, even in the neighbouring Moroccan region of Oujda. All the populations - except the doubtful Sicilian one - have been recently studied by the authors. Two different systematic units clearly appear: one in Algeria and Balearic Islands (*G. mauritanica* s.str.), having subcylindric “*G. bohémica*-like” basal leaves with 3 vascular bundles; one in southern Italy and southern France, having flattened basal leaves with 5-9 vascular bundles. All these plants are morphologically and ontogenetically almost identical except the basal leaves, and share similar thermo-mediterranean ecology. According to the neotenic divergence theory (LEVICHEV & KRASOVSKAYA, 2005: 309), however, their leaf morphology and anatomy suggest two different species. As does the remainder of the *G. granatellii* complex, these taxa need further study.



Fig. 8. – Lectotype (iconotype) of the name *Ornithogalum granatellii* Parl. in PARLATORE (*L'occhio* 2(11): 85).
[Library of the Conservatoire et Jardin botaniques de la Ville de Genève]

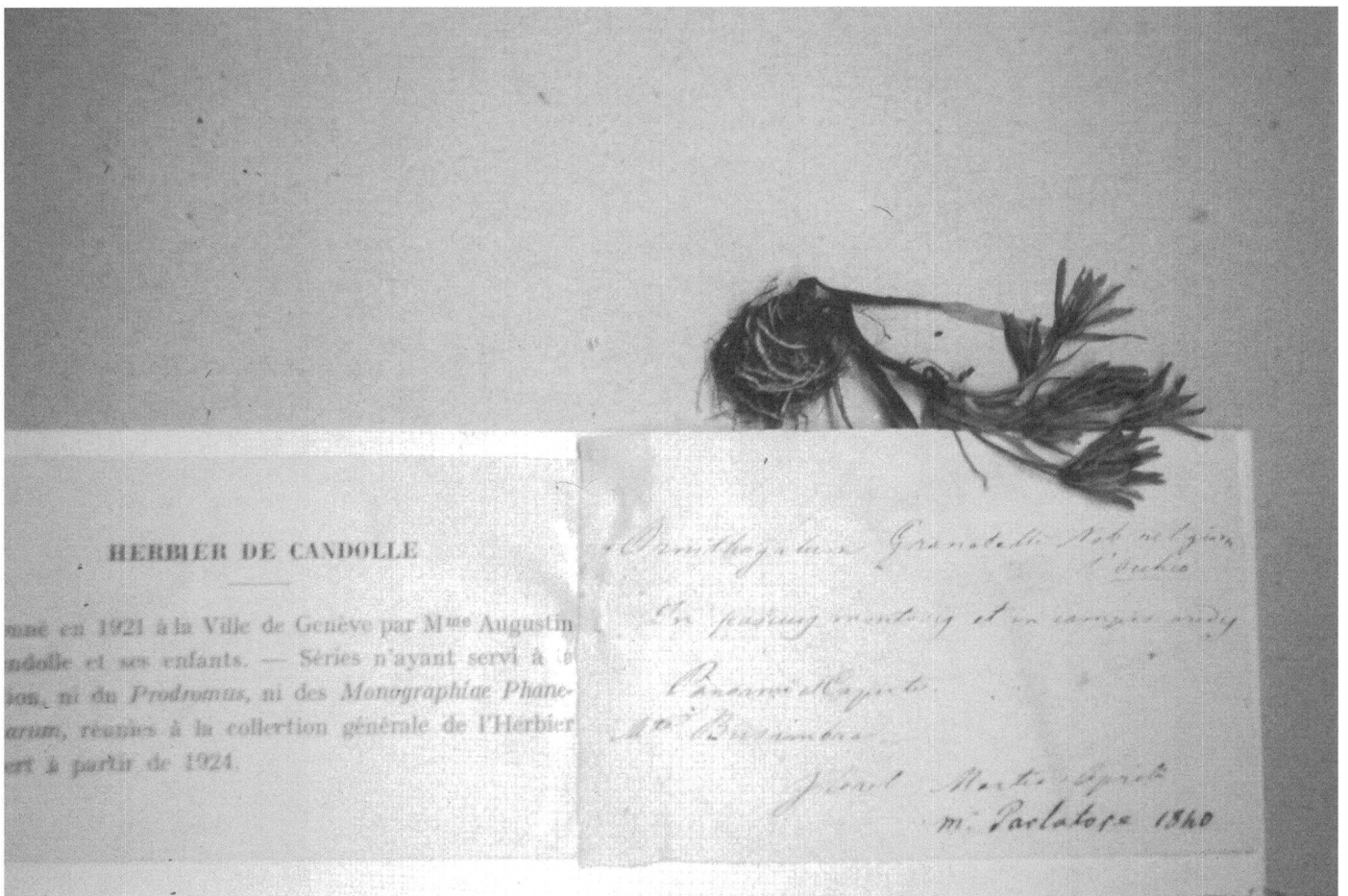


Fig. 9. – Epitypus - in support of the plate shown in Fig. 8 - of the name *Ornithogalum granatellii* Parl. [Parlatore s.n., G] © Conservatoire et Jardin botaniques de la Ville de Genève



Fig. 10. – *Epitypus* - in support of the plate shown in Fig. 4 - of the name *Gagea mauritanica* Durieu.
[Durieu de Maisonneuve s.n., P] [© Museum National d'Histoire Naturelle, Paris. Reproduced with permission]

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