

Typification and taxonomic status of *Dianthus balbisii* subsp. *knappii* comb. et stat. nov. (Caryophyllaceae)

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Abstract. Morphological observations of *Dianthus knappii* (here typified) from Herzegovina are presented and critically compared with those of the closely related *D. balbisii* Ser. s. l. *Dianthus balbisii* subsp. *knappii* comb. et stat. nov. is proposed.

Key words: Balkans, *Dianthus*, Italy, taxonomy, typification

Introduction

Dianthus knappii (Pant.) Borbás (Caryophyllaceae) is a yellow-flowered carnation species, endemic to Herzegovina and SW Montenegro (Jalas & Suominen 1986; Tutin & Walters 1993; Šilič 2002), included in the *Red Data Book of the Flora of Bosnia and Herzegovina*, and assigned to the category Vulnerable (Šilič 1996).

When the authors visited Bosnia-Herzegovina in 2003, they were surprised by the resemblance between *D. knappii* and the S Italian endemic *D. guliae* Janka (for the nomenclature of the latter species, see Peruzzi & Gargano 2006), a critical taxon included in the *D. balbisii* Ser. aggr., including also *D. liburnicus* Bartl. ex Bartl. & Wendl. and *D. liburnicus* var. *lucanus* Lacaita – widespread from SE France to peninsular Italy and the Adriatic part (Liburnia, in classical times) of the Balkan Peninsula (Greuter & al. 1984; Tutin & Walters 1993). Morphological studies aiming to clarify the taxonomic relationships among these taxa were carried out and the name *D. knappii* was typified.

Material and methods

Herbarium specimens of *D. guliae* were used preserved in Florence (FI); the Botanic Garden of Calabria University (CLU); Cluj-Napoca, Romania (CL); Budapest, Hungary (BP), and the British Museum, UK (BM), along with specimens of *D. balbisii* s.l. conserved in CLU and BM, and specimens of *D. knappii* (Pant.) Borbás conserved in Sarajevo, Bosnia and Herzegovina (SARA) and Budapest (BP).

Specimina visa:

***Dianthus balbisii* s.l.:** **Croatia, Quarnero** – Istria. In herbis prope Castuam et Voloscam ad sinum flantaticum; solo calc. 50–300 m, s.d., *Pichler* (BM, topotype of *D. liburnicus*); **Italy, Liguria** – Sestri Levante (Riviera di Genova), in rup. marit. siliceis, flower delicate pink, 18.07.1914, *Lacaita* 27086 (BM, topotype of *D. balbisii*); **Basilicata** – Foresta di Gallipoli-Cognato (Basilicata), in collibus herbosis, ca. 600 m, petala rubina, 29.06.1921, *Lacaita* 2422 (BM, type material of *D. liburnicus* var. *lucanus* Lacaita); *ibidem*, forma *luxurians*, *Lacaita* 24227 (BM, type material of *D. liburnicus* var. *lucanus* Lacaita);

Calabria – Rossano, in dumetis montanis, solo sili-
ceo, ca. 700 m, 17.06.1921, *Lacaita* 23751 (BM); Arca-
vacata di rende (Cosenza) nei pressi dello svincolo per
l'Università, 250 m, V/2002, *Gargano* (CLU, no. 2017);
primo svincolo Università (Arcavacata di Rende, Cosenza),
UTM XD 05.56, 220 m, 23.06.1998, *Bernardo* (CLU,
no. 2018); strada per Caloveto (Cosenza), ca. 500 m, 10/
VI/1993, *Bernardo* & *Gangale* (CLU, no. 2019); Valle del
Fiume Lese nei pressi del ponte sul Lese lungo la stra-
da per Verzino (Crotone), 200 m, 10.07.1995, *Bernardo*,
Gangale et *Naccarato* (CLU, no. 2020); Acque Termali
Bruciarello presso lo svincolo sulla S.S. 107 per Cotronei
(prov. Crotone, Calabria), 130 m, 29/V/2000, *Bernardo*
(CLU, no. 2588); Cerenzia, nei pressi dello svincolo della
SS 107 (Prov. di Crotone, Calabria), 587 m, 15.06.2002,
Bernardo (CLU, no. 2589); Caloveto, presso la cava di
Peppe (Prov. Cosenza, Calabria), affioramento rosso
ammonitico, 550 m, UTM 33S XD 51.73, 22/V/1999,
Bernardo (CLU, no. 7454).

***Dianthus guliae*: Italy, Tuscany** – Cetona – sopra
Sferracavalli, 31.07.1939, *Corti* (FI); Cetona, a Belve-
dere, 14.06.1943, *Negri* et *Corradi* (FI); **Campania** – In
campestribus dumosis inter Eboli et fl. Sele non procul
a Neapoli, 18.06.1874, *Janka* (BP); Lucania – prov. Saler-
no: secus viam inter praga Sacco et Teggiano, in pascuis
montanis loco dicto Timpa Muletta, 1050 m, solo schis-
toso, 10.07.1921, *Lacaita* (FI); Timpa Muletta tra Sacco
e Teggiano (Salerno) in pascuis montanis ca. 1050 m,
10.07.1921, *Lacaita* (BM, FI); In pascuis La Pecora, ca.
1000 m, inter Sacco et Teggiano (Lucania) ubi copiosis-
sima, flores supra lutei, subtus rubiginosi, 02.08.1914,
Lacaita (BM); Monte Alburno, s.d., *De Philippis* (FI);
Campania, Vallo di Diano, 17.06.1993, *Bernardo* (CLU,
no. 2053); Sassano, Parco del Cilento provincia di Saler-
no Campania, 27.06.2001, *Musacchio* (CLU, no. 2549,
2550, 2551); **Calabria** – Calabria, Settore orientale del
Massiccio del Pollino, sul versante settentrionale del
Monte Sellaro, presso il Bifurto (Cerchiara di Calabria, CS),
UTM XE 16.13, flysch argillit-
ico – calcareo a contatto con
roccia calcarea ca. 950 m esp.
NE, 15.06.1994, *Bernardo* (FI);
CLU, no. 2050, 2051, 2052);

***Dianthus knappii*: Herce-
govina** – Gatačko Pole, Fazla-
gića/Kula, 970 m, 17.08.1926,
Maly (SARA, no. 11544); Pa-
gum Bijele Rudine prope Bi-

leće, 23.09.1979, *Živković* (SARA, no. 11540); Sup-
ra pagum Korita prope Koritska Jama, 23.07.1979,
Djuran (SARA, no. 11539); Steppen na Gacko, 08.1906,
Maly (SARA, no. 11542); Staza prope pagum Gacko,
23.07.1979, *Šilič* (SARA, no. 11534); Trebeni in dumetis
montis Gliva copiose, 08.1886, *Vandas* (SARA, no.
11546); **SW Montenegro** – Auf trockenen steppen bei
Miljkovac, 1869, *Knapp* (BP).

For SEM studies, the material was directly observed
and photographed at 20kV. The analysis was carried
out on very small leaf samples taken from the following
herbarium specimens: CLU, no. 2017 (*D. balbisii*); CLU,
no. 2551 (*D. guliae*); SARA, no. 11540 (*D. knappii*).

Quantitative and qualitative features of *D. guliae*,
D. balbisii and *D. knappii* derive from observations
carried out on herbarium specimens.

Results

Examining the morphological characters reported in
Table 1, there have been wide overlaps among *D. guliae*,
D. balbisii and *D. knappii* in respect to all quantita-
tively compared features. The bract is distinctly long-
er than calyx in some individuals of *D. guliae*, while in
D. balbisii and *D. knappii* the bract seldom overtops
the calyx. *D. knappii* is always scabrid on the surface of
leaves and bracts, on the average has a greater number
of flowers, and is with a smaller calyx width than in
D. guliae and *D. balbisii*.

Scabridity of the leaves in *D. knappii* is due to the
presence of bi-celled, somewhat pyramidal tubercles, ca.
20 µm long, which occur grossly arranged in lines. Those
tubercles are absent in *D. balbisii* and *D. guliae* (Fig. 1).
On the other hand, the size of stomata in *D. balbisii* and
D. knappii completely overlaps, while *D. guliae* tends to
be distinct, thanks to longer and larger stomata (Fig. 2).

Table 1. Morphological characters of *D. balbisii*, *D. guliae* and *D. knappii*. Numerical data
are expressed in 10–90 percentiles, with the extreme values in brackets.

	<i>D. guliae</i>	<i>D. balbisii</i>	<i>D. knappii</i>
foliar surface	glabrous	glabrous	scabrid
bract	almost equalling to longer than flowers	a little shorter to slightly longer than flowers	a little shorter to slightly longer than flowers
width of leaves (mm)	2 – 3.6 (4)	(1.5) 1.85 – 4 (5.5)	(2) 2.4 – 3.5 (4)
length of calyx (mm)	(16) 16.7 – 18.6 (21)	(16) 17.7 – 20 (21)	(17) 17.6 – 18
width of calyx (mm)	(4) 4.4 – 5 (6)	(3) 4 – 5.15 (6)	3 – 4.1 (5)
length of petal limbs (mm)	(4) 4.7 – 7 (7.5)	(5) 5.85 – 8 (11)	5 – 7
number of flowers	(1) 2 – 6 (8)	(1) 3 – 9	1 – 11 (15)
number of inflorescences	1	1(2)	1 (2)
corolla colour	citrine to orange yellow	pink to red – purplish	citrine

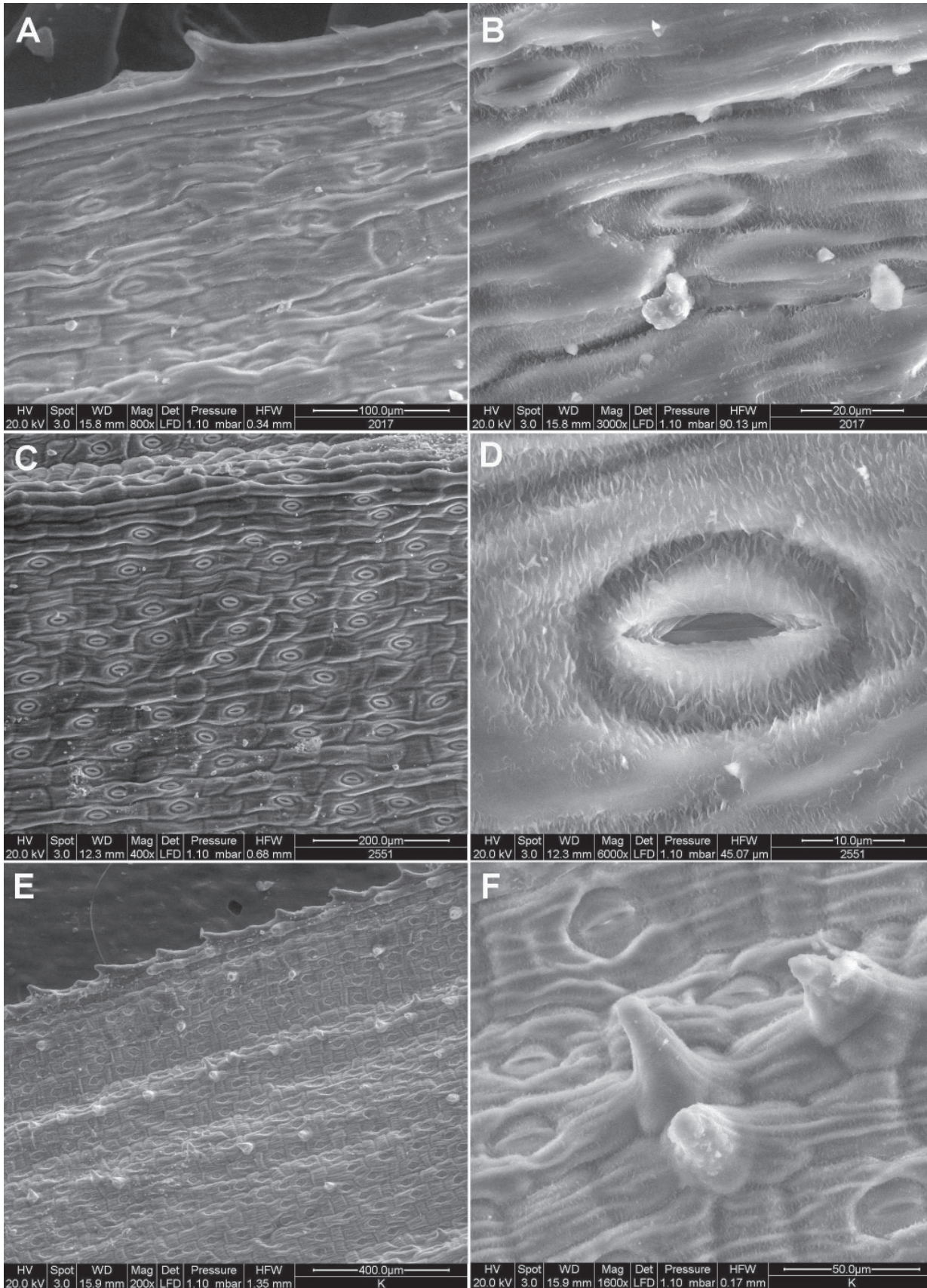


Fig. 1. SEM microphotographs of leaf surface of: *Dianthus balbisii*: A, general view, B, particular; *D. guliae*: C, general view, D, particular; *D. knappii*: E, general view, F, particular.

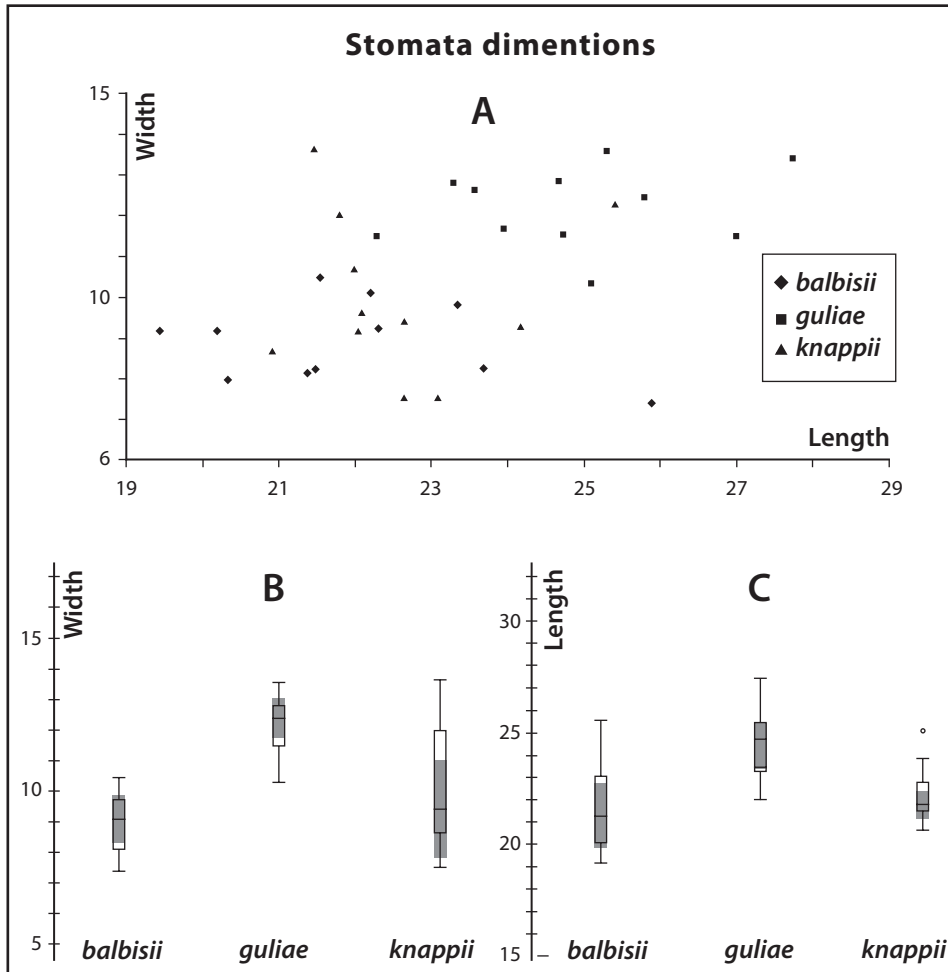


Fig. 2. Comparison of stomata dimensions between *D. balbisii*, *D. guliae* and *D. knappii*: **A**, scatter plot of length over width; **B**, boxplots illustrating the variability of stomata width; **C**, boxplots illustrating the variability of stomata length. In the figure, the outlined central box depicts the middle 50% of the data extending from upper to lower quartile; the horizontal bar is on the median. The ends of the vertical lines (or "whiskers") indicate the minimum and maximum data values, unless outliers are present, in which case the whiskers extend maximum 1.5 times to the interquartile range. Superimposed grey areas indicate confidence interval bounds around its median (median \pm 1.58 times to the interquartile range). Circles indicate outliers, unless extreme outliers are present, in which case the circles extend maximum three times to the interquartile range and the extreme outliers are indicated with asterisks. All measurements are in μm .

Discussion

The three studied units appear closely related to each other, and it is very difficult to define clearly distinctive characters among them, other than the corolla colour (*D. balbisii* vs. *D. guliae*/*D. knappii*), stomata dimensions (*D. guliae* vs. *D. balbisii*/*D. knappii*) and scabridity (*D. knappii* vs. *D. balbisii*/*D. guliae*).

As far as karyology is concerned, *D. knappii* was repeatedly reported with $2n=30$ (Andersson-Kottö & Gairdner 1931; Rohweder 1934; Gentscheff 1937; Carolin 1957). *D. balbisii* s.s. also has $2n=30$ chromosomes (Loon & Jong 1978, sub *D. ferrugineus* Mill.) – counted on plants coming from Alassio (Liguria, N Italy) – and the same number was found in the S Italian *D. guliae* from Calabria by Peruzzi (2003). Indeed, according to Fedorov (1969), the chromosome number $2n=30$ is the lowest and the most widespread within the genus *Dianthus* L., which therefore should be characterized by a basic number $x=15$.

Conclusions

Thanks to the morphological and karyological affinities, it seems appropriate to consider *D. knappii* as a subspecies of *D. balbisii*, because of the tendency of the two taxa to occur in distinct areas, even if with few overlaps. Irrespective that *D. guliae* is not directly object of this study, it probably deserves a taxonomical status as subsp. of *D. balbisii* and this will be a matter of further investigation.

Dianthus balbisii Ser. in DC. [Prodr. 1: 356 (1824)] subsp. *knappii* (Pant.) Peruzzi & Uzunov comb. et stat. nov.

D. liburnicus var. *knappii* Pant., Österr. Bot. Z. 23: 4 (1873)

\equiv *D. knappii* (Pant.) Borbás, Math. Természettud Közlem 13: 196 (1877)

Lectotypus (here designated): Auf trockenem steppen bei Miljkovac, 1869, *Knapp* (BP!, Fig. 3).

The specimen traced at BP is eligible as a lectotype, since it is part of the material – originally collected by Knapp – used four years later by the author for variety description. The selected type is clearly referable to the systematic unit to which the concerned name currently applies.

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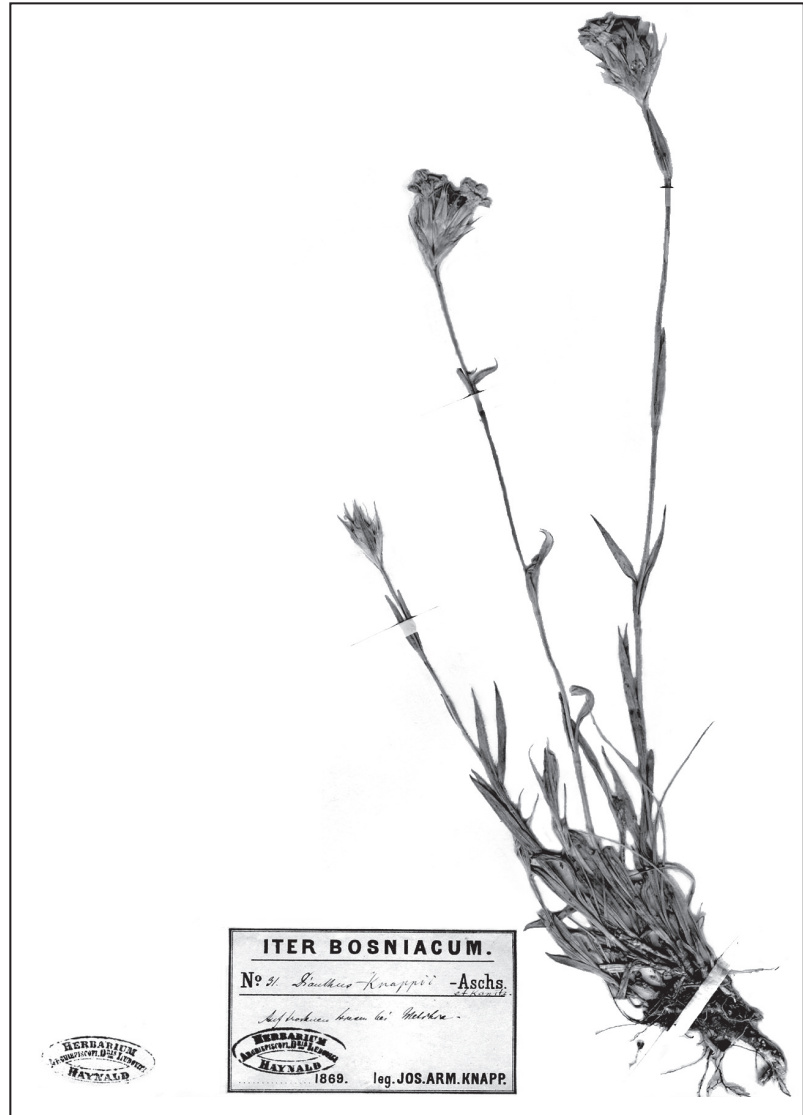


Fig. 3. Lectotype of the name *D. liburnicus* var. *knappii* Pant., conserved in BP.

