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## ***Goniolimon africanum* (Plumbaginaceae), a new endemic species from North Africa**

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### **Abstract**

A new species, *Goniolimon africanum* is described and illustrated from Algeria and Tunisia (North Africa). This study, based on investigations of herbarium specimens and data from literature, highlights the fact that this species was collected for the first time by Ernest Cosson and provisionally named ‘*Goniolimon luteolus*’ nom. nud., while it was later attributed to *G. tataricum*. A detailed morphological study, carried out on some related European species of *Goniolimon*, has emphasized that African populations are taxonomically well differentiated from European ones. Its distribution, ecology and relationships are also examined. A table comparing the new species with the closest allied European species of *Goniolimon* is provided.

**Key words:** Algeria, *Goniolimon*, herbaria, Mediterranean flora, morphology, taxonomy, Tunisia

### **Introduction**

The genus *Goniolimon* Boissier (1848: 632) belongs to the family Plumbaginaceae Jussieu (1789: 92) and includes 20–30 taxa, distributed from East Europe (Balkan Peninsula, Aegean islands, Romania, Ukraine, European Russia) to Asia (Anatolia, China, Mongolia, former Asiatic Russia), with isolated populations in North Africa and Italy (Linczevski 1952, Klokov 1957, Răvărut 1960, Quézel & Santa 1963, Pignatti 1972, 1982, Pottier-Alapetit 1981, Ančev 1982, Tammaro *et al.* 1982, Bokhari & Edmondson 1982, Hepper 1988, Greuter *et al.* 1989, Nikolić 1994, Pen & Kamelin 1996, Le Floc'h *et al.* 2010, Domina 2011, Dimopoulos *et al.* 2013, Buzurović *et al.* 2013, 2016, Urgamal *et al.* 2014, Vangjeli 2015, Strid 2016a,b). In Euro-Mediterranean countries the genus is represented mainly by scattered or isolated endemic species, such as *G. italicum* Tammaro, Pignatti & Frizzi (1982: 39) from Apennine (Central Italy), *G. dalmaticum* Reichenbach (1855: 61) from Croatia, *G. sartorii* Boissier (1859: 67) and *G. heldreichii* Halácsy (1886: 241) from Greece. Other species with a wider distribution occur in the Balkan Peninsula and East Europe (Bulgaria, Romania, Moldavia, Ukraine, Caucasus, and Russia). Among them there are: *G. tataricum* (Linnaeus 1753: 275) Boissier (1848: 632), *G. incanum* (Linnaeus 1767: 59) Hepper (1988: 212) (= *G. collinum* (Grisebach 1846: 300) Boissier (1848: 633)), *G. besserianum* (Schultes 1820: 789) Kusnezov (1909: 202), *G. elatum* (Fischer 1812: 18) Boissier (1848: 634), *G. graminifolium* (Aiton 1789: 383) Boissier (1848: 633), *G. rubellum* (Gmelin 1774: 199) Klokov & Grossheim in Grossheim (1949: 593), *G. speciosum* (Linnaeus 1753: 275) Boissier (1848: 634) and *G. tauricum* Klokov (1957: 521). According to the literature (Linczevski 1952, Quézel & Santa 1963, Pottier-Alapetit 1981, Greuter *et al.* 1989, Domina 2011), only *G. tataricum* seems to have a wider trans-continental distribution from North Africa to Euro-Asia. Other Russian and Asian taxa are distributed eastwards (Linczevski 1952, Klokov 1957, Grossheim 1967, Pen & Kamelin 1996, Urgamal *et al.* 2014).

Based on literature (Battandier & Trabut 1888, 1902, Quézel & Santa 1963, Pottier-Alapetite 1981, Le Floc'h *et al.* 2010) and herbarium investigations, geographically very isolated populations of *G. tataricum* were recorded from Africa and particularly in some localities in northern Algeria and one in Tunisia. In-depth taxonomical investigation on the genus *Goniolimon* in the Balkan Peninsula (Buzurović *et al.* 2013, 2016) questioned the recorded occurrence of *G.*

*tataricum* in North Africa. Therefore, we performed research to verify the correct taxonomical position of these African populations. This study was based on herbarium material, which allowed examination of morphological differences between African populations and those ones typical of *G. tataricum*, as well as with the other closely related species. We thus conclude that the African populations are attributable to a species new to science, named here *G. africanum*.

## Material and methods

African material of *Goniolimon* were studied only from herbarium specimens deposited in different European herbaria, namely BM, CLF, GRM, MANCH, MPU, P, W, and WAG. Abbreviations of all herbarium acronyms are according to Thiers (2018). A total of thirty herbarium specimens of *G. africanum* were studied, and for the morphological analysis ten specimens from P herbarium were used. From each specimen, three spikelets with five spikes and five flowers were prepared on adhesive tape for measuring (with permission from P).

Plant material of morphologically closely related European taxa (*G. tataricum*, *G. incanum*, *G. italicum*, *G. dalmaticum*, *G. heldreichii*, *G. sartorii*, and *G. besserianum*) were used for morphological comparison (Tables 1–2), from collections by the authors and from herbarium material or virtual herbaria: AMD, BEO, BEOU, BM, BP, BUNS, C, CAT, CGE, CNHM, E, ENSA, FR, G, GDB, GE, H, K, L, LE, LD, M, MA, MKNH, MNHM, MW, OXF, P, PAD, PAL, S, SO, SOA, SOM, SARA, TUN, UPS, W, WU, ZA, ZAGR and ZAHO.

A distribution map of *G. africanum* was produced by using chorological data provided in the literature (Battandier & Trabut 1888, 1902, Quézel & Santa 1963, Pottier-Alapetite 1981) and from herbarium data. Chorological data were plotted on the map as circles (black circles—herbarium record; red circles—literature record; and red/black circles—herbarium and literature records) with coordinates as rough positioning by using Q-GIS software (Fig. 4).

## Taxonomic treatment

### *Goniolimon africanum* Buzurović, Bogdanović & Brullo sp. nov. (Figs. 1–2)

**Type:**—AFRICA. Algeria: Batna, sur les collines arides, 15 July 1853, B. Balansa 814 (sub *Goniolimon tataricum* Boiss. / *Statice tatarica* L., *Goniol. luteolus*, Coss. et DR.! olim. / Herb. E. Cosson) (holotype P 05388232!; isotypes P 05117905!, BM!, MANCH!, MPU 243820!, W 99191!, W 278982!, WAG 1169431!).

**Diagnosis:**—*Species a Goniolimone tatarico similis sed usque ad 25 cm alta, foliis glaucescentibus, spathulatis vel oblanceolato-spathulatis, 2–10 cm longis, 4–14 mm latis, acuminato-aristatis, 1-nervatis, scapo striato-costato, pubescenti, spicis 8–20 mm longis, spiculis 1(2)-floris, ad 5–7 pro centimetro dispositis, bractea exteriore 2.3–2.5 mm lata, cuspide 1.5–2.5 mm longa, bractea media 4–5 mm longa, bractea interiore 4.5–5.5 mm longa, cuspide centrale 2–2.5 mm longa, cuspidibus lateralibus 0.7–1.5 mm longis, auriculis absentibus, calycis tubo dense pubescenti, nerviis fere ad apicem loborum attingentibus, lobis 1–1.3 mm longis.*

**Description:**—Plant perennial, forming a sub-shrub, 7–20(25) cm high, with 1–3 erect stems and a robust taproot. Caudices 2–5 cm long, branched, living leaves in rosettes at apices and branches covered by dry leaf remnants. Leaves glabrous, coriaceous, rigid, glaucescent, minutely dotted, 2–10 cm long and 4–14 mm broad, spatulate to oblanceolate-spatulate, acuminate-aristate mucronate, 1-nerved, with margin narrowly hyaline and often undulate, gradually tapering into the petiole. Stems scabrous-pubescent, rigid, striate-ribbed, 6–15(20) cm long, branched in the upper part. Inflorescence densely branched, with branches curved, rigid. Spikes 8–20 mm long, straight. Spikelets 7–8 mm long, 1(2) flowered, densely arranged, 5–7 per cm. Outer bract 3.5–5.0 mm long and 2.3–2.5 mm wide, triangular-ovate, long cuspidate, mucronate at apex, pubescent, with narrow hyaline margin, with cusp 1.5–2.5 mm long. Middle bract membranous, 4–5 mm long and 1.5–1.8 mm wide, oblong, laterally gibbous, long cuspidate, mucronate at apex, pubescent in the central part and cusp. Inner bract oblong to oblong-rounded, 4.5–5.5 mm long and 2.2–2.5 mm wide, 3-cuspidate, mucronate at the apex, with central cusp 2.0–2.5 mm long and lateral ones 0.7–1.5 mm long; margin membranous; hairy in the central part and cusps. Calyx 6.5–7.0 mm long, exceeding the inner bract by 2.5–3.5 mm; calyx tube densely pubescent, with 5 ribs reaching almost the lobe apex; lobes triangular, 1.0–1.3 mm long, undulate at the margin (Figs. 1–2).

**TABLE 1.** Morphological comparison between *Goniolimon africatum* and the known European *Goniolimon* species.

Character	<i>G. africanum</i>	<i>G. tataricum</i>	<i>G. dalmaticum</i>	<i>G. incanum</i>	<i>G. heldreichii</i>	<i>G. italicum</i>	<i>G. bessaricum</i>	<i>G. sartorii</i>
Plant height (cm)	7–20(25)	10–40	7–30	10–45	(10)15–35	10–25	10–25(40)	12–30
Leaf colour	glaucescent	glaucescent	pale-green	glaucous	green-glaucous	green-glaucous	pale-green	glaucous
Leaf shape	spatulate to ob lanceolate- spatulate	broadly lanceolate	ob lanceolate- spatulate	narrowly lanceolate to oblong- lanceolate	spatulate to ob long-spatulate	ob lanceolate- spatulate	ob long-lanceolate	spatulate to lanceolate
Leaf length (cm)	2–10	(5)10–20(25)	3–8	5–16	2–13	5–10	3–8(12)	2–9
Leaf width (cm)	0.4–1.4	2.0–2.5(3.5)	1.2–1.6	0.3–1.3	1.6–3.2	(0.3)0.6–1.0	0.3–1.5(1.8)	0.3–1.5
Leaf apex shape	acute- acuminate-aristate mucronate	obtuse to rounded mucronate	obtuse to aristate mucronate	acute- acuminate- apiculate mucronate	acute- acuminate- apiculate mucronate	cuspidate- acuminate- mucronate	acute- acuminate-apiculate mucronate	acute- apiculate mucronate
Leaf nerves	uninerved	pennerived	uninerved	uninerved	pennerived	uninerved	uninerved	uninerved
Leaf indumentum	glabrous	glabrous	glabrous	sparsely pubescent to ciliate at margin	glabrous or ciliate at margin	pubescent at margin	glabrous	glabrous
Stem branches	striate-ribbed	broadly winged	ribbed to slightly winged	ribbed below, winged above	ribbed	ribbed to winged	ribbed to winged	ribbed to winged
Stem indumentum	always pubescent	to sparsely puberulous	glabrous	glabrous	glabrous	sparsely pubescent	glabrous	glabrous
Spike length (cm)	0.8–2.0	2.5–10.0	0.5–2.0	0.5–1.3	1–4	0.5–1.2	0.5–1.0	0.5–1.5
Spikelet per cm	5–7	2–4	7–8	1–3	3–5	1–5	1–4	7–9
Flower per spikelet	1(2)	2–3	1–2	1	1	1–2	1(2)	1
Outer bract length (mm)	3.5–5.0	4.0–4.5	3.5–5.0	2.5–3.0	2.8–3.5	3.5–4.8	3.5–4.0	3.0–3.7

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TABLE 1. (Continued)

Character	<i>G. africanum</i>	<i>G. tataricum</i>	<i>G. dalmaticum</i>	<i>G. incanum</i>	<i>G. heldreichii</i>	<i>G. italicum</i>	<i>G. besseriannum</i>	<i>G. sartorii</i>
Outer bract width (mm)	2.3–2.5	2.5–3.0	2.2–2.7	2.2–2.8	2.3–2.8	1.7–2.7	1.8–2.2	2.0–3.5
Outer bract cusp length (mm)	1.5–2.5	1.2–1.3	1.3–1.5	1.0–1.3	0.7–1.0	1.2–1.8	1.5–2.0	1.0–1.5
Outer bract indumentum	totally pubescent	totally pubescent	glabrous with glands in the middle	glabrous and glandulous	glabrous with ciliate cusp	totally hairy	glabrous to sparsely pubescent	glabrous
Middle bract length (mm)	4–5	3.7–4.0	5.0–5.5	4.6–5.2	4.5–4.7	4.5–5.0	4–5	4.2–5.0
Middle bract width (mm)	1.5–1.8	1.5–1.7	1.6–2.0	1.8–2.2	1.7–1.8	1.2–1.5	1.2–1.6	2.3–2.5
Middle bract indumentum	totally pubescent	totally pubescent	glabrous	glabrous with ciliate cusp, glandulous	glabrous with ciliate cusp	totally hairy	glabrous to sparsely pubescent	glabrous or with ciliate cusp
Inner bract length (mm)	4.5–5.5	4.0–4.5	4.5–6.6	4.2–5.0	3.7–5.0	4.8–5.2	3.7–5.0	3.3–4.8
Inner bract width (mm)	2.2–2.5	2.5–2.8	2.0–2.8	2.5–2.8	2.2–4.0	1.5–2.5	1.8–2.4	3.0–3.3
Inner bract central cusp length (mm)	2.0–2.5	1.4–1.7	1.7–1.8	1.5–2.2	1.2–2.0	2.2–2.5	0.8–1.0(2)	1.4–2.0
Inner bract lateral cusps length (mm)	0.7–1.5	0.6–0.8	1.0–1.2	1.0–1.7	0.7–1.0	1.3–2.0	0.4–0.8(1.2)	0.7–1.0
Inner bract indumentum	pubescent in central part and cusps	pubescent in central part and cusps	ciliate at cusp margin	glabrous, with ciliate cusps, glandulous	glabrous, with ciliate-pubescent cusps	totally hairy	glabrous to sparsely ciliate in the centre	glabrous or with ciliate cusp
Auricle occurrence in the lateral cusps	absent	present	absent	present	present	subabsent	subabsent	subabsent
Calyx indumentum	densely pubescent only in tube	densely hairy up to apex of ribs	densely pubescent only in tube	glabrous	hairy at tube base	densely hairy up to apex of ribs	glabrous to sparsely pubescent in tube	glabrous
Calyx length (mm)	6.5–7.0	6.5–7.0	7.2–8.0	7.0–7.7	6–7	7–8	7–8	5.0–6.3
Calyx ribs	reaching almost lobe apex	not reaching lobe base	reaching lobe base	reaching lobe base	exceed lobe base	reaching lobe base	reaching lobe base	exceed lobe base
Calyx lobes length (mm)	1.0–1.3	1.3–1.5	1.7–2.0	1.0–1.2	0.8–1.2	1.5–1.7	2.0–2.2	0.7–1.0

**TABLE 2.** Vouchers of *Goniolimon* species used for the morphological analyses.

Taxon	Country	Locality	Date	Collector(s)	Herbarium
<i>G. africanum</i>	Algeria	Batna	15 July 1853	B. Balansa	P
	Algeria	Batna	17 June 1853	E. Cosson	P
	Algeria	Batna	1854	du Colombier S. Bogdanović & U.	P
<i>G. besserianum</i>	Romania	Cheia	26 June 2016	Buzurović	BEOU, CAT, ZAGR
	Bulgaria	Balčik, Topola	23 July 2014	U. Buzurović <i>et al.</i>	BEOU, CAT, ZAGR
	Moldovia	Podolia, pr. Balta	s.d.	E. Lindeman S. Bogdanović & U.	P
<i>G. dalmaticum</i>	Croatia	Split, Marjan	11 July 2015	Buzurović	BEOU, ZAGR
			21 September		
	Croatia	Dalmatia, Vir	2008	S. Bogdanović	ZAGR
<i>G. heldreichii</i>	Greece	Thessaly, Tyrnavos	7 August 2014	U. Buzurović <i>et al.</i>	BEOU, CAT, ZAGR
		Thessaly, Loutra		S. Bogdanović & U.	
	Greece	Kaitsis	21 June 2016	Buzurović S. Bogdanović & U.	BEOU, CAT, ZAGR
<i>G. incanum</i>	Greece	Thracia, Porto Lagos	20 June 2015	Buzurović	BEOU, CAT, ZAGR
	Bulgaria	Sozopol	24 July 2014	U. Buzurović <i>et al.</i>	BEOU, CAT, ZAGR
	Turkey	Boziar, Canakkale	22 June 1988	S. Brullo <i>et al.</i>	CAT
	Turkey	Manisa Dag	25 June 1987	S. Brullo <i>et al.</i>	CAT
		Capestrano,		S. Bogdanović & U.	
<i>G. italicum</i>	Italy	Collelungo	11 July 2015	Buzurović S. Bogdanović & U.	BEOU, CAT, ZAGR
	Italy	Fossa Raganesca	11 July 2015	Buzurović	BEOU, CAT, ZAGR
		Attica, Porto Rafti,		S. Bogdanović & U.	
<i>G. sartorii</i>	Greece	Koroni	21 June 2015	Buzurović	BEOU, CAT, ZAGR
	Greece	Mykonos, Ftelia	7 July 2016	S. Brullo <i>et al.</i>	CAT, ZAGR
	Greece	Attica, Laurion	12 July 2016	S. Brullo <i>et al.</i>	CAT, ZAGR
<i>G. tataricum</i>	Russia	Russie merid.	1855	Backer	P
	Russia	Sarepta	s.d.	Wunderlich	P
	Russia	Sibiria	1 August 1828	A. L. de Candolle	G

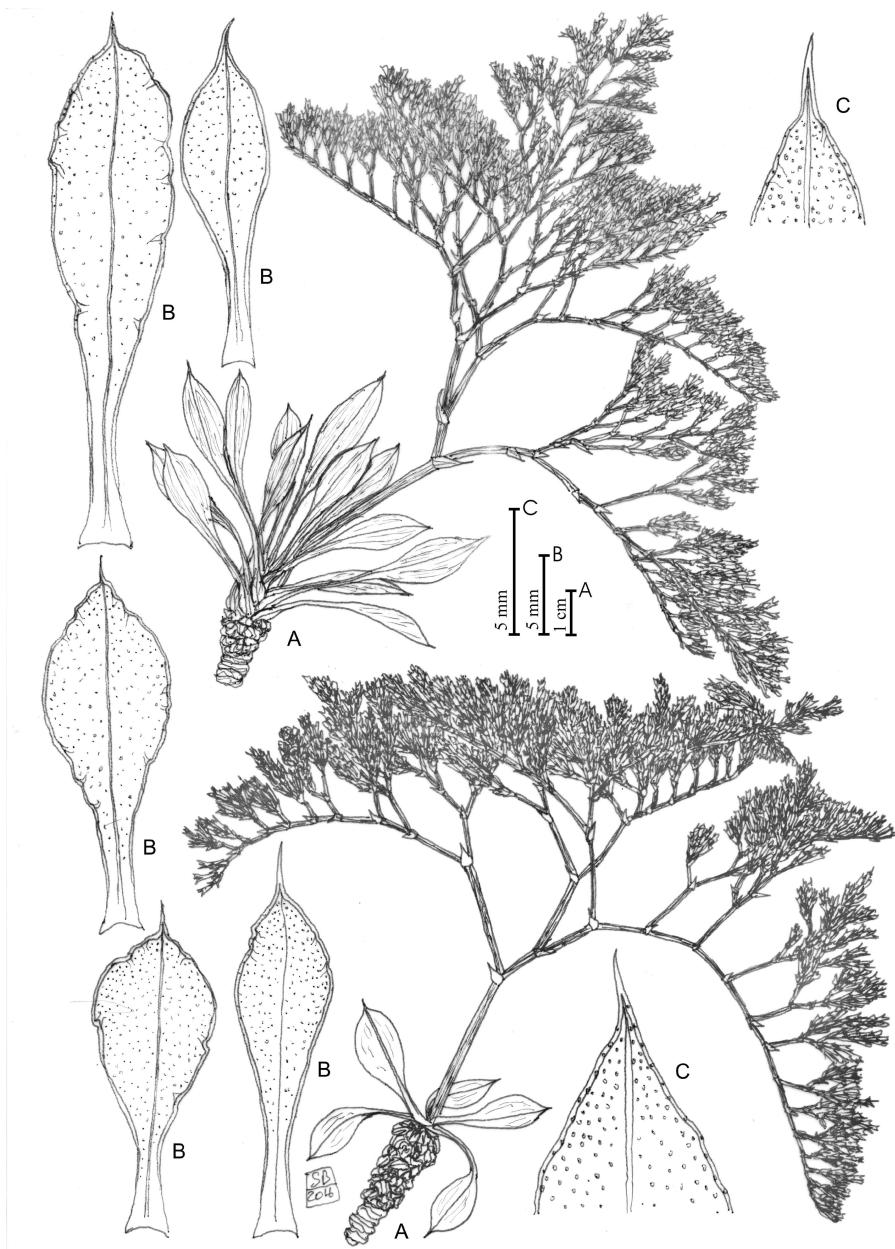
**Etymology:**—The specific epithet “*africanum*” refers to Africa, where the species occurs.

**Phenology:**—Flowering from June to July.

**Distribution and ecology:**—Based on investigations of herbarium specimens and literature data, *G. africanum* is distributed in North Africa, currently limitedly to some localities in Algeria and Tunisia (Fig. 4). In particular it occurs in north-western Algeria near the Chott Chergui (Saida) and in north-eastern Algeria in the neighbourhoods of Batna and Constantine, while in northern Tunisia it is localized in a small stand near Kesra (“Kessera”). This species grows in very arid territories characterized by sub-desert climate and is localized in sandy or rocky habitats, where it is a member of steppe grassland or halophilous shrubby plant communities.

**Discussion:**—According to literature (Battandier & Trabut 1882, 1902, Quézel & Santa 1963, Pottier-Alapetite 1981, Le Floc'h *et al.* 2010) populations of *G. africanum* were attributed to *G. tataricum*, although Cosson (1853), who was the first to collect this plant in Algeria during a botanical excursion in May 1852, considered it as a distinct species quoted by this author on the label of its herbarium sheets. Subsequent botanists (e.g. Balansa, du Colombier, D'Alleizette, Hénon, Warion, Joly, Bachelet, de la Perraudière, etc.), who collected this species in Algeria and Tunisia,

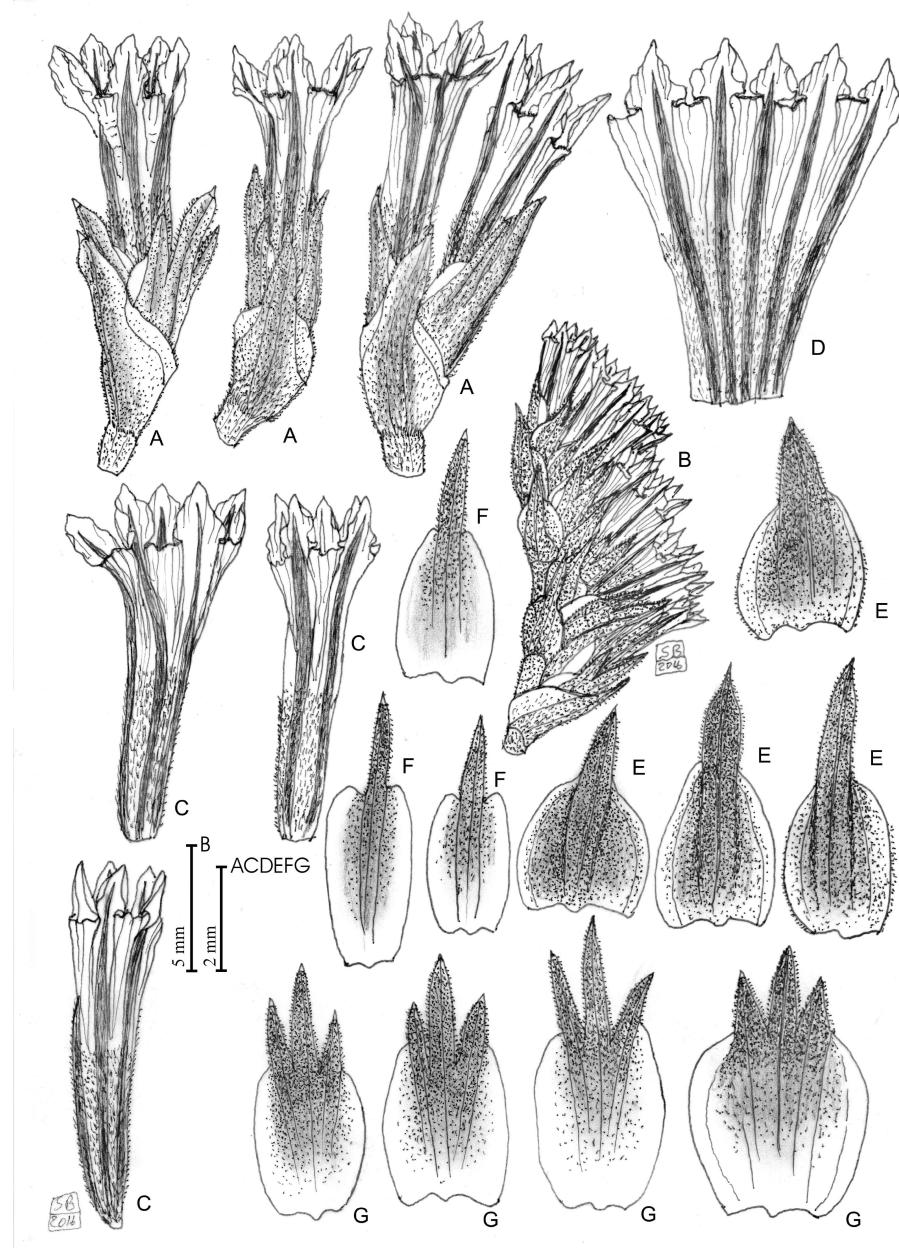
identified it as *G. tataricum*. This determination has also been followed in the most recent Mediterranean floras (Greuter *et al.* 1989, Domina 2011). Besides, it should be highlighted that E. Cosson carried out his excursions in Algeria together with B. Balansa, who collected much more material of this species, distributing his specimens to several European herbaria. Therefore, we have considered it opportune to choose these specimens as type material of *G. africanum*. Among the isotypes kept in W, we found that W. Wangerin in 1929 noted on a distinct herbarium label a new name “*Goniolimon collinum* (Griseb.) Boiss. ssp. *cossonii* Wangerin ined.” that he proposed for this plant. This name remains a *nomen nudum* since it has never been published.



**FIGURE 1.** Diagnostic features of *Goniolimon africanum*. A. Habit. B. Leaves. C. Leaf apex. Illustration by S. Brullo based on type material (P 05388232!).

Regarding its taxonomic relationships, *G. africanum* is morphologically distinct from other known species of *Goniolimon*. In particular, it differs from *G. tataricum* (Fig. 3, Table 1) in its smaller size, leaves being 1-nerved (not pinnatinerved), shorter (2–10 cm vs 10–20 cm) and markedly acuminate-aristate mucronate (not obtuse and rounded), stems being pubescent and not winged (vs glabrous to sparsely puberulous and winged), spikes that are much shorter (0.8–2.0 cm vs 2.5–10.0 cm) and denser (not lax), 1(2)-flowered spikelets (not 2–3-flowered), outer bract that is narrower (2.3–2.5 mm vs 2.5–3.0 mm) with a longer cusp (1.5–2.5 mm vs 1.2–1.3 mm), a longer middle bract (4–5

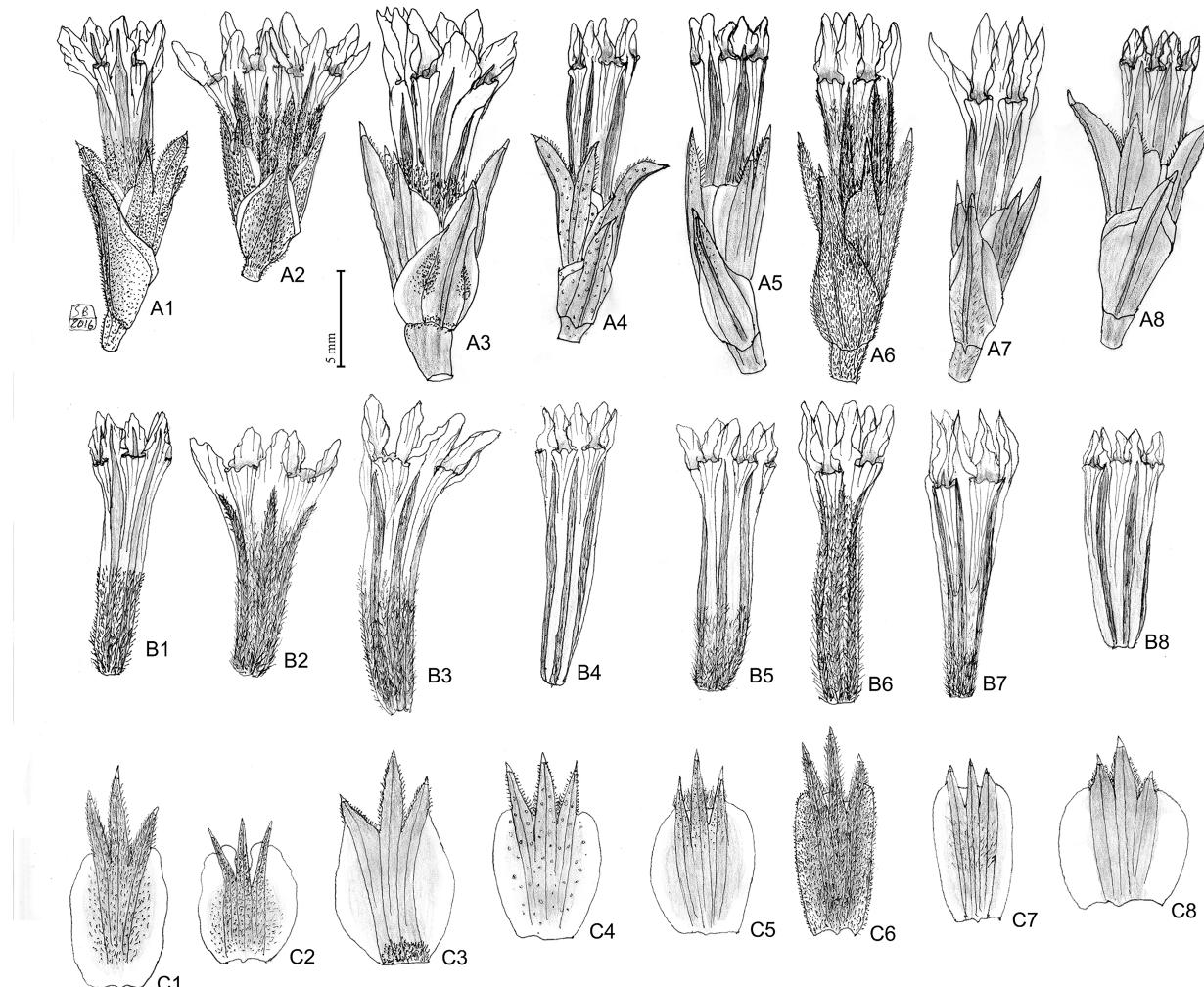
mm vs 3.7–4.0 mm), a longer inner bract (4.5–5.5 mm vs 4.0–4.5 mm) with longer cusps (2.0–2.5 mm and 0.7–1.5 mm vs 1.4–1.7 mm and 0.6–0.8 mm) and auricles that are absent (not present), the calyx being pubescent only in the tube (not also on the ribs), and with ribs almost reaching the lobe apex (vs ribs not reaching the lobe base). A detailed morphological investigation of the known European species of *Goniolimon* (Fig. 3, Table 1), showed that *G. africanum* is well differentiated from them all. It shows a closer relation with *G. sartorii*, which is distributed in some Aegean islands and Attica (Greece). The two species share some features (e.g. habit, colour, shape and size of leaves, short and dense spikes, spikelets 1-flowered), but several other significant characters distinguish these two species from each other. In particular, *G. sartorii* is characterized by a glabrous stem, spikes with 7–9 spikelets per cm, glabrous bracts, an outer bract with a shorter cusp, a shorter and wider inner bract, a shorter glabrous calyx with smaller lobes exceeding the lobe base. These two species have very similar ecological requirements, since they occur in arid environments, often characterized by saline soils. These habitats are represented by coastal sandy or rocky places for *G. sartorii* and by inland steppe sub-desert grasslands or salt lakes for *G. africanum*. A very similar ecology was observed also in *G. incanum*, which occurs in coastal sandy or rocky grounds and hilly xerophilous grasslands.



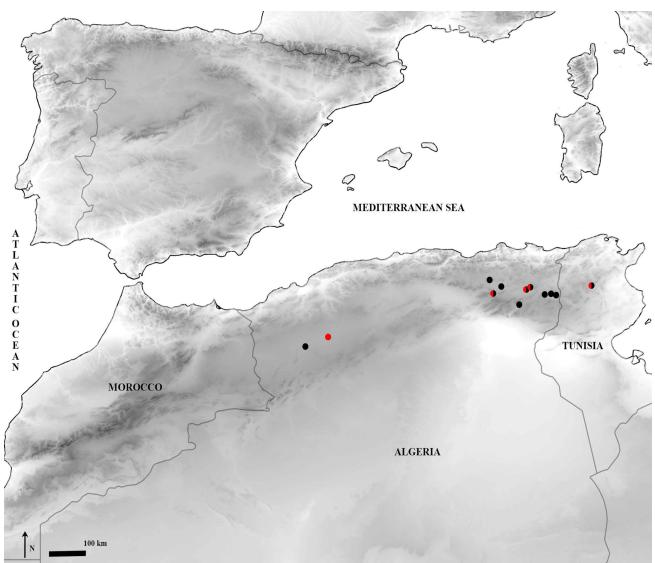
**FIGURE 2.** Diagnostic features of *Goniolimon africanum*. A. Spikelets. B. Spike. C. Calices. D. Open calyx. E. Outer bracts. F. Middle bracts. G. Inner bracts. Illustration by S. Brullo based on type material (P 05388232!).

**Additional specimens examined (Paratypes):**—ALGERIA. Aïn Beïda, July, sine leg., sub. *Goniolimon tataricum* (MPU 243816!); Dunes du Chott, Tarf, July, sine leg. (MPU 243817!); Batna, 1911, *Ch. D'Alleizette s.n.*, sub. *Goniolimon tataricum* Boiss. (CLF 173391!); plaine de Batna, Algérie, 1854, *du Colombier 175*, sub. *Goniolimon tataricum* Boiss. (P 05388237!); Batna, s.d., *A. Hénon s.n.*, sub. *Goniolimon tataricum* Boiss. (MPU 243814!); terrains salés près du Madracca près Aïn-Yagaert, cercle de Batna, prov. de Constantine, 17 June 1853, *E. Cosson s.n.*, sub. *Goniolimon tataricum* Boiss. (*G. luteolus* Coss. et Dr.) (P 04026846!); dépressions des hauts plateaux à El May (Sahara Oranais), 02 July 1868, *A. Warion s.n.*, sub. *Goniolimon tataricum* Boiss. (P 05388231!); plaines d'Alfa entre Krider et Beida, cercle de Saïda (Algérie), 30 May 1852, *E. Cosson s.n.*, sub. *Goniolimon luteolus* (P 05388234!); Massif de Tafrent, Ouled Abd Ennour, prov. d. Constantine, 01-08 June 1912, *Joly s.n.*, sub. *Goniolimon tataricum* (L.) Boiss. (MPU 243819!); Tafrent (Abd Ennour), (prov. d. Constantine), 17 June 1909, *Joly s.n.*, sub. *Goniolimon tataricum* L. (MPU 243818!); El Beïda, 30 May 1852, *E. Cosson s.n.*, sub. *Goniolimon luteolus* Coss. et Dr. (P 05388236!); cultivé HDR (Hortus Durieu, Bordeaux), 06 July 1855, *Durieu s.n.*, sub. *Goniolimon tataricum* Boiss., *G. luteolus* C. et Dr. olim. (P 05388235!); bords de l'Haloufa, 1883, *Bachelet s.n.*, sub. *Goniolimon tataricum* (P 05388233!); plaine entre Morsot et Tebessa, prov. de Constantine, Algérie, 1864, *V. Reboud s.n.*, sub. *Goniolimon tataricum* (P 05388233!, P 04026845!); Trubeau de Synhàn, cercle de Batna, province de Constantine, Algérie, 17 June 1853, *H. de la Perraudière s.n.* (MPU 243813!); Le long des sentiers du Djebel Dyr près Tebessa, 28 Juin 1864, *V. Reboud*, sub. *Statice*, *Goniolimon tataricum* (GRM s.n.!); Aïn Tamagra, avril-mai 1872, *V. Reboud* (GMR s.n.!).

TUNISIA. Falaises de la Kessera, 09 May 1944, *Iserite?* 28, sub. *Statice sp.* (MPU 243821!).



**FIGURE 3.** Comparative diagnostic features of spikelets (A), calices (B) and inner bracts (C) for 1. *G. africanum*. 2. *G. tataricum*. 3. *G. dalmaticum*. 4. *G. incanum*. 5. *G. heldreichii*. 6. *G. italicum*. 7. *G. besserianum*. 8. *G. sartorii*. Illustration by S. Brullo.



**FIGURE 4.** Distribution of *Goniolimon africanum* in North Africa. Black circles—herbarium records; red circle—literature records; red/black circles—herbarium and literature records.

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