

A NOTE ON NARCISSUS GADITANUS BOISS. & REUTER
AND N. MINUTIFLORUS WILLK.

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Resumen. Estudios detallados de cuatro poblaciones, indican que los criterios que se utilizan normalmente para separar *Narcissus gaditanus* Boiss. et Reuter y *N. minutiflorus* Willk. no son válidos. Ambas especies forman un espectro más o menos continuo. *N. minutiflorus* debe tratarse como variedad de *N. gaditanus*, y no como especie independiente.

Summary. Detailed observations at four populations, indicate that the usual criteria for separating *Narcissus gaditanus* Boiss. et Reuter and *N. minutiflorus* Willk. are not valid. They form a more or less continuous spectrum. *N. minutiflorus* is best treated as a variety of *N. gaditanus*, and not as a separate species.

BOISSIER & REUTER (in BOISSIER, 1859: 96) described *Narcissus gaditanus*, based on plants collected in Cádiz and Medina Sidonia (Spain), and Loulé (Algarve, Portugal). One year later, WILLKOMM (1860: 104) described *N. minutiflorus*, based on a plant collected by him on 15 February 1846, near the road down to Lagos from Monchique in the Algarve (Portugal)*.

(*) The sheet in Coimbra Herbarium (Willkomm collection) marked HOLOTYPUS has two separate collections mounted on it: one collected by Willkomm himself with the comment «alia species, cujus duo specimina mixta erant cum no. 1376» «legit et det. Willkomm»; and the other collection by Kafilisch dated 12.2.1859 from Baetica. Attached to the sheet is the following note in Willkomm's handwriting:

«*N. minutiflorus* n. sp. Gracillimus, scapo tenuissimo 5-6''' 1., foliis (3) angustissime linearisubulatis subteretibus longiore flor quinis v. senis, unilateralibus luteis, pedunc. inequalibus sub anthesi in spatha unilapis, tubo gracili eximie curvato subclavato 4-5''' 1. ovato lanceolato duplo longiore, lacin. stellatim patentibus 2''' 1. lanceolatis acuminato apiculatis, externe paulo latioribus apice fimbriolatis, corona poculiforme truncata ore subintegerrima 1½''' 1., stilo in tubo incluso (v. nullo).»

Unfortunately the Coimbra Herbarium does not have Willkomm's no. 1376 referred to by him, and it would be of interest to know whether this collection no. 1376 consists of specimens of *N. gaditanus* or of some other plant.

He found only 3 or 4 specimens growing in a marshy meadow («in pascuis uliginosis») with *N. jonquilloides* Willk. (now called *N. willkommii* (Samp.) A. Fernandes) and *N. niveus* (i.e. *N. papyraceus* Ker.-Gawl.). He later described it at greater length, with a plate (WILLKOMM, 1884: 122). Here, he compares his plant with *N. gaditanus*, which he says is quite different by reason of the following points:

<i>N. gaditanus</i>	<i>N. minutiflorus</i>
(a) Flowers larger.	Flowers smaller.
(b) Corona crenellated.	Corona subentire.
(c) Style longer than perianth tube.	Style included in perianth tube.

The perianth segments are described as «laciniis primo porrectis deinde stellato-patentibus imo reflexis» and his plate shows a scape of 3 flowers, the bottom one with segments «porrectis», the second one with segments «stellato-patentibus» and the top one with segments reflexed.

From other descriptions by WILLKOMM (1861: 307; 1893: 39) a fourth point of difference might be stated:

<i>N. gaditanus</i>	<i>N. minutiflorus</i>
(d) Segments ovate-lanceolate, apiculate, reflexed.	Segments oblong-lanceolate, at first pointing outwards (porrectis), later stellate-patent.

WILLKOMM (1860, 1861, 1893) stresses the rarity of these plants, and gives as localities:

<i>N. gaditanus</i>	<i>N. minutiflorus</i>
In Algarve, near Loulé, <i>Bourgeau</i> .	In Algarve, between Monchique and Lagos, <i>Willkomm</i> .
Cerro de San Cristóbal, Grazalema (Cádiz), <i>Reverchon</i> .	Same.
Between Chiclana and Medina Sidonia (Cádiz), <i>Willkomm</i> .	In lower Andalucía, <i>Kaflisch</i> .

Distribution and habitat.

The range of *N. gaditanus* extends from the Algarve at least as far east as Almería province, but populations are not easy to find. Sometimes, there is a single plant with none other in sight; sometimes two or three; sometimes a little population of one to two dozen plants; rarely a large one of several hundred. Its typical habitat is on terra rossa soil in clear patches

among the bushes of limestone garigue or maquis, but there is at least one population on deep maritime sand close to the sea (population C below). *N. minutiflorus* is much rarer and it is always mixed with *N. gaditanus* (with the possible exception of WILLKOMM's original population). What controls the distribution of these plants is unknown, but one can cover many hectares of apparently suitable habitat without finding a trace of them, and then accidentally stumble on a small population.

Four populations have been examined in detail:

Population A. North of Manilva (Málaga) on Jurassic marble at 300 m. above sea level. Typical *Pistacia lentiscus* maquis. In a small area of turf among the bushes, on top of the ridge, a population of a dozen or so plants was found, and a few single plants within a radius of a kilometre elsewhere.

The plants stood 5-9 cm. above ground level, giving a total length of scape from bulb to the tallest ovary of 10-16 cm. Leaves filiform, prostrate. The number of flowers varied from one to five per plant (only one plant with less than two), all the same colour, same scent, all with reflexed segments; three ovate-apiculate segments alternated with three narrower acute segments.

Population B. 5 Km. south of Benafim (Algarve) on the road to Loulé at 230 m. above sea level. Heavy terra rossa soil with typical maquis scrub of *Quercus coccifera*, *Pistacia lentiscus*, *Cistus* spp., *Phlomis purpurea*, in areas close by much *Rosmarinus officinalis*, *Endymion hispanicus*, *Urginea maritima*, etc. The population of *Narcissus* consists of several hundred plants radiating with diminishing density from a focal area of c. 500 sq. m. to cover an over-all area of c. 2500 sq. m. Most plants grow round the edges of relatively clear areas (which at one time in the past seem to have been cleared of limestone boulders and on which no heavy growth of shrubs has since appeared).

Plants similar in size to those of population A; leaves filiform, prostrate. Flowers of two types: about 60 % with strongly reflexed segments (*gaditanus* type) and 2-4 flowers per scape; the remainder, with stellate-patent segments (*minutiflorus* type) and 1-3 flowers per scape; in the former, three ovate-apiculate segments alternate with three narrower segments, as in population A; in the latter, all six segments are lanceolate-ovate. On the fringe of this population, in the shade of a large *Ceratonia siliqua*, grew a single specimen of *N. willkommii*.

Population C. Deep maritime sand, not far from the sea, east of the

estuary of the Riotinto river (Huelva) among open scrub vegetation of *Retama monosperma*, etc. In spite of extensive search, only the one population was found, spread along for c. 100 m. beside a footpath running through the sand.

Plants more luxuriant than in populations A and B, with leaves up to 47 cm. long by 1.5 mm. broad (when transplanted to my garden, the leaves increased to 65 cm. long by 3 mm. broad in the following year). Flowers up to 8 per scape. This population was visited on 2.3.67 and 14.3.67, before the need for detailed measurements had become apparent. However, it was noted that all the segments were reflexed (gaditanus type); some plants had all segments lanceolate-acuminate 8-9 mm. long, whereas others had segments of the colony a type 5 mm. long.

Population D. Sierra de Gádor (Almería) on the road from Enix to Almería at 700 m. above sea level. Typical *Thymus vulgaris* garigue, on calcareous soil.

A population of c. 100 plants just above the road. Flowers like those of population A (gaditanus type).

Population	Type	Diameter of flower *	Length of tube	Length of segments	Height of corona	Number of flowers measured
A	All gaditanus type	13-21	8-17	5-8	4-7	18 fls. on 8 plants
B★	25 gaditanus type	13-16	12-16	5-6,5	3-6	Healthiest remaining flower on each plant measured
	11 minutiflorus type	12-17	11-13,5	5-6,5	2,5-4	
D	All gaditanus type	12-17	12-17	—	4-5	10 fls. on 6 plants

TABLE I.—Measurements of flowers of *N. gaditanus* and *N. minutiflorus*, all in mm.

* To eliminate inconsistencies caused by differences in the degree of reflexing of the segments, all measurements of the diameter of the flower in populations A, B and D were taken after raising the segments to a position at right angles to the tube.

★ Measured by C. E. WUERPEL.

Measurements of flowers. Detailed measurements of a series of flowers in populations A, B, and D were taken, only a summary of which is given in table I. Where there are more than two flowers on a scape, it was noticed that the top two are normally the largest, and the rest grow progressively smaller in order of opening.

Length of style. In population A, the style was included in the tube in 3 plants, exerted from the tube but included in the corona in 4 plants, exerted in 1 plant. In population B, the style was included in all plants of minutiflorus type, and in the plants of gaditanus type, the style was included in the tube in 21 plants, exerted from the tube but included in the corona in 3 plants and exerted from the corona in 1 plant.

The length of the style relative to the tube is invariant for all flowers on one plant, but varies considerably from one plant to another.

Let us now consider each of WILLKOMM's four diagnostic characters in turn:

Size of flowers. FERNANDES (1968: 52), separates these two taxa on measurements, which we give in table II compared with WILLKOMM's figures

Type	Diameter of flower	Length of tube	Length of segments	Shape of segments	Corona height	Corona diameter
<i>gaditanus</i>						
WILLKOMM		13-17				
FERNANDES	c. 20	12-16	6-7	broadly ovate	5	
Population A	13-21	8-17	5-8		4-7	
Population B*	13-16	12-16	4,5-6		3,5-6	5-8
<i>minutiflorus</i>						
WILLKOMM		8-10	4		3-6	
FERNANDES	c. 10	8-11	4-5	lanceolate-acuminate	2,5-3	
Population B*	12-17	11-13,5	5,5-6	all lanceolate	2,5-4	4,5-5

TABLE II.—Comparison of measurements of flowers of populations A and B, with the values given by WILLKOMM (1860; 1893) and FERNANDES (1968). All measurements in mm.
* Measured by C. E. WUERPEL.

(1860; 1893) and ours. According to these measurements, *N. minutiflorus* falls within the spectrum of *N. gaditanus* and the two taxa cannot be separated by measurement; all one can say is that *N. minutiflorus* tends to have a smaller corona averaging 1 mm. less in height and 1-2 mm. less in diameter, but I have examined one plant in colony B that had the smallest possible corona combined with reflexed petals (i.e. *gaditanus* type), thus combining the characters of the two taxa.

Corona crenellated or subentire. The plants in population A had both types of corona and there was no question of more than one taxon being present in the population. This character is of no diagnostic value.

Length of style. WILKOKM (1860: 104; 1884: 122) thought that in *N. gaditanus* the style was always longer than the tube, but we have already shown that the length of the style varies from plant to plant, and in population A and B combined only 9 out of 33 plants examined had the style as long as or longer than the tube.

Shape and reflexing of perianth segments. The perianth segments are of the following forms:

(a) Reflexed. Ovate-apiculate segments alternate with narrower non-apiculate ones. Length 5-8 mm. Found both on limestone and on maritime sand.

(b) Reflexed. All segments lanceolate, non-apiculate, 8-9 mm. long. Found only on maritime sand.

(c) Stellate-patent. All segments lanceolate, non-apiculate, 5-6.5 mm. long. Found only on limestone. This seems to be the form on which WILKOKM (1860) based his *N. minutiflorus*.

CONCLUSION

That *N. gaditanus* (like many other members of the genus) is a phenotypically plastic species, capable of variation in response to edaphic conditions, is shown by the way it grows in terra rossa, maritime sand and garden loam.

Although HEDBERG's recommendation that a species should be separated by at least two morphological differences (HEDBERG, 1958) may be an oversimplification in the recognition of species, it seems preferable to treat *N. gaditanus* as a variable species, one of its forms being *N. minutiflorus* (a name that can be used to distinguish plants that combine stellate-patent

tepals with a corona not exceeding 4 mm. in height and 5 mm. in diameter, if it is considered that such plants merit nomenclatorial separation), better considered as variety of the former (COUTINHO, 1939; SAMPAIO, 1946) rather than to retain it as a full species. This view is supported by the caryological data. FERNANDES (1969) found that the two taxa have the same chromosome number $2n = 14$, and similar idiograms.

Considering the two taxa conspecific, the description of *N. gaditanus* should need to be emended somewhat as follows:

Bulb 12 x 12 mm. on limestone to 25 x 20 mm. on maritime sand. Leaves up to 18 cm. x 1 mm. on limestone, 47 cm. x 1.5 mm. on maritime sand and up to 65 cm. x 3 mm. on garden loam, filiform, prostrate. Flowers trimorphically heterostylous, 13 to 21 mm. diameter. Tepals reflexed, rarely stellate-patent at anthesis; 3 ovate-apiculate tepals alternating with 3 narrower non-apiculate ones, sometimes all lanceolate-acute. Style enclosed in the tube or appearing half-way up the corona, rarely exerted from it.

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