

BARNARDIELLA: A NEW GENUS OF THE IRIDACEAE AND ITS RELATIONSHIP TO GYNANDRIRIS AND MORAEA¹

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ABSTRACT

The discovery of the presence of a sterile ovary tube in a plant known both as *Homeria herrei* and *Gynandriris spiralis* led to a detailed study of the characteristics of this species. A chromosome number of $n = 10$ suggests that the species belongs neither to *Homeria* or *Gynandriris* but may have been derived from the genus *Moraea* independently, though it has characteristics of *Homeria* and *Gynandriris*. The species is thus assigned to a new genus as *Barnardiella spiralis* (N.E. Br.) Goldblatt.

In the course of field studies on South African Iridaceae, I was surprised to discover that the fairly common Namaqualand species known as *Homeria herrei* possessed a well-developed ovary tube, a fact not noted in the description of this plant (Bolus, 1931). Careful examination of living plants and subsequently of ample herbarium material showed this character in all specimens, and confirmed that this unusual feature is exactly like the sterile prolongation of the ovary which characterizes and partly defines the genus *Gynandriris*.

A cursory review of all the species of *Gynandriris* revealed that the long overlooked *G. spiralis* (N.E. Br.) Foster described by Baker in 1892 as a *Moraea*, in which genus it is an illegitimate homonym, matched *Homeria herrei* exactly. With the combination in *Gynandriris* already made, *H. herrei* could simply have been reduced to synonymy. However, living material on hand enabled further examination and this confirmed Bolus's description of the flower as being like that in the genus *Homeria*, i.e., lacking clear distinction between the inner and outer tepals, and without the typical petaloid style branches and paired crests (Fig. 1 B) of both *Gynandriris* and *Moraea*, the probable ancestor of *Gynandriris*.

The presence in this one species of the distinguishing characteristics of two genera immediately posed the problem of the true relationship of *Gynandriris spiralis*/*Homeria herrei*. The genus probably ancestral to both *Homeria* and *Gynandriris* is *Moraea* (Goldblatt, 1971). *Homeria* is believed to have evolved from *Moraea* by reduction of the broad petaloid style branches and long, paired style crests and by a change from distinct inner and outer tepal whorls to \pm equal tepals (Fig. 1A) (Goldblatt, 1971). In contrast, *Gynandriris* has a flower exactly like many species of *Moraea* except that the ovary is extended upwards to form a sterile tube, and with the development of the ovary tube the pedicels are much reduced in length (Fig. 1 B).

The question with regard to *Homeria herrei* is whether it is more closely re-

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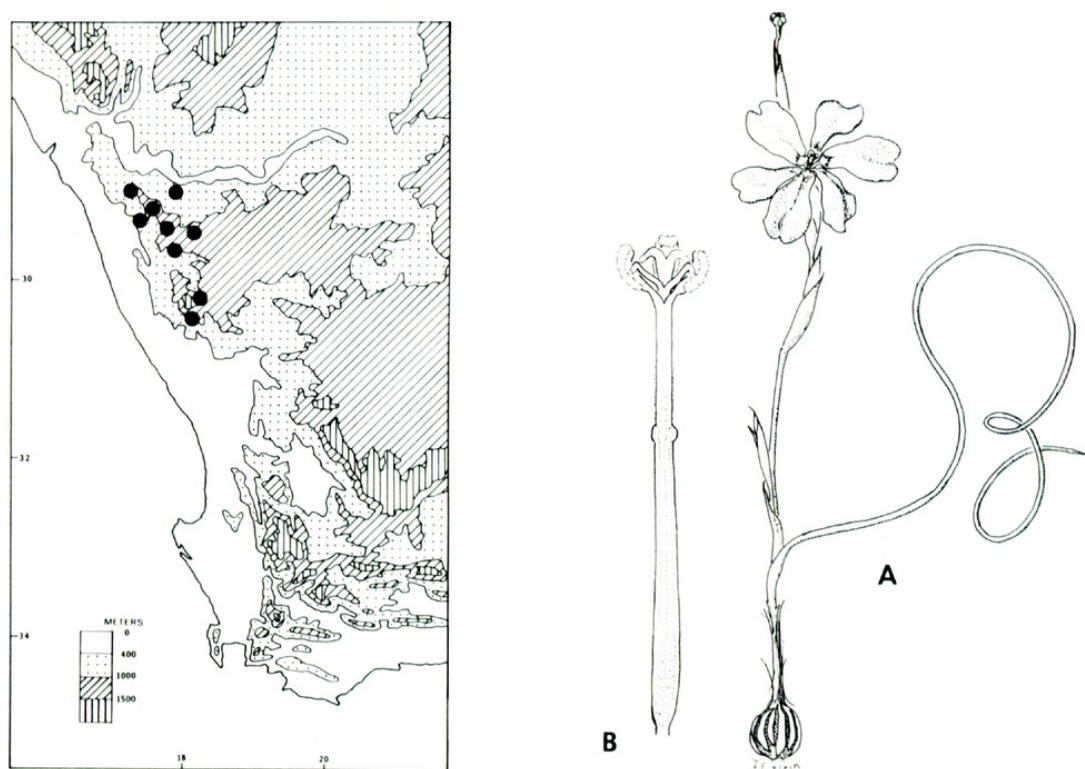


FIGURE 1. Morphology and distribution of *Barnardiella spiralis*.—A. Whole plant ($\times \frac{2}{3}$). —B. Androecium and gynoecium ($\times 7$).

lated to *Homeria*, in fact a *Homeria* with an ovary tube, or a derivative of *Gynandriris*, having a simplified flower. The first possibility assumes independent origin of the ovary tube in *Gynandriris* and in a single species of *Homeria*, while the second presupposes the reduction of the style branches and crests independently in the ancestors of *Homeria* and in one specialized species of *Gynandriris*. The latter seems more likely since species of *Moraea* with partly to entirely reduced style branches and crests are known and these are certainly derived independently of *Homeria*.

An answer to this question was sought by a chromosome study which seemed promising as both *Homeria* and *Gynandriris* are quite well known cytologically (Goldblatt, 1971). *Gynandriris*, with a basic chromosome number of $x = 6$, has a characteristic karyotype with one or two metacentric chromosomes and a very large satellite. *Homeria*, also with $x = 6$, has by contrast only submetacentric to acrocentric chromosomes and one or two usually small satellites.

CYTOLOGY

The following two collections were studied, one kindly provided by Kirstenbosch Botanical Gardens, Cape Town, South Africa, and the other collected by myself in South Africa. Mitotic studies on root tips were made following the method described previously (Goldblatt, 1976a).

Barnardiella spiralis (N.E. Br.) Goldblatt, $2n = 20$. SOUTH AFRICA. Cape: Namaqualand, near Steinkopf, *Wisura* 3891 (NBG). Namaqualand, south of Nababeep, *Goldblatt* 3066 (MO).

The cytological findings were startling: *Gynandriris spiralis*, with $n = 10$, proved to have a karotype unlike either *Homeria* or *Gynandriris*, all species known cytologically having $x = 6$. Consequently it seemed the question relating to the origin of *G. spiralis* could not be explained in either of the two ways already discussed.

A base number of $x = 10$ is however known in the large genus *Moraea* in which the primitive members of the genus, subgenera *Moraea*, *Monocephalae* and *Visciramosa*, all have a base number of $x = 10$, while the more specialized species assigned to subgenera *Vieusseuxia* and *Grandiflora* have $x = 6$ (Goldblatt, 1976a). It seems reasonable that the so called *G. spiralis* could have been derived directly from one of the primitive subgenera of *Moraea*, especially as its karyotype, with five acrocentric long and five very short pairs of chromosomes, is not unlike that in *M. serpentina* Baker and *M. tortilis* Goldblatt ined. of sect. *Moraea* and in several species assigned to sect. *Deserticola* (Goldblatt, 1976b), where four (or occasionally five) long acrocentric and six (or five) much shorter chromosome pairs occur. Accepting this hypothesis for the origin of *G. spiralis*, it seems that both the sterile ovary beak and the reduced flower, especially the style, evolved independently in this species and in *Gynandriris* and *Homeria*, respectively. If so, consistent generic treatment compels the recognition of *G. spiralis* as a distinct genus.

MORPHOLOGY

Morphological comparison between *Gynandriris*, *Moraea*, and *Homeria* gives no reason to doubt the contention that *G. spiralis* should be placed in a distinct genus. Features shared with *Gynandriris* proper extend no further than the beaked ovary tube. The single, terete leaf, flower with subequal tepals and crestless style branches, and especially the brown, firm inflorescence spathes are all unknown in *Gynandriris*, which has particularly distinctive spathes that are membranous, transparent and conspicuously veined. The latter difference in particular provides strong grounds for distinguishing *G. spiralis* from the rest of *Gynandriris*.

Homeria, a larger genus, comprises a range of morphological types and a few representatives are as diminutive and small flowered as *G. spiralis*. *Homeria rogersii* L. Bol. in particular approaches it in general form. As is typical in *Homeria*, *H. rogersii* has an ordinary short green ovary, and a single leaf, which in this species is terete; it also has a base number of $x = 6$, like all other species of the genus. Except for the great difference in chromosome number with $x = 6$ in *Homeria* and $x = 10$ in *Gynandriris spiralis*, a species such as *H. rogersii* might easily be envisaged as ancestral to *G. spiralis*.

A comparison with the very large and varied genus *Moraea* confirms that the corm, terete leaf form, and spathes of *Gynandriris spiralis* do conform in a general

way to species such as *M. serpentina*, *M. tortilis*, as well as *M. bolusii* Baker and *M. macgregorii* Goldblatt ined., and their allies (all subgen. *Moraea* with $x = 10$). These species of *Moraea* have dark corm tunics like those in *G. spiralis*, otherwise not common in *Moraea*, and are rather small and few branched, with narrow to terete leaves. Another reason for accepting forms such as these as possible ancestors is that the reduction of the style branches and crests does occur within *Moraea* itself. This is believed to have occurred independently several times, giving rise to *Homeria*-like species, e.g., *M. elisiae*, forms of *M. odorata*, and *M. insolens*, while the genus *Homeria* has been suggested to have evolved from *Moraea* (Goldblatt, 1971) in this way. Thus the reduced style and subequal tepals could equally have had an independent origin from *Moraea*, as from *Homeria*.

Morphological evidence then seems equally strong in supporting the origin of *Gynandriris* from *Homeria* or *Moraea*, but weaker in the case of *Gynandriris*. Taken together with the chromosomal data, it is however difficult not to accept the conclusion that forms such as *M. serpentina* or *M. tortilis* in subgen. *Moraea* are the most likely ancestors. Regardless of which genus is ancestral, generic recognition is called for and this plant is assigned to the new genus *Barnardiella*, named in honor of Professor T. T. Barnard, a recognized expert on Iridaceae, and long-time student of the nomenclatural history of South African plants. In naming this genus after him, I wish to acknowledge personally his help and guidance in my own studies of the Iridaceae.

TAXONOMY

Barnardiella Goldblatt, gen. nov.

Caudex cormus, nigris tunicis. Folium solitarium, base insertum. Scapus pauciramosus, rami sessiles. Spatha pallida, brunnea, membranacea, costis obscuris. Flos stellatus; tepala subaequales, patentes. Filamenta connata. Ovarium cylindricum, fecundum in base, prolongatum supra tubo sterile. Rami stylis teretes, apices bifurcati, lobi breves, angusti, divergentes.

Rootstock a corm, with dark tunics. Leaf solitary, inserted at the base. Scape few branched, branches sessile. Spathes dry, pale brown, without prominent veins. Flower stellate; tepals subequal, spreading. Filaments connate. Ovary cylindrical, fertile at base only, prolonged upwards as a sterile beaklike tube. Style branches short, terete, dividing into two diverging, narrow apically stigmatic arms. Chromosome number $2n = 20$.

Type species: *Barnardiella spiralis* (N.E. Br.) Goldblatt

Only one species, distributed in Namaqualand, South Africa.

Barnardiella spiralis (N.E. Br.) Goldblatt, comb. nov.

Helixyra spiralis N.E. Br., Trans. Roy. Soc. S. Africa 17: 349. 1929. TYPE: as for *M. spiralis* Baker.

Moraea spiralis Baker, Handbook Irid. 55. 1892, nom. illeg., non *M. spiralis* L.f., 1781. TYPE: South Africa, Cape, Namaqualand, Drege 2604 (K, lectotype; BOL, isotype). *Morris s.n.* (BOL-5788, paratype).

Gynandriris spiralis (N.E. Br.) Foster, Contr. Gray Herb. 114: 41. 1946.

Homeria herrei L. Bol, S. African Gard. 21: 367. 1931. TYPE: South Africa, Cape, Breckpoort, Steinkopf, Namaqualand, *Herre s.n.* (BOL, holotype).



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