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A remarkable new *Biarum* (*Araceae*) from Turkey

Abstract

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Biarum ditschianum from SW Turkey is described as a species new to science and illustrated. Its possible relationships within the genus are discussed.

Discovery of the new species

During an excursion to SW Turkey organised by the Botanical Institute of the University of Bonn in March/April 1987 Friedrich Ditsch, a student at Bonn, collected material of a species of *Biarum*. He collected one sterile, living specimen which was grown on in Bonn. When the plant flowered in May 1987 it was obvious that it did not match any described species and Mr. Ditsch took colour photographs of the plant, but made no herbarium specimen. Unfortunately the plant died soon after flowering.

In October 1987 Mr. Ditsch, accompanied by Manfred Koenen from the Botanical Garden of the University of Bonn, visited Turkey in order to try to recollect the plant. They succeeded in finding only seedlings and immature plants and were unable to locate any flowering specimens. It therefore appeared that the spring flowering, so unusual in *Biarum*, exhibited by the cultivated plant was typical and not simply a response to disturbance. A trip by Mr. Koenen in April 1988 was, however, successful, resulting in good vegetative, flowering and fruiting specimens. Some of the tubers collected had developing inflorescences which subsequently opened in cultivation at Bonn at the beginning of May. From these spirit and dried material was prepared.

Despite the unusual appearance of the new species, it is clearly a *Biarum* on the basis of the unilocular, uniovulate ovaries with the ovule attached to a basal placenta.

It gives us great pleasure to name this new species in honour of Mr. Friedrich Ditsch.

Biarum ditschianum Bogner & Boyce, *sp. nova* – Fig. 1–8.

Typus: *Bonn Botanical Garden Accession no. 22592* (holotypus: K; isotypi: B, BONN (Fig. 2), K, M).

Lamina foliorum angustissime elliptica vel lanceolata; petiolus a lateribus compressus. Spatha 4 usque 5 cm longa, marginibus basi per ca. 2.5 cm connatis, tubum formans, lamina reducta, breviter subtriangulari. Spadicis pars flores femineos masculinis discedens nuda, pistillodia carentia, appendix stipitata basi incrassata processibus piliformibus retroversis instructa.

A perennial, tuberous herb. Tuber light brown, depressed-globular to sub-globular, 2.5–3 cm in dia-



Fig. 1. *Biarum ditschianum* Bogner & Boyce (left) in natural habitat growing in limestone holes. – Photo: M. Koenen.

meter, 1.5–2 cm thick, with a central growth point and peripheral adventitious buds on the upper surface. Roots 1.4–2 mm thick, contractile roots ringed. Leaves annual, 2–3, rarely up to 5, leaf bases encased by several 5–10 cm long, membranaceous, whitish cataphylls; petioles 8–20 cm long, 1.5–3 mm wide, channeled, laterally compressed, whitish basally below soil level, mid-green, sometimes reddish tinged distally; lamina linear, narrowly-elliptic, lanceolate or oblanceolate, 6–15(–20) cm long, 0.6–3(–3.5) cm wide, base cuneate, decurrent, apex acute to obtuse, lamina mid-green, veins mostly lighter coloured; venation reticulate, mid-vein pronounced, especially in the basal part of the lamina, 4–7 primary lateral veins on each side. Inflorescence appearing when plant leafless, base enclosed by 5–6 cataphylls, these at first membranaceous, whitish, soon withering to become papery and brown, 1.5–6(–7) cm long and up to 1.5 cm wide, the longest equalling the spathe; peduncle subterranean, 2–5 cm long, 3.5–5 mm thick, whitish; spathe 4–5 cm long, spathe tube ca. 3 cm long, 1.8–2 cm in diameter, margins basally connate for ca. 2.5 cm, free and overlapping distally for 5 mm, exterior whitish, sometimes slightly reddish tinged, interior reddish-purple, spathe lamina much reduced, 1.8–2 cm long, subtriangular, terminating in a ca. 2 mm long mucro, exterior greenish to light green, sometimes with a reddish tinge, interior purplish-red; spadix 7–8 cm long, appendix elongate-conoid to somewhat sub-cylindric, short-stipitate, 4–4.5 cm long, 7–11 mm diam., apex obtuse, base rounded, the basal 7–10 mm furnished with reflexed, filiform, acuminate, transparent white processes, 1–2.5 mm long, 0.1–0.25 mm thick, appendix dark yellow, except for the reddish-purple basal 7–10 mm; stipe 5–6 mm long, 3–4 mm thick, cream. Flowers unisexual, naked; pistillate and staminate flowers separated by a naked 2.3–3.5 cm long, 2.5–3.5(–4) mm thick light

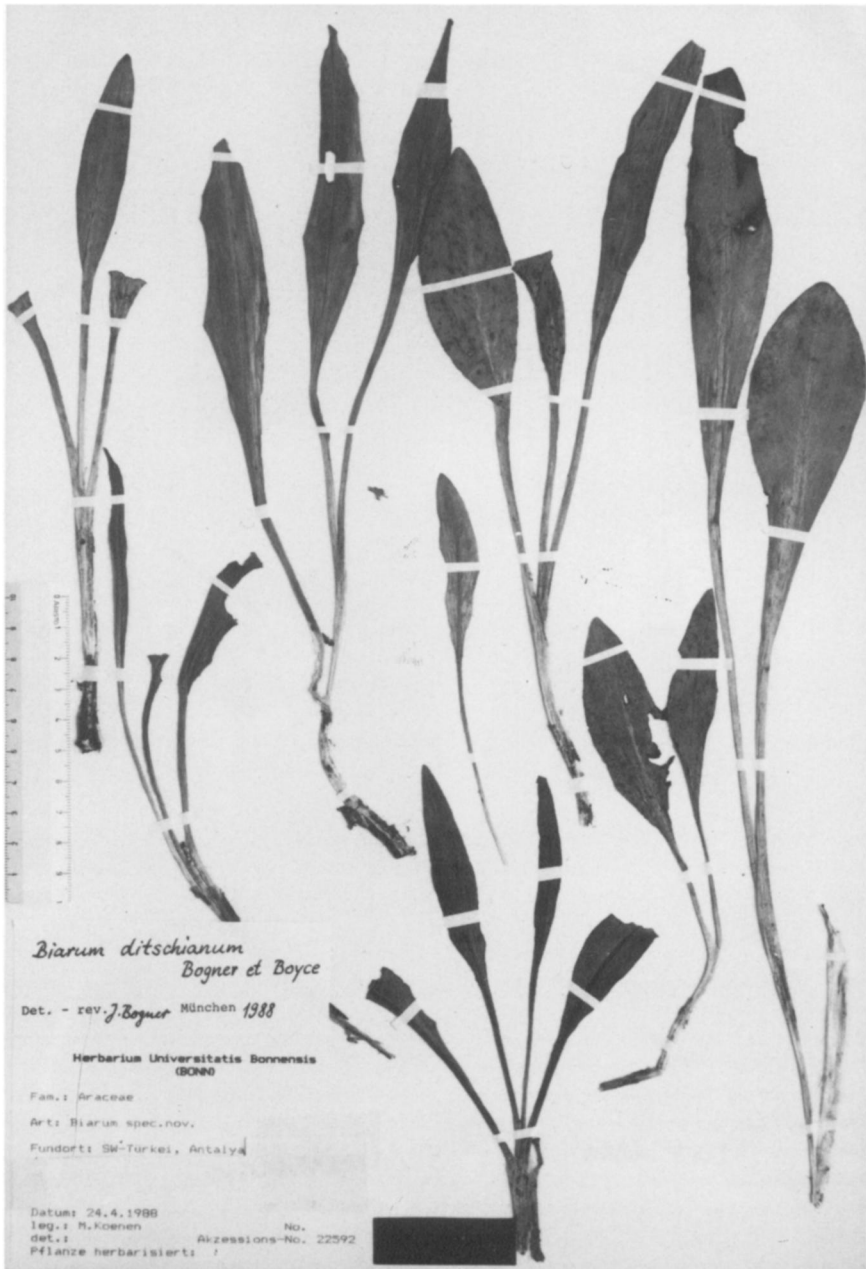


Fig. 2. *Biarum ditschianum* Bogner & Boyce. – Herbarium specimens, plants in vegetative stage showing the leaf variation (Bonn Botanical Garden Accession no. 22592, BONN). – Photo: K. Liedl.

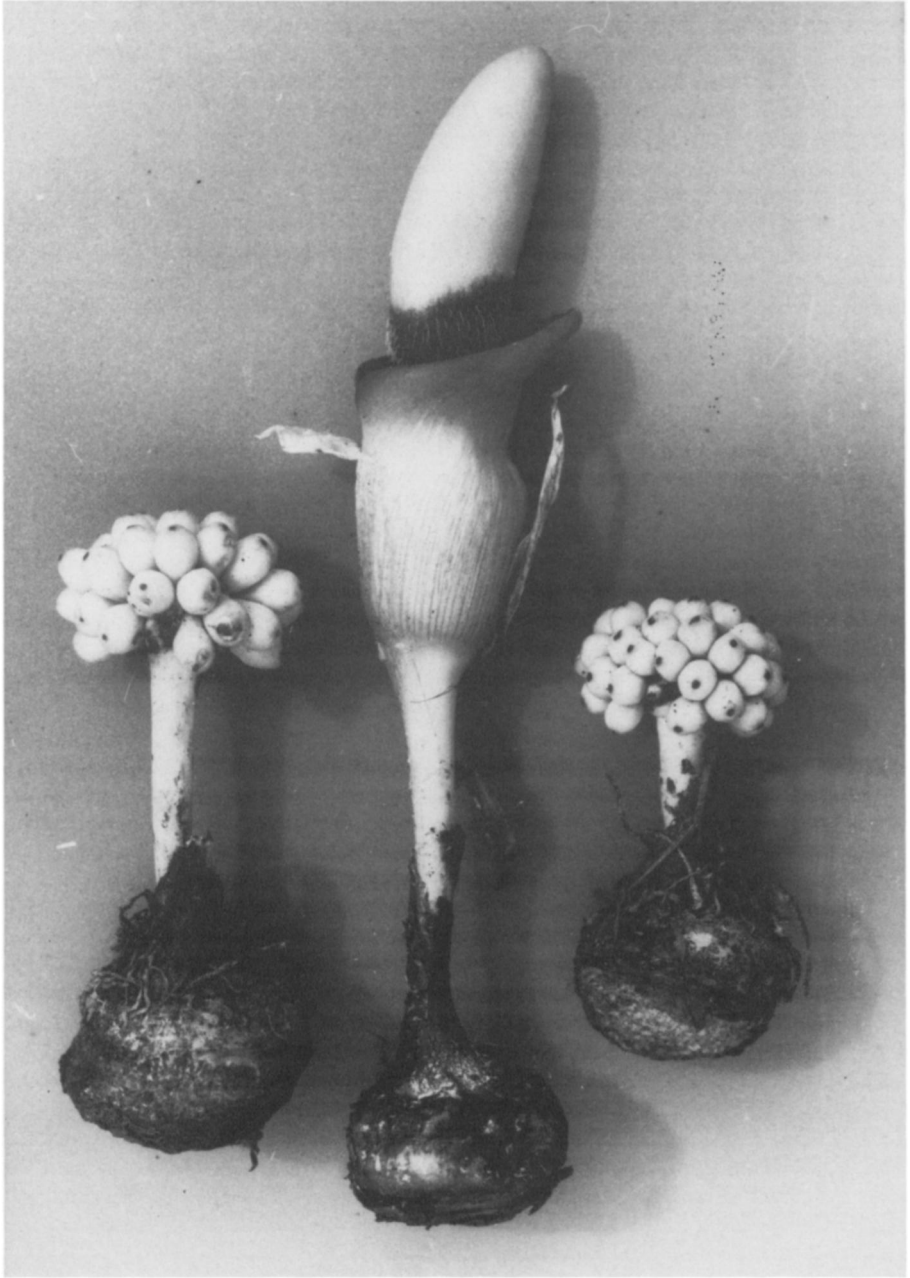


Fig. 3. *Biarum ditschianum* Bogner & Boyce. - One flowering and two fruiting specimens. - Photo: W. Barthlott.

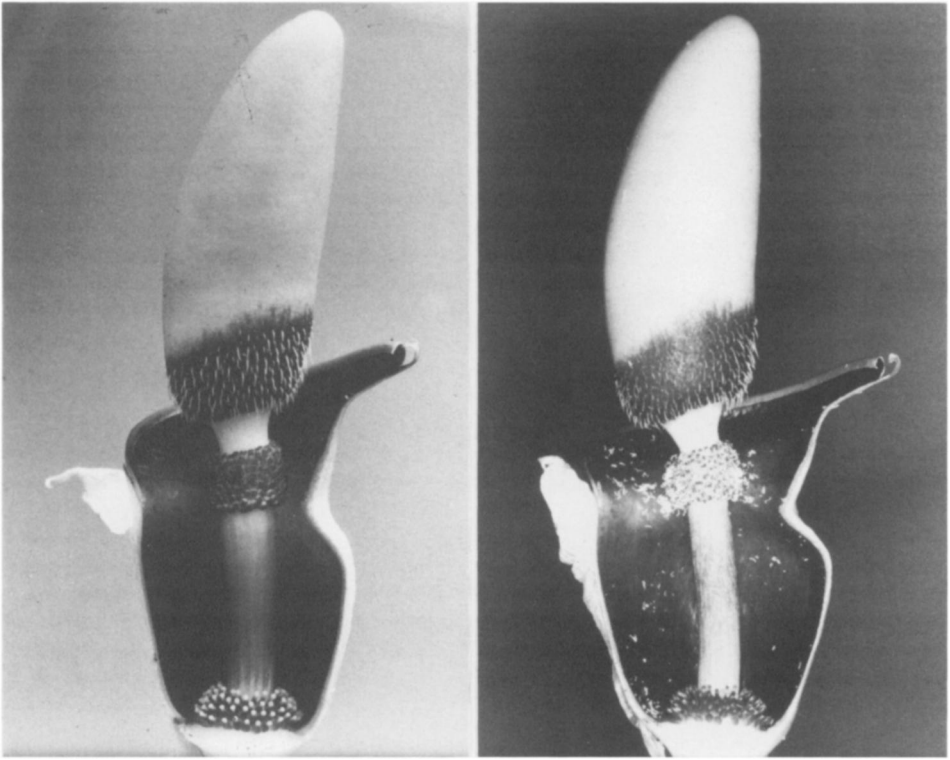


Fig. 4. *Biarum ditschianum* Bogner & Boyce. – Inflorescence; note the filiform processes at the base of the appendix, spathe partly removed: (left) female stage, note the still closed thecae; (right) male stage with pollen being extruded in strands, stigmas and styles shrivelled. – Photos: W. Barthlott.

purplish-red axis; pistillodes absent; pistillate flowers in ca. 4 spiral rows arranged in a 2–2.5 mm high hemispherical cluster at the base (Fig. 5); pistils lageniform, styles and stigmas curved outwards; style 1.2–1.3 mm long, ca. 0.4 mm thick basally, thickening slightly and purplish intensifying towards the ovary; stigma sub-capitate, 0.5–0.6 mm in diameter, slightly papillose, yellow; ovary ca. 1 mm diam., purplish-red; ovule orthotropous on a basal placenta, ca. 0.5 mm long, funicle very short; staminate flowers arranged in an oblong zone (Fig. 6), each consisting mostly of 2 stamens, rarely 1, sub-sessile; stamen 1 mm long, ca. 0.6 mm wide, yellow basally, purplish-red apically, thecae ellipsoid, dehiscing by an apical slit; pollen extruded in strands, pollen grains inaperturate, ellipsoid, 42–45 μm x 30–35 μm , exine smooth (Fig. 8). Infructescence borne at soil level, peduncle 3–5 cm long, ca. 5 mm thick, whitish, infructescence 3–3.5 cm in diameter, ca. 2 cm thick, consisting of ca. 50 berries in a depressed-globular cluster (Fig. 7); berries obovoid, 6–10 mm long, 4–7 mm wide, pericarp whitish, sometimes with a very slight reddish tinge basally, 0.4–0.7 mm thick. Seed obovoid, 5.5–7.5 mm long and 4–5.5 mm wide; testa with upper part very slightly irregular-reticulate, lower part smooth; embryo elongate, ca. 3.5 mm long, endosperm abundant.

Chromosome number: $2n = 26$.

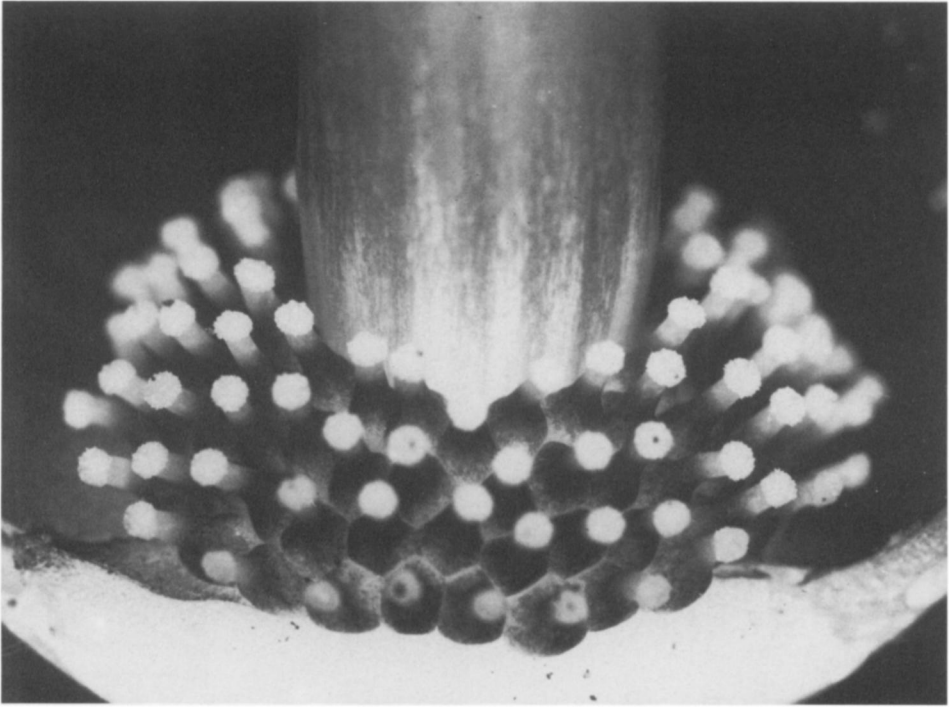


Fig. 5. *Biarum ditschianum* Bogner & Boyce. – Zone of female flowers at base of the spadix. – Photo: W. Barthlott.

Distribution

Turkey, Anatolia, Province of Lycia, in the Esen River valley, 30–60 m (*Bonn Botanical Garden Accession no. 22592*). We are not disclosing the exact locality since this species has a restricted local distribution and is also quite rare.

Another collection from the same locality is *B. Mathew 11058* (K); it was made in late April 1988 and the inflorescence was in bud.

Vernacular name: Yılan Bicaği.

Ecology

Biarum ditschianum grows in the low- to middle-high garigue usually in association with *Quercus aucheri* and *Daphne gnidioides* but occasionally in transition vegetation of *Asphodelus microcarpus* plains with *Urginea maritima*, *Pistacia lentiscus*, *Olea sylvestris*, *Euphorbia characias* subsp. *wulfenii*, *Selaginella denticulata*, *Phlomis fruticosa* and *Cyclamen graecum*.

Biarum ditschianum is confined to deep, partly loam-filled chimney-like holes, or more rarely crevices, in limestone rocks (Fig. 1). This type of habitat is unusual, but not unique for the genus; *B. bovei* Blume frequently grows in, but is not restricted to, similar situations in NW Syria (Boyce, pers. obs.).

The soft leaves are partly grazed by goats, but it seems that the deep holes favoured by *B. ditschianum* help to reduce damage since the tuber is often situated at the base of the hole with most of the foliage contained in the empty chimney and thus inaccessible. Furthermore, the narrow, deep holes are practically free of other perennial plants, the *Biarum* apparently growing with a minimum of competition. Precisely how the seed is spread from one hole to another is unclear. However, the infructescence morphology and seed type suggest seed dispersal by ants. This is known to occur in many species of *Biarum* including *B. bovei*.

The strong smell of carrion and excrement produced by the open inflorescence attracts carrion flies which are presumably the primary pollinators. The spadix is a strong UV light absorber, giving a good contrast to the surrounding limestone. Carrion flies are known to perceive mainly UV light.



Fig. 6. *Biarum ditschianum* Bogner & Boyce. – Upper part of spadix showing the male zone and base of appendix with filiform processes. – Photo: W. Barthlott.



Fig. 7. *Biarum ditschianum* Bogner & Boyce. – Infructescence. – Photo: W. Barthlott.

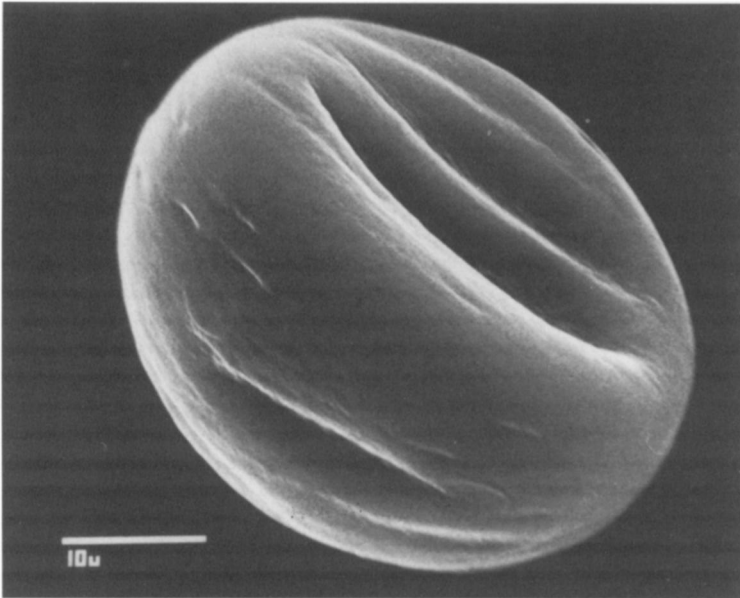


Fig. 8. *Biarum ditschianum* Bogner & Boyce. – Pollen grain (longitudinal depressions resulting from dehydration). – Photo: W. Barthlott.

Growth cycle

Biarum ditschianum begins growth in early winter after the first rains. Leaf shape is very variable. The first leaves produced are broadly spatulate but as the season progresses subsequent leaves are narrower. This may be in response to water availability in the confines of the limestone holes.

Flowering occurs towards the end of the growth period from early May to late June. At this time the previous year's infructescences ripen. By the time the inflorescences open most of the plants are leafless. Each inflorescence lasts for two days. During the first day, the pistillate flowers are at anthesis and the spadix appendix produces the characteristic foetid smell. By the second day the staminate flowers reach anthesis, the odour declines and the stigmas are no longer receptive.

Relationships

Biarum ditschianum is perhaps the most remarkable species of *Biarum* described to date. The much reduced spathe limb together with the filiform processes at the base of the appendix (Fig. 3, 4) clearly separate *B. ditschianum* from all other species. The morphology of the spathe and appendix and the oblong staminate flower zone suggest a link with *Biarum* sect. *Ischarum* Blume (1837), but the lack of pistillodes together with the filiform processes preclude the inclusion of *B. ditschianum* in this section. A reduced spathe limb and absence of pistillodes is found in *B. davisii* Turrill, but the vegetative features of *B. davisii* are different, as also is the shape of the staminate flower cluster. *B. davisii* has been tentatively included in *Biarum* sect. *Ischarum* (Riedl 1980) but this is probably incorrect because of the elongate staminate flower zone, lack of pistillodes and sweet, not foetid, odour. It would appear that the delimitation of sections in *Biarum* is in need of revision and although it would be best to accommodate *B. ditschianum* in a section of its own this would necessitate a complete reappraisal of the genus. Since a revision is presently being undertaken by the second author it is felt that the publication of a new section at this time is premature.

Acknowledgements

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