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Eminium koenenianum* (Araceae), a new species from NE Turkey and a key to the genus *Eminium

Abstract

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Eminium koenenianum from NE Turkey is described as a species new to science and illustrated. Comments are made regarding possible relationships of the new species. A key to the genus *Eminium* is provided.

Introduction

During an excursion to the province of Erzurum in NE Turkey, Mr M. Koenen, a horticulturist from the Botanical Garden of the University of Bonn, collected a remarkable aroid. Plants with fruit, leaves and inflorescences were collected. Attempts to identify the plants in the field failed, even with the help of the Flora of Turkey (Mill 1984), and after his return Mr Koenen handed the material over to the senior author. It soon became clear that the plant was undescribed.

Apart from the striking differences in the leaf shape of most species, the genus *Eminium* (Blume) Schott is superficially similar to *Biarum* Schott, differing in the number of ovules in the single locule of the ovary. In *Biarum* there is always one, whereas *Eminium* has two ovules, giving rise to a two-seeded fruit. The new species, *E. koenenianum* Lobin & Boyce appears to be somewhat intermediate in this character. Although it possesses two ovules per ovary, one is very often aborted and thus the fruits are frequently one-seeded. Furthermore, the entire leaves of *E. koenenianum* are similar to the leaves of *Biarum pyrami* (Schott) Engler and *B. kotschyi* (Schott) B. Mathew ex H. Riedl.

With the publication of this new species, the genus *Eminium* consists of seven species and ranges from Turkey to Soviet Central Asia, with one species, *E. spiculatum* (Blume) Schott, occurring in the Middle East as far south as N Egypt. All species occur in strongly seasonal habitats and are adapted to a semi-arid environment. Riedl (1980) published a key to the species and this is expanded here to include the new taxon.

E. koenenianum is named in honour of Mr Manfred Koenen who has enriched the collections at Bonn and Kew with many interesting plants.

***Eminium koenenianum* Lobin & Boyce, sp. nova** – Fig. 1, 2.

Type: BG Bonn accession no. 02487 (Holo- B; iso- BONN, E, FR, GOET, ISTE, K, M).

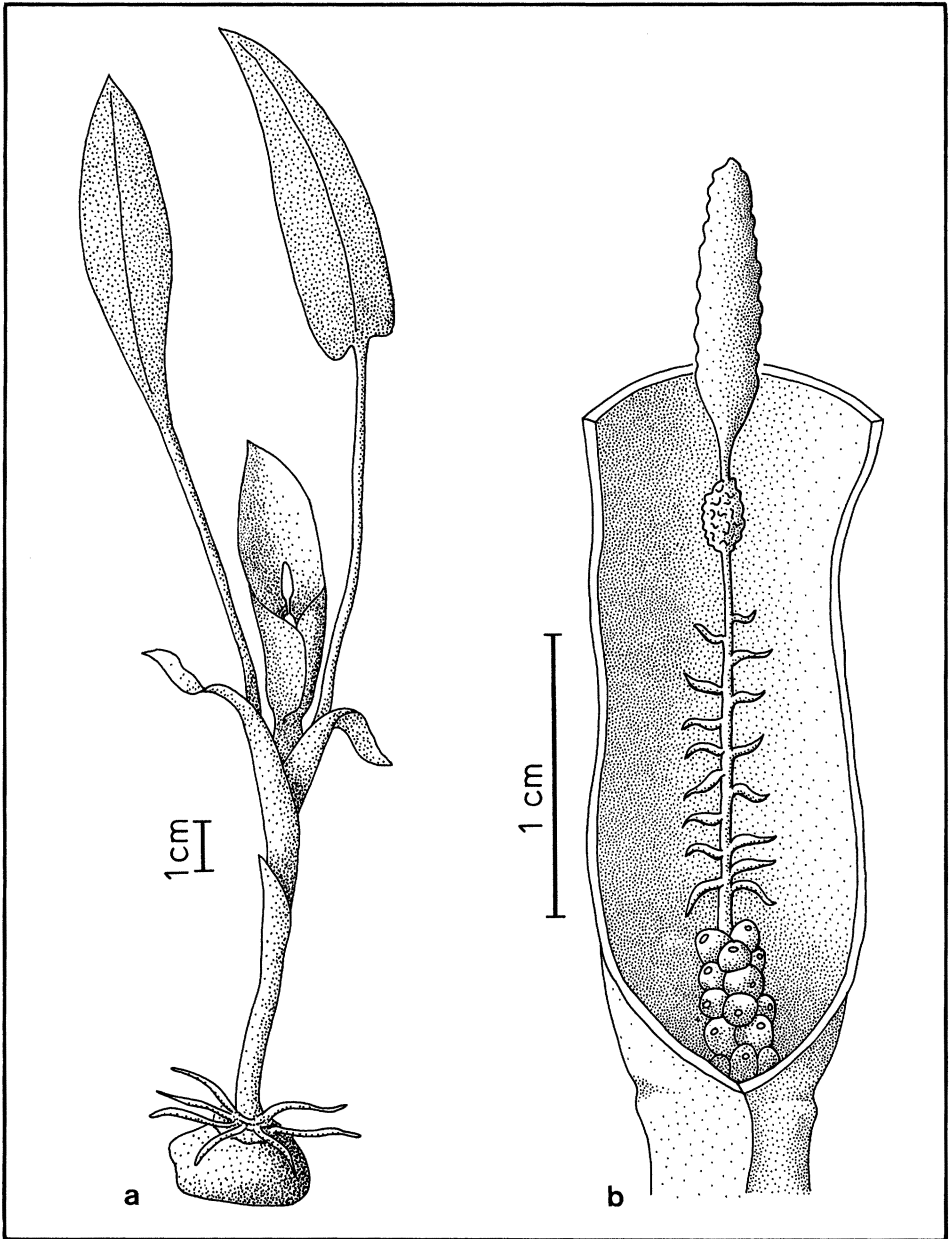


Fig. 1: *Eminium koenenianum* Lobin & Boyce. A habit, b Spadix showing the axis with pistilloides and the rugulose appendix. - Drawing: A. Hille.

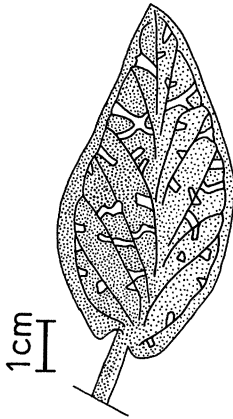


Fig. 2: *Eminium koenenianum* Lobin & Boyce. Leaf showing the white patches. – Drawing: A. Hille.

A speciebus ceteris Eminii spadice rugoso, pagina spathae adaxiali laevi et foliis integris distincte albopictis differt.

A perennial, tuberous herb with 2–3 leaves. Tuber depressed-globose, (1.1–)1.5–2.0 cm in diam., 1.6–2.5(–2.7) cm thick, yellowish-white, with whitish powder at growth point. Roots simple, less than 1 mm in diam., whitish. Leaves elongate to broadly lanceolate, 3.0–7.0 cm long x 1.3–2.5 cm, proximally cuneate to cordate, distally subacute, lamina dull green, glistening when fresh, usually with conspicuous white patches, occasionally so densely covered with these patches as to appear \pm white, primary venation sub-parallel, secondary venation reticulate. Petiole 9–35 cm long, canaliculate adaxially, distally green, becoming violet basally, proximally subterranean, whitish; sheaths 4.0–12.5 cm long, sub-fleshy at first, becoming papery on drying, straw-coloured. Cataphylls membranaceous, varying in size, the largest 9.0–14.5 cm long x 0.9–1.7 cm at the broadest part, white. Inflorescence appearing in spring. Peduncle 4.7–13.6 cm long, 0.8–1.1 mm in diam. in lowest part, widening to 1.8–3 mm directly below the spathe, distinctly striate, violet distally, becoming white proximally. Spathe 5.5–9.3 cm long; spathe limb 4.4–6.7 cm long x 1.3–2.5 cm, lanceolate – triangular, erect to slightly reflexed, terminating in a c. 4(–6) mm long tip, abaxial surface dirty violet to pale brownish violet, becoming darker distally, adaxial surface dark violet; spathe tube rounded, 1.5–2.0 cm long, 8–17 mm in diam., margins completely free, proximal third slightly convolute, interior and exterior cream; spadix 12.3–23.3 mm long; appendix rather elongate-clavate, shortly stipitate, proximally abruptly wider than the stipe, 7–14 mm x 1.8–2.5(–4) mm, black to dark-brown, surface usually rugulose, foetid even when dry; stipe 2–4.5(–6) mm long, 1.5 mm in diam., gradually becoming wider distally, whitish to light brown, distal third sometimes black, proximal half striate, becoming prominently striate and rugulose distally. Staminate flower zone (1.5–)2–2.3 mm in diam., (2.8–)4–5 mm long, dark violet to dark brown; axis between pistillate and staminate zone naked, 1.6–2.3(–2.5) cm long, strongly striate, distinctly longer than the appendix, furnished with pistilodes, these subulate 0.75–1 cm long, white. Flowers unisexual, naked; staminate flowers with 1 stamen, sessile to sub-sessile; stamen almost quadratic in shape, c. 0.43–0.46 mm long, dark violet to dark brown; thecae opening by an apical slit, open thecae ellipsoid; pollen (Fig. 3) consisting of isopolar eumonads, 15–20 μ m x c. 15 μ m, prolate, in lateral outline elliptic, in polar view \pm circular, inaperturate, spinulose, exine thin, intine thick (c. 3–4 μ m). Pistillate flowers not seen at anthesis, ovary cylindrical, unilocular, bi-ovulate on a basal placenta, one ovule very often aborted, style \pm absent, stigma round, c. 1 mm in diam.,



Fig. 3: *Eminium koenenianum* Lobin & Boyce. EM-photograph of a pollen grain. – Photo: M. Wolter.

receptive surface raised, margins flattened, prominent, violet, receptive surface cream. Infructescence borne at or just below soil level, consisting of 10–40 berries in a ovoid cluster 2.0–2.5 cm in diam., encased by the persistent, papery, light brown spathe tube remains; peduncle (4–)5–7(–17) cm long, proximally 2–4 mm in diam., widening to 4–5 mm in diam. above and becoming abruptly wider distally, whitish proximally, longitudinally striped purple from distal end to the lower median portion. Berry obovoid, 10–12 mm x 5–7 mm; pericarp white, greenish towards the apex when immature, wholly white when ripe, crested with a violet stigma remnant; mostly one-seeded, sometimes two-seeded. Seeds c. 5 mm in diam., roundish, reticulate, cream coloured when fresh, becoming brown when dry.

Chromosome number: $2n=28$.

Specimens examined:

Turkey, Vilayet Erzurum, NW slopes of N range of Mescit Dağlari, Çoruh Nehir Valley, 1300 m, 3. 5. 1989, *M. Koenen* 32*89* K (B, BONN, E, FR, GOET, ISTE, K, M).

E. koenenianum differs from all other species in the genus by the combination of a usually rugulose spadix appendix, smooth surface adaxial to the spathe limb, and entire leaves with distinct white patches.



Fig. 4: *E. koenenianum* Lobin & Boyce growing in open, dry, rocky positions with sparse vegetation. – Photo: M. Koenen.

Variation

E. koenenianum is quite variable with regard to the inflorescence, leaf size, and the leaf base shape. It is possible to find both cordate and cuneate leaf bases in a single population. Riedl (1969) was especially interested in the shape of the leaves in *Eminium* and found that there is apparently a phylogenetic trend in the development of those species with entire leaves (e.g. *E. reglii* Vved.) and those with strongly dissected leaves (e.g. *E. spiculatum*). The first leaves of all *Eminium* species are lanceolate. However, while in three taxa (e.g. *E. reglii*) all leaves are entire, in others various degrees of leaf division occur, those of *E. spiculatum* being the most dissected. Riedl suggested that the leaf dissections associated with some species are a development of the small posterior lobes found in some of the juvenile leaf-forms. In this respect *E. koenenianum* stands in an intermediate position with its cuneate to cordate leaf base which usually shows no posterior extensions, although occasionally there is some disparity between the lobe size on one side compared to the other.

Ecology

E. koenenianum grows on the NW slopes of the north range of the Mescit Đaglari at an altitude of about 1300 m in open, dry, rocky positions with sparse vegetation (Fig. 4). The specimens described in this paper were found together with isolated shrubs such as *Juniperus oxycedrus* L., *Paliurus spina-christi* Miller, *Cotoneaster morulus* Pojark. and *Rosa canina* L. All these species reach a height of 2–4 m. Two other geophytes were flowering together with *E. koenenianum*, namely *Iris taochia* Woronow ex Grossh. and *I. galatica* Siehe.

E. koenenianum occurs as single plant and does not form clumps in the same way that other *Eminium* species sometimes do. Nevertheless, up to ten plants can be found in one square metre. Interestingly at the time of collection (3. 5. 1989) all parts of the inflorescence were present and displayed their original colours, although plants were in advanced fruit. In *Eminium* most of the spathe and spadix is usually shed soon after the berries begin to swell, with only the partially buried spathe tube remaining as a papery shell around the developing infructescence. The leaves on the plants observed were green where shaded but yellowed where exposed to the sun.

The sun-dried inflorescences, or more strictly the spadix appendices, smell of carrion, although during anthesis this smell would have undoubtedly been considerably stronger. The retention of the carrion-like smell in withering inflorescences is interesting and is possibly linked to the rugulose spadix appendix surface. A similar phenomenon occurs in *E. spiculatum* which also has a rugulose spadix appendix. It seems possible that small quantities of the chemicals responsible for the carrion-like smell are in some way retained on the uneven appendix surface even after the inflorescence had withered. In species with smooth spadices this post-anthesis odour-retention has not been recorded.

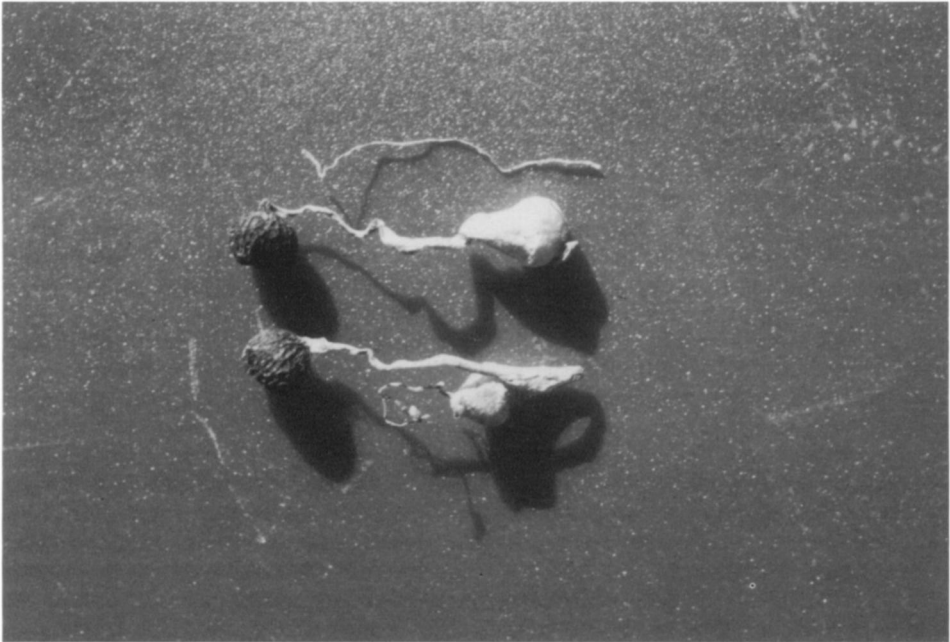


Fig. 5: *E. koenenianum* Lobin & Boyce. Seeds germinating without producing a leaf. The growth terminates with the production of a small tuber. – Photo: M. Koenen.

In common with other members of the genus, *E. koenenianum* flowers and fruits in spring. The inflorescences appear approximately in April and the seeds mature in May. The seeds had germinated without producing a leaf and the growth ended with the production of a small tuber (Fig. 5). It is not until the following growing season that the first leaves are produced. The mode of seed distribution in *E. koenenianum* is not known. In some other Turkish species it seems that the seed is not spread but rather germinates in situ around the parent plant. This leads to the formation of extremely congested colonies. The occurrence of *E. koenenianum* as single individuals suggests that the seed is moved away from the parent plant.

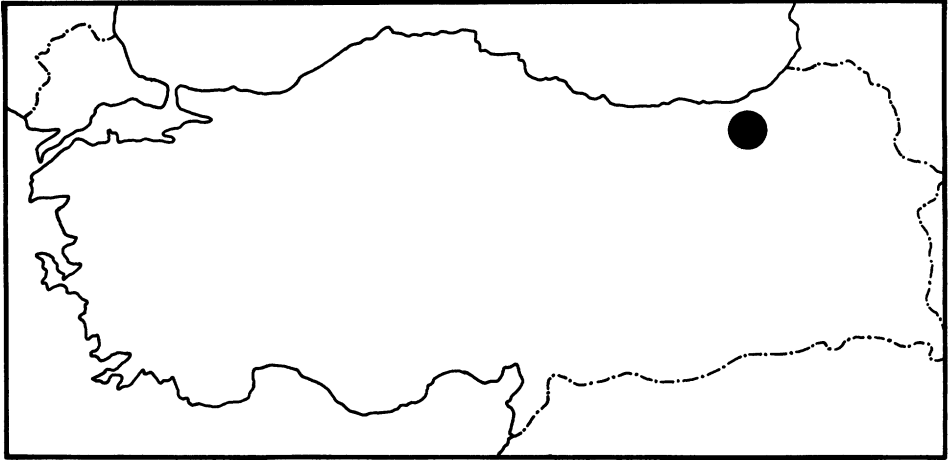


Fig. 6: *E. koenenianum* Lobin & Boyce. Distribution in NE Turkey. In order to protect the species, a large scale map has been used. – Drawing: A. Hille.

Distribution

So far, *E. koenenianum* is known only from the type locality (Fig. 6).

Relationships

E. koenenianum is apparently allied to *E. lehmannii* (Bunge) O. Kuntze and *E. heterophyllum* (Blume) Schott and, perhaps, *E. regelii*. *E. lehmannii* has entire leaves similar to those of *E. koenenianum* but differs in having flattened, not subulate, lower pistilloides, a parallel sided, not distally thickened peduncle and a longer, more slender, smooth spadix appendix. *E. lehmannii* is native to Afghanistan, Soviet Central Asia and S Siberia, it has not been recorded in Turkey.

E. heterophyllum, especially in its entire-leaved form, resembles *E. koenenianum* but is distinguished by the smooth, slender spadix appendix and broader pistilloides. In the divided-leaf form *E. heterophyllum* is readily distinguished by leaf architecture. The considerably widened peduncle in *E. heterophyllum* is a character shared by *E. koenenianum* and since we feel that this character is important in the taxonomy of *Eminium*, it would appear that *E. koenenianum* is closest to *E. heterophyllum*. Interestingly both species occur in N Turkey.

The suggestion of a relationship between *E. koenenianum* and *E. regelii* is more tenuous. The two features they both share are the entire leaf and the distally expanded peduncle. However, *E. regelii* is a far larger plant in all its parts and differs by the long, smooth, cylindrical spadix appendix, the densely arranged pistilloides and the broader, longer spathe limb. So far *E. regelii* has only been recorded from Soviet Central Asia.

Key to the genus *Eminium*

1. Adaxial spathe limb surface densely verrucate 2 (*E. spiculatum*)
- Adaxial spathe limb smooth 3

2. Flowering diurnal, spathe limb 12–20 cm long, 7–14 cm wide, adaxial surface glossy, spathe tube 8–12 cm long, 2.5–4 cm in diam. *E. spiculatum* subsp. *spiculatum*
 – Flowering nocturnal, spathe limb 5–11 cm long, 4–7 cm wide, adaxial surface velvety, spathe tube 5–8 cm long, 1.7–3 cm in diam. *E. spiculatum* subsp. *negevense*
3. Peduncle thickened markedly towards the spathe 4
 – Peduncle not or scarcely thickened towards the spathe 9
4. Leaves with highly divided posterior lobes 5
 – Leaves entire or with only two orders of posterior lobe division 7
5. Anterior lobe of leaf lanceolate, acute, posterior lobe divisions narrowly lanceolate to linear, ± strongly involute. Spathe erect to reflexed; spadix slender cylindrical *E. albertii*
 – Anterior lobe of leaf broadly oblong, obtuse, posterior lobe divisions broadly linear, ± flat, occasionally suberect. Spathe incurved over the spadix, sometimes almost cucullate, spadix conical to broadly cylindrical 6 (*E. rawwolfii*)
6. Spadix appendix short-stalked, ± broadly cylindrical to slightly conical
 *E. rawwolfii* var. *rawwolfii*
 – Spadix appendix sessile, strongly conical *E. rawwolfii* var. *kotschyi*
7. Spadix appendix ± sessile, tapering gradually proximally, pistillodes densely arranged . . *E. regelii*
 – Spadix appendix distinctly stipitate, pistillodes scattered 8
8. Leaves entire, green with white patches. Spadix appendix usually rugulose, pistillodes all subulate *E. koenenianum*
 – Leaf posterior lobes with one, occasionally two order of division, rarely entire, leaves grey-green, unmarked. Spadix appendix smooth, upper pistillodes subulate, lower ± flattened
 *E. heterophyllum*
9. Leaves with much divided posterior lobes. Spadix appendix slender to broadly conical
 *E. intortum*
 – Leaves entire. Spadix appendix slender cylindrical *E. lehmannii*

We wish to add here that we do not accept Riedl's reduction of *E. heterophyllum* to subspecific rank within *E. intortum* (Riedl 1985). Material examined of both taxa does show differences of sufficient stability to maintain them at species rank, especially with regard to the degree of peduncle expansion beneath the spathe.

A few words should be said here about the conservation of *E. koenenianum*. With its beautiful white-spotted, glistening leaves, *E. koenenianum* will certainly attract horticultural interest. In order to protect the species from a fate similar to that suffered by *Sternbergia candida* B. Mathew & T. Baytop and *Iris pamphylica* Hedge the exact location is not cited in this publication. *E. koenenianum* is easily propagated from seed and therefore it is not necessary to collect more plants in the wild. The species will certainly be distributed from the Botanical Garden of the University of Bonn and will thus be available for plant enthusiasts.

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