

## REDISCOVERY OF DIONYSIA BORNMUELLERI (PAX) CLAY (PRIMULACEAE) IN WEST IRAN

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*Dionysia bornmuelleri* (Pax) Clay (Primulaceae) was rediscovered in 2021 in Kermanshah province, W of Iran, on the surface of wet limestone rock walls in Bayangan area far from its previously known habitat after not being documented for more than 100 years in Iran. The type specimen that was reported from Nova Mountain in Kermanshah province, is maintained in the herbarium of Berlin Botanical Garden (B). A detailed taxonomic description, photographs, and diagnostic characters to distinguish *Dionysia bornmuelleri* from its close relatives have been provided.

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**Keywords:** Geographical distribution; Iran; Kermanshah province; Bayangan; rare plant; conservation status

کشف مجدد گونه نادر *Dionysia bornmuelleri* (Pax) Clay از تیره Primulaceae در غرب ایران

نسترن جلیلیان: استادیار پژوهش بخش تحقیقات جنگلها و مراتع، مرکز تحقیقات و آموزش کشاورزی و منابع طبیعی استان کرمانشاه،

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گونه *Dionysia bornmuelleri* (Pax) Clay از خانواده پامچال بعد از گذشت بیش از صد سال از آخرین مشاهده آن در ایران، در سال ۱۴۰۰ بر روی دیواره‌های صخره‌ای آهکی مرطوب در منطقه باینگان استان کرمانشاه واقع در غرب ایران دور از محل تیپ آن جمع‌آوری گردید. نمونه تیپ آن که از کوه نوا در استان کرمانشاه گزارش شده است، در هرباریوم باغ گیاه‌شناسی برلین (B) نگهداری می‌شود. جزئیات آرایه شناختی، تصاویر گیاه و ویژگی‌های خاص برای تشخیص از گونه‌های خویشاوند ارائه گردیده است.

### INTRODUCTION

The genus *Dionysia* Fenzl. of the Primulaceae Batsch ex Borkh. containing more than 50 species distributed from SE Turkey, N Iraq, Iran, Pakistan, Oman to Tadzhikistan and Afghanistan (Liden 2007). They are small, cushion forming or laxer and *Primula* L. looking, in yellow, purple, violet, or pink flowers.

Wendelbo (1965) and Jamzad (1999) introduced 30 species of *Dionysia* for Iran and later the number of species represented in Iran increased to 40 almost restricted to the mountains of western Iran (Liden 2007; Borjian & al. 2014; Younesi & al. 2016; Mehregan & al. 2021).

*Dionysia bornmuelleri* (Pax) Clay was introduced

as *Primula bornmuelleri* Pax and later transferred to the genus *Dionysia*. The species was first collected by Strauss from Nova Mountain, Kermanshah province, Iran in June 1909 (Wendelbo 1961).

*Dionysia bornmuelleri* is known only from three localities, one locality in Mardin in SE Turkey (Lamond 1978), two localities in N of Iraq (Wendelbo 1965), and one locality in Kermanshah province, Nova Mountain in W of Iran as type locality (Wendelbo 1965; Jamzad 1999). After not being observed for more than 100 years this species was rediscovered in 2021 by the authors. It is currently known from a small population in a wet habitat in Kermanshah province, W of Iran, far from previously known distribution area, at an altitude of 1105-1108 m a.s.l.

***Dionysia bornmuelleri*** (Pax) Clay in Present Day Rock Gard. 194 (1937).

Syn.: *Primula bornmuelleri* Pax in Jahresber. Schles. Ges. Vaterl. Cult. 87: 21 (1909).

Type: Iran, Kermanshah, Nova Mountain near Kerend-e gharb, Strauss 601 (B; isotype: E, K, W).

Lax chasmophytic aromatic subshrub. Indumentum of green plant parts of (a) scattered sessile glands, (b) rather dense many-celled articulated glandular hairs 0.2-1 mm long, and especially on veins on the underside of leaves, (c) scattered coarse and straight, acute eglandular hairs. Farina woolly and mainly on the underside of leaves, at petiole bases, and inside of calyx. Leaves (including petiole) 10-60 × 4-20 mm, narrowed into a long narrowly petiole, lamina oblong to spatulate, with raised veins below, flat or (especially when young) with slightly revolute margin, dentate with obtuse to subacute primary teeth or lobes, each usually with 1-3 minute secondary teeth. Scapes

3-10 cm long with (1-) 2-4 whorls of flowers, each with 3-6 flowers. Bracts ovate to lanceolate, serrate, up to 25 mm. Calyx 6-8 mm, split to  $\frac{3}{4}$  or more into linear, broadly oblanceolate or lanceolate lobes. Corolla tube 20-30 mm long, limb 6-8 mm broad, obtusely sub-rectangular in shape. Capsule ovate with numerous seeds.

**Specimen examined:** Kermanshah province: Bayangan, after Dudan village, seasonal waterfall, 1105-1108 m, 46°10' 12.60" E, 35° 00' 35.50" N, Jalilian, Nemati and Soleimani, 10082 (RANK).

**Taxonomic remarks:** *Dionysia bornmuelleri* by having yellow flowers, inflorescence stalked consisting of superposed verticils of the flower is related to *D. viva* Liden & Zetterlund and *D. mira* Wendelbo, as two endemic species of Iran and Oman respectively. But because of the size and number of teeth on each side of leaves, it is different from *D. mira*. Furthermore, *D. bornmuelleri* is distinguished from *D. viva* by the following characters: corolla tube 20-30 mm (vs. 13-15 mm); calyx split to  $\frac{3}{4}$  or more (vs.  $\frac{2}{3}$ ).

**Distribution:** According to documented observation (table 1, fig. 3), *D. bornmuelleri* is an Irano-Turanian element growing in SE Turkey, N Iraq, and W Iran.

**Flowering time:** Late March to April

**Habitat:** Crevices of wet limestone rock walls in north slopes at an altitude from 1105-1108 m (figs.1-3).

The main companion species is *Ficus carica* subsp. *rupestris* (Boiss.) Browicz, but next to this small wet rocky habitat species such as *Quercus brantii* Lindl, *Paliurus spina-christi* Miller, *Acer monspessulanum* L., *Crataegus azarolus* var. *aronia* L., and *Pistacia atlantica* Desf. were observed.

Table 1. The known localities for *Dionysia bornmuelleri*.

Known localities	Collector, Herbarium voucher, last observation
Turkey: Mardin, Cudi Da, above Hessana, 1450-1500 m	Davis, P.H. 42833, May 1966.
Iraq: Mosul, Zakho near Sharanish, 1000 m	Rech., K.H. 11485, July 1957.
Iraq: Arbil, near Rawandiz, 500 m	Guest, E.R. 2139, April 1932; Polunin, O. 5069, April 1956; Rech., K.H. 11261, July 1957; Gillett, J.B. 8313, April 1963.
Iran: Kermanshah, Nova Mountain near Kerend-e gharb	Strauss, T. 601, June 1909, (holo. B, iso. E, K, W).
Iran: Kermanshah, near Paveh, Bayangan, Dudan village, 1105-1108 m	Jalilian, N., Nemati, M. & Soleimani, F. 10082, RANK. 3 April 2021.

### Conservation status

According to our observations, the distribution of *D. bornmuelleri* is restricted to a single location in Iran. The population size is very small and the number of individuals is less than 100 in the observed population.

It occupies an area of about 0.003 km<sup>2</sup>. For calculating Area of Occupancy (AOO) and Extent of Occurrence (EOO) in all reported localities of the species; according to the standard defined measures in GeoCAT program (geocat. kew. org; Bachman 2011), the cell

size was considered to be 2 km<sup>2</sup>. Even though the species was not observed in the type locality (Nova Mountain), (table 1), but, in the calculations of GeoCAT software, the number of habitats was considered as 5, and accordingly, the Area of Occupancy (AOO) is calculated as 20 Km<sup>2</sup> in Iran, Iraq, and Turkey and the Extent of Occurrence (EOO) was 19299 Km<sup>2</sup> (fig. 3). According to the number of locations (5) and area of occupancy (20 km<sup>2</sup>) the conservation status is assessed as “Endangered”, but based on the Extent of Occurrence (EOO) (IUCN 2019), the species should be placed under the Vulnerable (VU) category, but generally, the highest category of threat is considered in assessments. In the assessment of the species, considering the available

data including the number of mature individuals (100) in the studied location, the number of locations in the distribution area (5), and the area of occupancy (AOO), we define the conservation status of *D. bornmuelleri* “Endangered (EN)”.

It should be noted that most *Dionysia* species appear in small populations in their natural habitats, usually in unique ecological niches, so any change in their habitat will be a risk of extinction for them. Climate change and drought are the risk factors that may affect the endemic *Dionysia* species, even though they usually do not face human impacts, and related threat categories, because of growing in high altitudes and being far to reach.



Fig. 1. *Dionysia bornmuelleri* (Photograph by N. Jalilian at Bayangan, April 3, 2021).



Fig. 2a. Habitat of *Dionysia bornmuelleri* (Photograph by N. Jalilian at Bayangan, April 3, 2021).

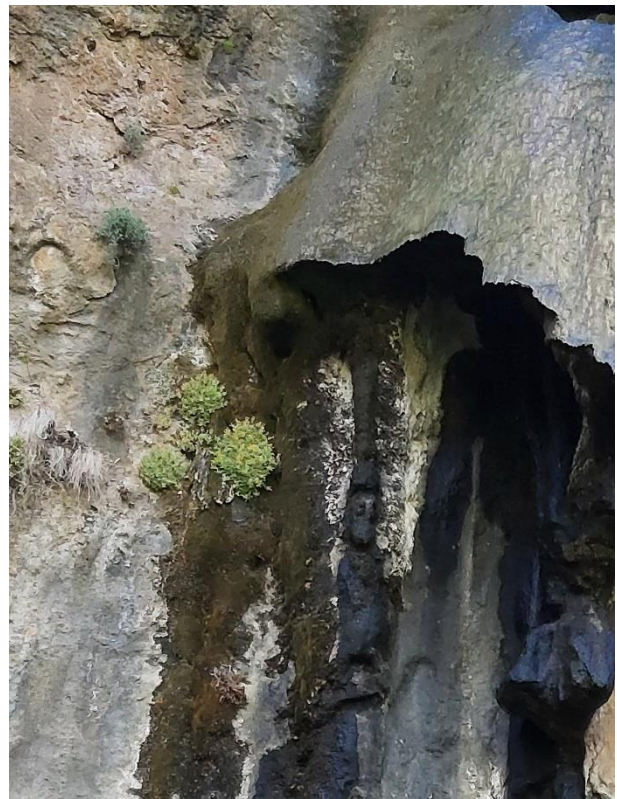


Fig. 2b. Habitat of *Dionysia bornmuelleri* (Photograph by M. Nemati at Bayangan, April 3 2021).

Fig. 2c. Habitat of *Dionysia bornmuelleri*. (Photograph by M. Nemati at Bayangan, April 3 2021).

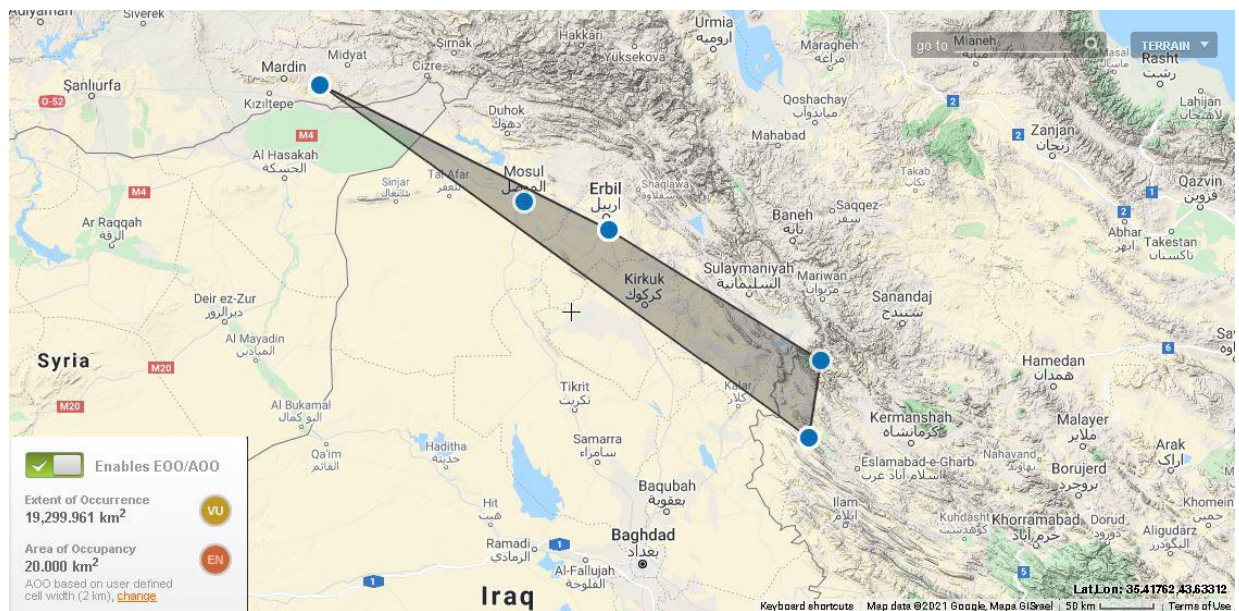


Fig. 3. The GeoCat map, showing the Extent of Occurrence and the Area of Occupancy of *Dionysia bornmuelleri*.

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