

# THE GENUS *DIONYSIA* (PRIMULACEAE) IN IRAN

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The genus *Dionysia* in Iran is studied. Four new species are described as follows: *D. aubrietioides*, *D. bazoftica*, *D. iranica*, and *D. khuzistanica*. *D. bolivarii* is treated as a synonym of *D. caespitosa*. A key to the Iranian species of the genus is given. The species are listed and their geographical distribution are shown in a map.

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جنس *Dionysia* در ایران

زیبا جمزاد

جنس *Dionysia* در ایران مورد مطالعه قرار می‌گیرد. چهار گونه جدید به نامهای *D. aubrietioides*, *D. iranica*, *D. bazoftica*, *D. khuzistanica* شرح داده می‌شوند. گونه *D. bolivarii* مترادف با گونه *D. caespitosa* قرار داده می‌شود. لیست گونه‌ها و نقشه پراکندگی جغرافیایی آنها ارائه می‌گردد. هم‌چنین یک کلید جهت شناسایی گونه‌ها داده می‌شود.

## INTRODUCTION

The genus *Dionysia* is mainly an Irano-Turanian element with its centre of diversity in dry mountains of Iran. After the work of late Per Wendelbo (Fl. Iranica 1965, no.9) some new species were described either by him or other European or Iranian taxonomists. In the course of preparing the Flora of Iran; *Primulaceae* the genus was revised and many new collections were done. The study of the newly collected specimens revealed four new species which will be described. Also *D. bolivarii* is treated as a synonym of *D. caespitosa*. The number of species in the genus reaches to 46 from which 30 occur in Iran. A key to the species is given and their distribution is mapped.

## DISTRIBUTION

The genus *Dionysia* in Iran is restricted to the mountainous area of northern, western, central and southern part of the country. The northern most species are *D. aretioides* (Lehm.) Boiss., *D. tapetodes* Bunge and *D. kossinskyi* Czern. *D. revoluta* Boiss. is the southern most species, it occurs in Bakhtiari, Kohgilouyeh and Boir-Ahmad, Fars, Kerman and extends to Genu

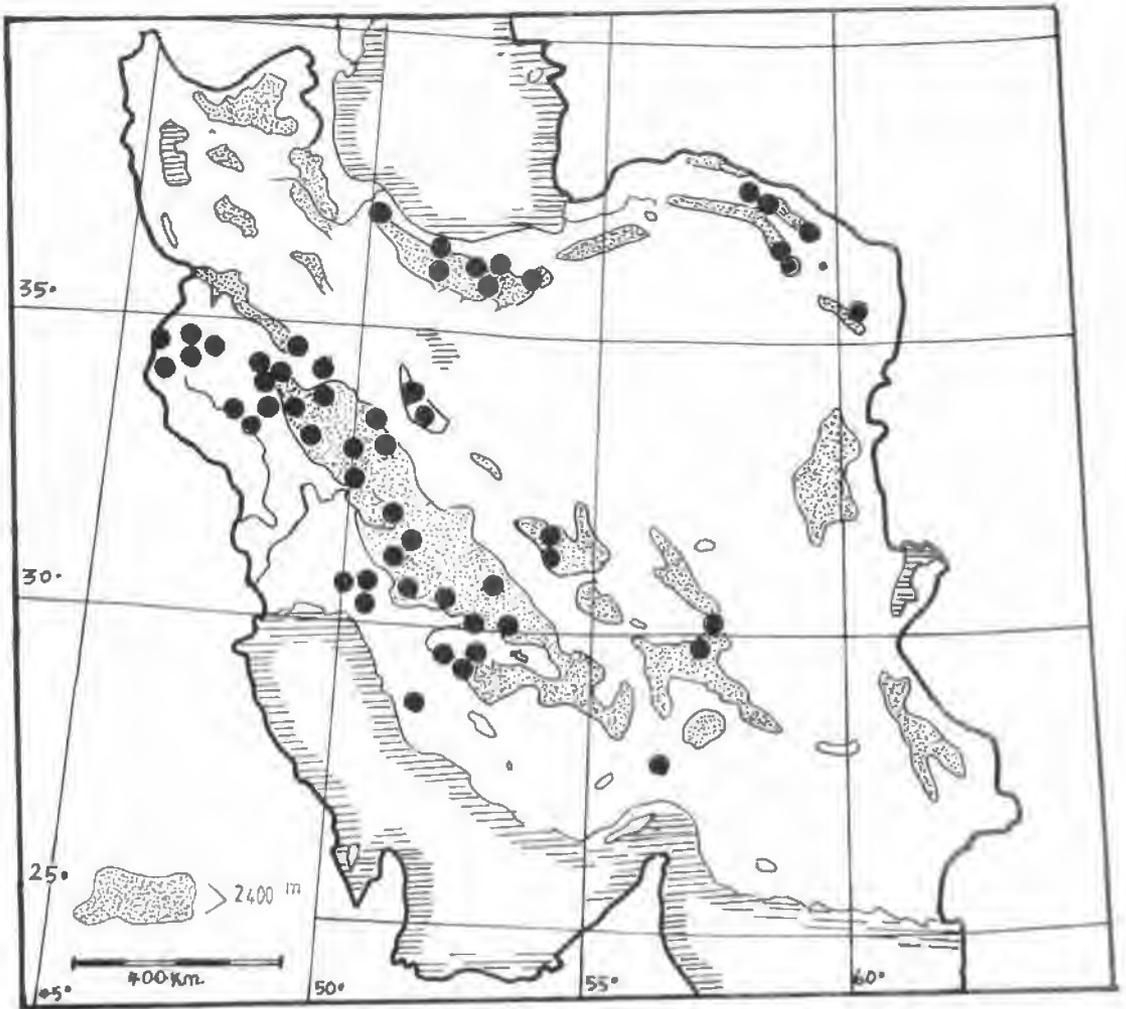
mountain in Bandar-Abbas province in South Iran. Zagros Mountains specially in Bakhtiari and Fars provinces are the centre of diversity and speciation of the genus. 22 from 30 known species belonging to section *Anacamptophyllum* including subsections *Scaposae* and *Revolutae* as well as section *Dionysia* including subsections *Caespitosae* and *Bryomorphae* occur in this district. Due to the habitat condition of the species and difficulties of collecting, there may exist more species in habitats, which have not been explored yet (map.1. shows the distribution of *Dionysia* species in Iran).

## NEW SYNONYMS

***Dionysia caespitosa*** (Duby) Boiss., Diagn. Pl. Or. Nov. ser. 1, 7: 67 (1846).  
Syn.: *D. bolivarii* Pau, Trab. Mus. Nac. Cienc. Nat. (Bot.) 14:27 (1918), **syn. nov.**

*D. caespitosa* (Duby) Boiss. is a member of the section *Dionysia* subsect. *Caespitosae* which was described by Duby (1844) under the name *Gregoria caespitosa*, later Boissier (1846) treated it as *D. caespitosa*. Pau (1918) described *D. bolivarii* from Bakhtiari province. The two mentioned species are similar in most characters, through description. The main difference

Map. 1. Distribution map of the genus *Dionysia* in Iran (after Wendelbo 1961, revised).



between them through the description is the shape of leaves which have well defined and evenly spaced teeth in *D. bolivarii*.

By examining the specimens collected

from the mentioned localities it is evident that the dentation of the leaf margin varies in different specimens as well as in a single specimen, so it can not be used as a good



Fig. 1. *Dionysia aubrietioides* (nat. size); flowering branch (x3) marcescent leaves (x3).

character for separating them and they are treated as synonymy.

## NEW SPECIES

***Dionysia aubrietoides*** Jamzad & Mozaffarian, **sp. nov.**

Sect. *Anacamptophyllum* Melch.

Subsect. *Scaposae* Wendelbo.

Caespites laxi, ramis tenuis, foliis membranaceis farinosis glomerosis obsitis.

Folia herbacea petiolo incluso 1-2 cm longa, 0.5-1 cm lata, ovata, efarinosa, margine dentata, plana, apice acuta, basi cuneata, petiolata, minute glandulosa.

Inflorescentia uniflora, scapo 12-20 mm longo suffulta; scapus pilis articulatis patentibus obsitis. Flos sessilis. Bracteae binae, foliaceae, 8-10 x 4-5 mm, ovatae, margine dentatae. Calyx 8 mm longus, ad  $\frac{7}{8}$  fissus, campanulatus, in fructum incrassatus, 12 mm longus, sparse glanduloso-papillosus. Corolla flava, tubum florum longistylorum 13 mm longum, limbus 10 mm diam; lobis integris, ovato-oblongis. Antherae 2 mm longae. Capsula polysperma.

*Typus.* Bakhtiari, Bazoft valley. Mavarz, Talkhdan Kuh-e Mafaron (Kuh-e Sefid), 2700 m, Mozaffarian 74002 (holotypus

TARI).

Cushions lax, branches slender covered by glomerules of membranaceous farinose marcescent leaves; leaves 5-8.5 x 3.5-4 mm oblong-ovate, with one midrib which is prominent and branched at  $\frac{1}{3}$  of the apical part. Leaves of flowering shoots 10-20 x 5-10 mm, ovate, without farina, not revolute, the margins dentate, cuneate at base, petiolate, minutly glandulose, nervation reticulate prominent below. Scape 12-20 mm long, superposed by a single sessile flower, covered by patent articulated hairs. Bracts 2, foliaceous, 8-10 x 4-5 mm, ovate, dentate. Calyx campanulate, 8 mm long in flowreing, 12 mm long in fruiting stage, divided to  $\frac{7}{8}$  of its length into oblong-lanceolate teeth, sparsely glandulose papilose. Corolla yellow; the tube in long styled flowers 13 mm long; the limb 10 mm diam. with ovate-oblong entire lobes. Anthers 2 mm long. Capsule with many ovules.

The section *Anacamptophyllum* subsection *Scaposae* with 6 previously known species is mainly distributed in West Afghanistan, West Pakistan and Pamir Alai. *D. teucroides* Davis & Wendelbo from Turkey, *D. bornmulleri* from West

Iran and Iraq were considered the most primitive and north western migration branch (Wendelbo 1961). The new species in S.W. Iran which is geographically closer to the most primitive member of the genus; fills partly the gap of the migration route between *D. mira* from Yemen and *D. bornmulleri* from W. Iran.

The most characteristic feature of the new species is the small farinose membranaceous marcescent leaves forming glomerules from which the scape and shoots with large leaves emerge. Bracts are two and foliaceous. Above mentioned characters distinguish the new species from *D. bornmulleri* and *D. teucroides*. Branching type of the new species is very similar to *D. hissarica* which from the dried rosulate leaves usually 2-3 new branches arise. The new branches bear eventually a number of rosettes (glomerules) divided by the internodes. However, it differs from *D. hissarica* in the size of the leaves of flowering shoots and other characters as well as the geographical distribution.

***Dionysia bazoftica* Jamzad, sp. nov.**

Sect. *Anacamptophyllum* Melch.

Subsect. *Revolutae* Wendelbo.

Fruticulosa, laxe caespitosa, canescentia, foliis  $\pm$  lanato-farinosis. Folia 4-6mm longa, 0.5-0.7mm lata, oblongo-spatulata, margine revoluta,  $\pm$  distincte crenulata; crenulae 2-3; pilis patentibus et glandulis obsitis; pili usque ad 0.5mm longi. Inflorescentia singuliflora, sessilis. Bracteae 2, aequales, 4mm longae, lineares. Flos sessilis. Calyx 5mm longus, tubulosus, usque ad basin fissus, pilis patentibus obtectus. Corolla violacea et tubus florum brevistylorum 15mm longus; florum longistylorum 17mm longus, glaber; limbus 10mm diam; lobis apice bifidus. Antherae 1.5mm longae. Capsula ovoidea; semina ignota.

*Typus.* Chaharmahle Bakhtiari, Darreh Bazoft, Chedeb, N. slope of Kuh-e Taraz, 1700-2300m, Mozaffarian 57824 (holotypus TARI).

Fruticose, lax caespitose, canescent with wooly white farina in the leaf axils. Leaves 4-6mm long, 0.5-0.7mm wide, oblong-spatulate, the margin revolute with 2-3 pairs of  $\pm$  distinct teeth, covered densely with 0.5mm long patent hairs and a few minute glands. Inflorescence with a single sessile flower. Bracts 2, equal, 4mm long, linear, covered with long patent hairs.

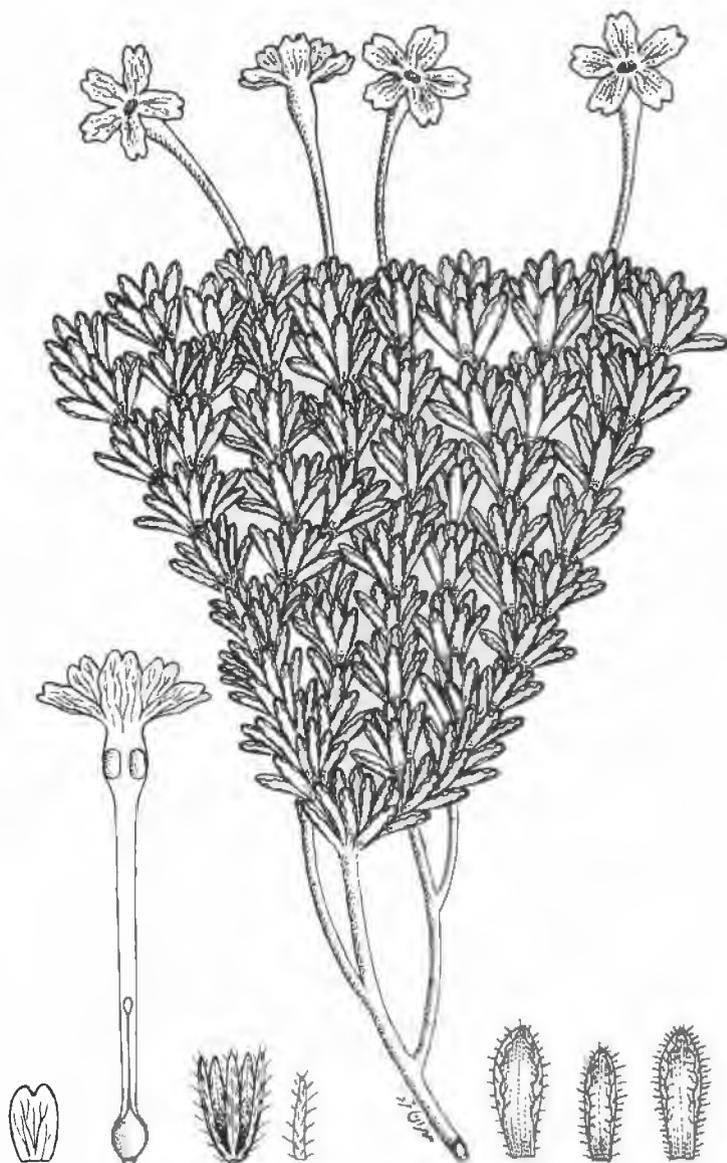


Fig. 2. *Dionysia bazoftica* (x2); from left to right, corolla lobe, flower, calyx, bract and leaves (x3).

base, the teeth linear covered with long patent hairs. Corolla violet, the tube in the short style flowers 15mm long, in long style flowers 17mm long, glabrous; the limb 10mm wide, divided into bifid lobes. Anthers 1.5mm long. Capsule ovoid. Seeds not seen.

The new species is close to *D. archibaldii* Wendelbo but differs from it in following characters: in *D. archibaldii* the leaves of vegetative shoots are flat while in the new species all leaves are revolute. The margin of leaves are  $\pm$ entire in *D. archibaldii* but crenate in new species. Marcescent leaves on branches form distinct glomerules in *D. archibaldii* but they more or less cover each other in the new species. In *D. archibaldii*, indumentum consists of short glandular hairs covering the leaves, calyx and bracts but in the new species it consists of long patent simple hairs and small scattered glands. The bracts are not equal in length in *D. archibaldii* while they are equal in the new species. The calyx is campanulate with linear oblong teeth in *D. archibaldii* but it is tubular with linear teeth in the new species.

The other violet flowered species of the subsection *Revolutae* is *D. esfandiarii* which

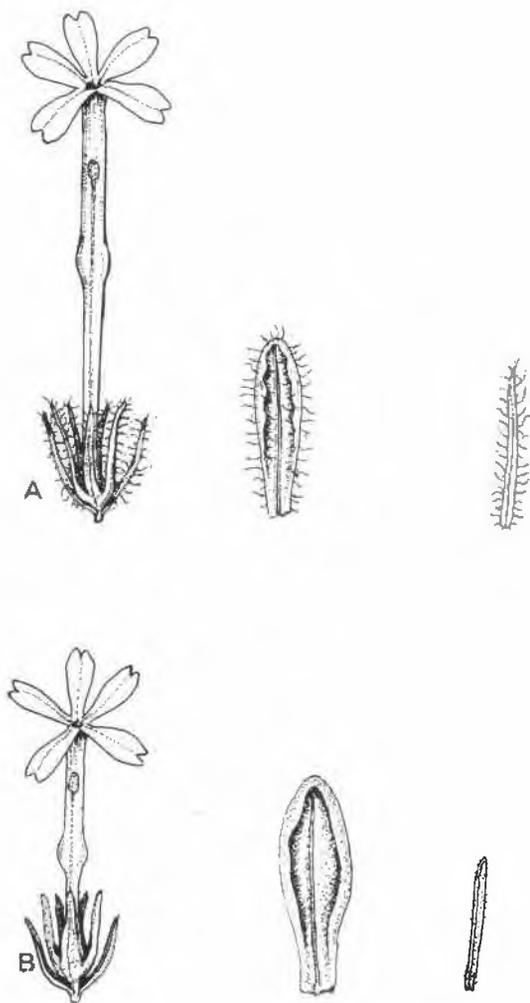


Fig. 3. Diagnostic characters: of A. *Dionysia bazofica* and B. *Dionysia archibaldii*; flowers (x3); leaves and bracts (x5).

Calyx 5mm long, tubular, divided to the

differs from the new species in leaf margin, indumentum, bracts and calyx teeth.

***Dionysia iranica* Jamzad, sp. nov.**

Sect. *Dionysia* Subsect. *Caespitosae*

Caespites  $\pm$ densi virides. Rami foliis marcescentibus atrobrunneis, reflexis; per totam longitudinem obsiti. Folia 5-6mm longa, 1.8-2mm lata, oblonga usque spatulata, margine plana, integra usque 1-2 crenulata, glabra, margine ad dimidium longitudine laxe glanduloso-ciliata. Flos solitarius, sessilis. Bractea singula, 4mm longa, linearia. Calyx 5.5mm longus, ad  $\frac{4}{5}$  divisus, tubuloso-campanulatus, glaber. Corolla flava; tubum florum longistylorum 16mm longum, glanduloso-puberulum; limbus 7mm diam.; lobis integris, ovato-orbicularis. Antherae 1.5mm longae. Capsula ovata, 3 sperma.

*Typus.* Chaharmahle Bakhtiari, Lordegan, Monj, Badamestan, Kuh Badamestan, North of Bon-e gerd, 1500-2350 m, Mozaffarian 54700 (holotypus TARI).

Cushions rather dense, green. Branches covered by reflexed dark brown marcescent leaves along all of its length. Leaves 5-6.5 mm long, 1.8-2mm wide, glabrous on both surfaces, glandular ciliate along the margin

up to the middle of its length, oblong to spatulate, the margin flat, entire or in some leaves with 1 or 2 teeth in each side. Flower single, scapeless, sessile. Bract one, 4mm long, linear. Calyx 5.5mm long tubular-campanulate, divided to  $\frac{4}{5}$  of its length into linear teeth, more or less overlapping each other at the base. Corolla yellow; the tube in long style flowers 15 mm long, glandulose puberulate; the limb 7 mm in diameter, divided into ovate-orbicular entire lobes. Anthers 1.5mm long. Style exerted. Capsule ovate, 3 ovulate.

The new species belongs to the subsection *Caespitosae* of the section *Dionysia* with 6 formerly known species; *D. bolivarii* Pau, *D. caespitosa* (Duby) Boiss., *D. diapensifolia* Boiss., *D. termeana* Wendelbo, *D. gaubae* Bornm. and *D. odora* Fenzl.

The closest species to the new species is *D. gaubae* from Lorestan province. It differs from *D. gaubae* in indumentum, the length of branches which are covered by marcescent leaves, the length of flower and the length of style in long style flowers. The calyx teeth overlap each other at the beginning of their length. Also the new species grows in a different locality. It also



Fig. 4. *Dionysia iranica* (nat. size); flower (x2); calyx and leaves (x3).

differs from *D. diapensifolia* in leaf shape, indumentum and the cushion form. It differs from the other members of the subsection; *D. caespitosa* (syn. *D. bolivarii*) by not having scape, and the shape of bracts.

*D. termeana*, in this study, has been transferred to the subsect. *Bryomorphae* according the anatomical evidences studied by Bokhari and Wendelbo (1976) and other morphological features.

***Dionysia khuzistanica* Jamzad, sp. nov.**

Sect. *Dionysia*

Subsect. *Bryomorphae*

Caespites densi, virides. Folia 2.5x1-1.4mm obovato-oblonga, apice trilobata usque integra, minute glandulosa, margine glanduloso-ciliata. Flos solitarius, sessilis. Bractea singula, 2.7mm longa, lanceolata. Calyx 2.5mm longus campanulatus, ad basin in lobos lanceolatos divisus, margine glanduloso-ciliatus. Corolla flava, tubum florum longistylorum 12mm longum, glabrum; limbus 6mm diam.; lobis integris, ovato-orbicularis. Antherae 1.2mm longae. Capsula 4-13 sperma.

*Typus.* Khuzistan, Dehdez, Kuh-e Sefid, opposite of Sar Sahra village and Bazoft

valley, 2400 m, Mozaffarain 74001 (holotypus TARI).

Cushions dense, green. Branches short, covered by imbricate dark brown marcescent leaves. Leaves 2.5x1-1.4mm, obovate-oblong, trilobate at the apex to entire, minutely glandular; the margins ciliate with small stipitate glands. Flower single, sessile. Bract one, 2.7mm long, lanceolate. Calyx 2.5mm long, campanulate, divided to the base to lanceolate teeth with ciliate glandular margin. Corolla yellow, the tube in long style flowers 12-13mm long, glabrous, the limb 6mm diam. with entire ovate-orbicular lobes. Anthers 1.2mm long. Ovary with 4 to 13 ovules.

The new species belongs to the group of *D. zagrica* and *D. sarvestanica* by having entire corolla lobes, yellow flower and minutely glandular hairs. The three lobed and entire form of leaves and the raised nervation of the apex of lower surface of the leaves which is very distinct in marcescent leaves, are similar to the characters of *D. tapetodes*. The distinct veins are also seen in *D. lamingtonii*. *D. khuzistanica* with its typical character specially the leaf characters emphasizes the

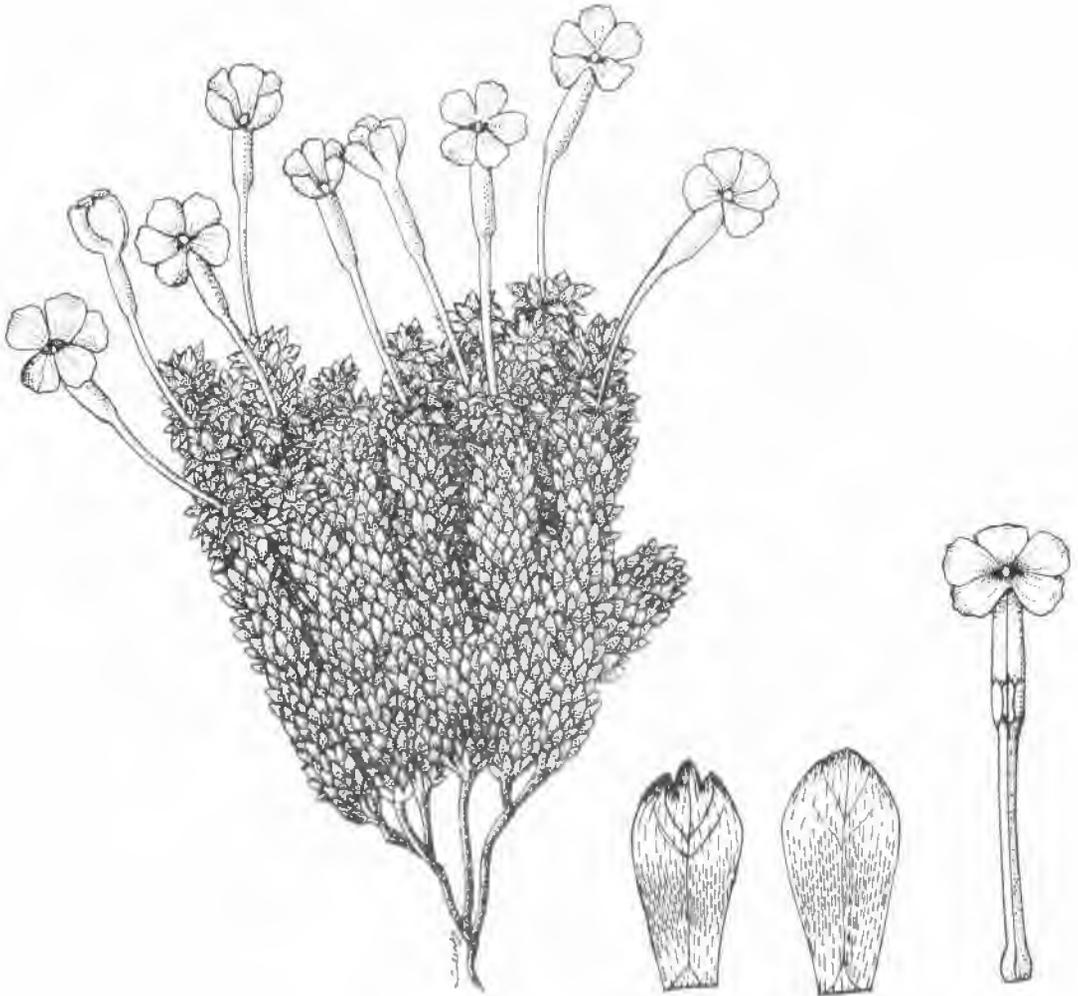


Fig. 5. *Dionysia khuzistanica* (x3); leaves (x15); flower (x4).

idea of close relation of the species of the two subsections *Bryomorphae* and *Tapetodes*.

**KEY TO THE SPECIES**

- |   |   |   |
|---|---|---|
| 1. Scape distinct, more than 1 cm long. | Inflorescence consisting of an umbel or superposed verticils of flowers or flowers single   | 2 |
|   | - Scape indistinct or if present then shorter than 1 cm. Inflorescence 1, rarely 2 flowered | 4 |

2. Cushions dense, leaves dense, imbricating, usually shorter than 1 cm. Inflorescence umbellate.
12. *D. caespitosa*
- Cushions loose. Leaves alternate, or of flowering shoots in whorls. Leaves more than 1 cm long 3
3. Inflorescence consisting of 2 to 4 superposed 3-5 flowered verticils. Marcescent leaves alternate, as long as the leaves of flowering shoots, upper surface of the leaves covered by 1mm long articulated hairs. 2. *D. bornmulleri*
- Scape 1 flowered. Marcescent leaves in whorls, membranaceous, distinctly shorter than the leaves of flowering shoots. Leaves covered by scattered minute glands 1. *D. aubrietoides*
4. Leaves of flowering shoots revolute 5
- Leaves not revolute 12
5. Leaves entire or indistinctly crenate 6
- Leaves distinctly crenate 9
6. Corolla yellow 10. *D. rhapsodes*
- Corolla violet or pink 7
7. Calyx divided to the base; the teeth covered by long patent hairs
5. *D. bazoftica*
- Calyx divided for  $\frac{1}{2}$  to  $\frac{3}{4}$  of its length, indumentum different 8
8. Calyx divided for  $\frac{1}{2}$  of its length, covered by retrorse, 0.4mm long hairs
8. *D. esfandiarii*
- Calyx divided for  $\frac{3}{4}$  of its length, pubescent and glandulose
6. *D. archibaldii*
9. Leaf margin with 6-12 pairs of teeth. Calyx tubulose 7. *D. revoluta*
- Leaf margin with 3-4 teeth in each side. Calyx campanulate 10
10. Leaves glabrous, covered by some capitate glands mainly on the nerves of lower surface, calyx divided to the base 9. *D. oreodoxa*
- Leaves pubescent and glandular. Calyx divided for  $\frac{3}{4}$  or  $\frac{2}{3}$  of its length 11
11. Calyx teeth entire, densely pubescent
3. *D. aretioides*
- Calyx teeth irregularly toothed, not densely pubescent 4. *D. leucotricha*
12. Flowers yellow 13
- Flowers violet 26
13. Corolla lobes entire 14
- Corolla lobes distinctly emarginate 23
14. Leaves closely imbricating, leaf margin entire,  $\pm$  crenate or three lobed near the apex 15
- Leaves not as above 18
15. Leaves  $\pm$  entire to three lobed near the apex, not farinose. Calyx divided to the base or for  $\frac{3}{4}$  of its length 16

- Leaves entire or slightly crenate near the apex, with or without yellowish wooly farina. Calyx divided for  $\frac{1}{2}$  to  $\frac{2}{3}$  of its length 29. *D. tapetodes*
- 16. Leaves  $\pm$  entire to three lobed near the apex. Calyx 2.5 mm long 23. *D. khuzistanica*
- Leaves entire. Calyx more than 2.5 mm long 17
- 17. Calyx divided to the base, bracts 4 mm long 24. *D. sarvestanica*
- Calyx divided for  $\frac{3}{4}$  of its length, bracts  $\pm$  1 mm long 25. *D. zagrica*
- 18. Scape absent. Leaves glabrous or covered by minute glands 19
- Scape present. Leaves covered by short or long articulated hairs and minute glands 22
- 19. Cushions small. Bract 1. Ovules 3- 6 20
- Cushions large, to 1 meter diameter. Bracts 2-3. Ovules 5-11 13. *D. diapensifolia*
- 20. Branches covered all along of its length by marcescent leaves. Leaves glabrous on both surfaces, glandular ciliate on the margins 15. *D. iranica*
- Branches naked at the base, covered above by spreading marcescent leaves. Leaves not glabrous 21
- 21. Leaves covered by minute glands and articulated hairs. Calyx divided for  $\frac{3}{4}$  of its length 16. *D. odora*
- Leaves covered by minute glands. Calyx divided to the base 14. *D. gaubae*
- 22. Leaves with wooly white farina at the base. Calyx divided to the base. Scape  $\pm$  10 mm 11. *D. lurorum*
- Leaves without farina. Calyx divided for  $\frac{3}{4}$  of its length. Scape to 8 mm long 13. *D. diapensifolia*
- 23. Calyx divided for  $\frac{1}{2}$  of its length. Leaves covered by long hairs all over. Veins distinct in the upper part of the leaves 19. *D. lamingtonii*
- Calyx divided to the base. Leaves covered by minute glands or short patent or retrorse hairs. Veins indistinct 24
- 24. Leaves covered by dense, short patent or retrorse hairs 20. *D. michauxii*
- Leaves covered by glands 25
- 25. Leaves entire. Bract 1 18. *D. haussknechtii*
- Leaves  $\pm$  entire to crenate. Bracts 2 22. *D. termeana*
- 26. Corolla lobes entire. Calyx divided for  $\frac{1}{2}$  of its length 30. *D. kossinskyi*
- Corolla lobes  $\pm$  emarginate to slightly emarginate. Calyx divided to the base or for  $\frac{2}{3}$  of its length 27

27. Calyx divided to the base. Leaves covered by dense minute glands

26. *D. bryoides*

- Calyx divided for  $\frac{2}{3}$  of its length. Leaves covered by hairs 28

28. Corolla pubescent and glandular outside

28. *D. janthina*

- Corolla glabrous outside 29

29. Corolla lobes distinctly emarginate.

Lower surface of the leaves glabrous 30

- Corolla lobes  $\pm$  emarginate. Lower surface of the leaves covered by long articulated hairs 21. *D. iranshahrii*

30. Upper surface of the leaves covered by 0.5-0.8mm long articulated hairs near the apex. Calyx glabrous inside

17. *D. sawyeri*

- Upper surface of the leaves covered by dense articulated adpressed hairs in all parts. Calyx pubescent inside

27. *D. curviflora*

## SYNOPSIS OF SECTIONS AND SPECIES

Section **Anacamptophyllum** Melchior

Subsection **Scaposae** Wendelbo

1. *D. aubrietioides* Jamzad & Mozaffarian, **sp. nov.**

2. *D. bornmulleri* (Pax) Caly, the present day Rock Garden: 194 (1937).

Subsection **Revolutae** Wendelbo

3. *D. aretioides* (Lehm.) Boiss., Diagn. Pl. Or. Nov. ser 1, 7: 68 (1846).

4. *D. leucotricha* Bornm., Bieh. Bot. Centrbl. 28/2: 460 (1911).

5. *D. bazoftica* Jamzad, **sp.nov.**

6. *D. archibaldii* Wendelbo, Bot. Notiser 120: 144 (1967).

7. *D. revoluta* Boiss., Diagn. Pl. Or. Nov. ser. 1, 7:65 (1846).

8. *D. esfandiarii* Wendelbo, Bot. Notiser, 123: 302 (1970).

9. *D. oreodoxa* Bornm., Bull. Herb. Boiss. ser: 1, 7: 68 (1899).

10. *D. rhapsodes* Bunge, Bull. Acad. Sci. Petersb. 16: 562 (1871).

## Section **Dionysia**

Subsection **Caespitosa** Wendelbo

11. *D. lurorum* Wendelbo, Notes R.B.G. Edinb. 38 (1): 105 (1980).

12. *D. caespitosa* (Duby) Boiss., Diagn. Pl. Or Nov. ser.1, 7: 67 (1846).

13. *D. diapensifolia* Boiss., Diagn. Pl. Or Nov. ser.1: 7: 67 (1846).

14. *D. gaubae* Bornm., Feddes Repert. 41: 179 (1937).

Subsection **Bryomorphae** Wendelbo

15. *D. iranica* Jamzad, **sp. nov.**  
16. *D. odora* Fenzl, Flora 26: 390 (1843).  
17. *D. sawyeri* (Watt) Wendelbo, Acta Univ. Bergensis, ser. Math-Nat. No 3: 64 (1961).  
18. *D. haussknechtii* Bornm. & Strauss, Bull. Herb. Boiss. ser. 2, 4: 514 (1904).  
19. *D. lamingtonii* Stapf, Kew Bull. 43 (1913).  
20. *D. michauxii* (Duby) Boiss., Diagn. Pl. Or Nov. ser.1, 7: 67 (1846).  
21. *D. iranshahrii* Wendelbo, Iran. Journ. Bot. vol.1, no.1: 71 (1976).  
22. *D. termeana* Wendelbo, Bot. Notiser 123: 306 (1970).  
23. *D. khuzistanica* Jamzad, **sp. nov.**  
24. *D. sarvestanica* Jamzad & Grey Wilson, Kew Bull. 44, no.1: 123 (1989).  
25. *D. zagrica* Grey-Wilson, Kew Bull. 29, no. 4: 691 (1974).  
26. *D. bryoides* Boiss., Diagn., Pl. Or Nov. ser. 1, 7: 66 (1846).  
27. *D. curviflora* Bge., Bull. Acad. Sci, Petersb. 16: 562 (1871).  
28. *D. janthina* Bornm. & Winkler, Bull. Herb. Boiss. 7: 70 (1899).

Subsection **tapetodes** Wendelbo

29. *D. tapetodes* Bge., Bull. Acad. Sci,

Petersb. 16: 562 (1871).

30. *D. kossinskyi* Czern., Bull. Jard. Bot. URSS. 26: 116 (1927).

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