

THE GENUS *DIANTHUS* L. (CARYOPHYLLACEAE) IN IRAN

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Assadi, M. 1985 12 31 : The genus *Dianthus* L. (*Caryophyllaceae*) in Iran. — *Iran. Journ. Bot.* 3 (1); 9–54 , Tehran.

A revision of the genus *Dianthus* L. in Iran, including notes on the taxonomic problems, used characters, identification key, literature, synonyms, descriptions, type localities, geographical distributions, specimens seen and finally additional notes, is presented. Altogether 34 species are recognized from Iran. 5 new species, *D. denaicus*, *D. diversifolius*, *D. hafezii*, *D. rudbaricus* and *D. sahandicus*, are described. A new species is recognized but, due to the poor material, no name and no Latin description are given for it. The following names are for the first time treated as synonyms: *D. fallax* Rech. f. & Esfandiari (= *D. orientalis* Adams), *D. binaludensis* Rech. f. (= *D. polyepis* Bienert ex Boiss.), *D. stapfii* Lemperg (= *D. macranthus* Boiss.), *D. mazanderanicus* Rech. f. (= *D. tabrisianus* Bienert ex Boiss.), *D. paniculatus* Pau (= *D. strictus* Banks & Sol.) and *D. coloratus* (Bornm.) Hand. — Mzt. (= *D. pachypetalus* Stapf). 4 species, *D. armeria*, *D. basianicus*, *D. calocephalus* and *D. inamoenus* are new records to the flora of Iran.

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جنس میخک (*Dianthus L.*) در ایران

از: مصطفی اسدی

مروری از جنس میخک (*Dianthus L.*) در ایران شامل اشکالات رده‌بندی، اختصاصات مورد استفاده، کلید شناسائی، منابع علمی، اسامی مترادف، شرح گونه‌ها، محل نمونه‌های تایپ، پراکنندگی جغرافیائی، نمونه‌های دیده شده و بالاخره یادداشت‌های اضافی ارائه میگردد. در این مقاله جمعا ۳۴ گونه از ایران شناخته شده است.
۵ گونه جدید بنامهای:

D. denaicus, D. diversifolius, D. hafezii, D. rudbaricus, D. sahandicus

نامگذاری و شرح داده میشوند. یک گونه جدید تشخیص داده شده ولی بعلت اینکه تنها نمونه موجود ناقص میباشد از ارائه نام و شرح لاتین آن خودداری شده است. اسامی زیر برای اولین بار مترادف شناخته میشوند.

D. fallax (= D. orientalis), D. binaludensis (= D. polylepis), D. stapfii (= D. macranthus), D. mazanderanicus (= D. tabrizianus), D. paniculatus (= D. strictus), D. coloratus (= D. pachypetalus).

چهارگونه بنامهای زیر بعنوان گونه جدید برای فلور ایران شناسایی میگردد.

D. armeria, D. basianicus, D. calocephalus, D. inamoenus.

Introduction

This work is a revision of the genus *Dianthus* L. in Iran. The work was started about 1975 and is based on a study of about 1500 herbarium specimens, but to save space not all specimens studied by the writer are cited. Specimens of the two biggest herbaria in Iran namely the herbarium of the Research Institute of Forests and Rangelands (TARI) and the herbarium of the Plant Pests and Diseases Research Institute (EVIN) have been studied. The programme was completed with field studies from various parts of Iran. Many of the species were studied in the field at the type localities or specimens from the locus classicus or even the types were examined. In Linnaeus' Species Plantarum the genus comprises 15 species one of which now occur in Iran. Boissier (1867) recognized 14 species from Iran. Parsa (1951) has 24 species. In this work 34 species in all are recognized from Iran.

Taxonomic Problems

Many of the species have a tendency to show local, seasonal, sexual and altitudinal variation. *D. polylepis* Bienert ex Boiss. near the village of Zoshk (Khorasan) with small floral parts are well distinguished from the specimens of the same species from Kuh-e Shahjahan (near Esfarayen) with larger floral

parts. In this case, which represents local variation, all essential characters of the species remain unchanged.

Autumn flowers of *D. orientalis* Adams differ from spring flowers, moreover in a locality between Ghazvin and Alamoot plants of *D. orientalis* were partly past flowering and partly in flower or in bud.

Plants that differ sexually vary in morphological characters (cf. notes under *D. orientalis*).

High alpine plants of *D. orientalis* differ from plants of lower altitudes. *D. scoparius* Boiss. and *D. fallax* Rech. f. & Esfandiari are based on this kind of variation (altitudinal variation).

Characters normally used to distinguish species are extremely variable and rather often in extreme cases show resemblance to other close species. In some cases new species have been described on inadequate material on the basis of extreme variation within a species.

Characters used

LIFE FORM

Except for *D. armeria* and *D. cyri* the Iranian species are perennials, sometimes with a well-developed woody base. Most of the Iranian species are found in open mountainous places, but *D. hyrcanicus*

was collected in a ± dense forest.

LEAVES

The leaves in the genus *Dianthus* L. in Iran are usually linear, but in a few cases such as *D. lycanicus* lanceolate leaves are seen. Lower leaves include basal leaves, sterile shoot leaves and leaves of the basal part of the stem, while middle and upper leaves designate the leaves of the middle and upper part of the stem. Opposite leaves are usually connate at the base, forming a short or long sheath.

INFLORESCENCE

Stems simple, is used when stems bear 1-flower or a capitulum. Stems branched, is used when stems bear numerous flowers either solitary or in few-flowered groups

BRACTEOLES

The term bracteoles is used for scales covering the base of the calyx. The apex is obtuse, acute, mucronate or aristate. The relative size in the descriptions refers to the part of the calyx which is covered by all bracteoles.

PETAL LIMB

The petal limb is either entire, subentire,

crenate, dentate or fimbriate. The term fimbriate is used when the incisions are more than 1/4 of the total length. The petal limb is termed barbulate when hairs are present on the upper surface and ebarbulate when hairs are lacking.

Subdivision of the genus

As a satisfactory division is not available for the genus *Dianthus* L., no inter-specific classification or grouping is given, but the sequence of the species is more or less the same as in Boissier *Flora Orientalis* (1867).

Identification

Since the species, are extremely variable care should be taken in identification. For certain identification a combination of all key characters, descriptions, distribution and even notes under the species should be considered.

Dianthus L.

Linnaeus, Sp. Pl. 409(1753); L., Gen. Pl. ed. 5, 191(1754); DC., Prod. 1: 355(1824); Boiss., Fl. Or. 1: 479(1867); Williams, Monog. Genus *Dianthus*, in Journ. Linn. Soc. Bot. 29: 352(1893); Benth. & Hook. f., Gen. Pl. 1: 144 (1862); Pax & Hoffm., in Engler & Prantl Nat. Pflanzenf. 160: 356(1934);

Schischk., in Kom. Fl. of the USSR 6: 803(1936); Parsa, Fl. de l'Iran 1: 984, 985(1951); Reeve, in Davis Fl. of Turkey 2: 99(1967).

Annual or perennial herbs or subshrubs. Stems simple or branched. Leaves opposite, narrow, usually connate at base to a short or long sheath. Flowers solitary, capitate or in few-flowered groups. Bracteoles 4 to many, obtuse, acute, shortly mucronate to aristate, covering base of calyx. Calyx tubular with parallel nerves, without hyaline intervals and commissural nerves, 5-toothed. Corolla with 5 petals, petals clawed; petal limb barbulate or ebarbulate, entire, dentate or variously fimbriate; claw exerted or included. Stamens 10. Styles 2. Capsule sessile or borne on a carpophore, dehiscent by teeth. Seeds black, peltate.

Key to the species

- 1. Calyx punctate-verruculose or nearly so. 2
- Calyx not punctate-verruculose. 3
- 2. Perennial. Bracteoles much shorter than calyx tube.
 - 2. *D. strictus*
 - Annual. Bracteoles longer than calyx. 1. *D. cyri*
- 3. Petal limb entire, crenate or dentate. 4
- Petal limb fimbriate. 19

- 4. Annual. 31. *D. armeria*
- Perennials. 5
- 5. Flowers in a capitate dense head. 6
- Flowers solitary or in few-flowered groups. 7
- 6. Leaf sheath 3–5 mm.
 - 33. *D. persicus*
 - Leaf sheath 10–20 mm.
 - 32. *D. calocephalus*
- 7. Flowers mostly in few-flowered groups. 8
- Flowers solitary. 10
- 8. Flowers white or whitish-yellow in dried state. 25. *D. stenocephalus*
- Flowers red. 9
- 9. Calyx 12 mm. Leaves 1–2 mm wide. Small plants to 25 cm.
 - 28. *D. sahandicus*
 - Calyx ca. 23 mm. Leaves much broader to 7 mm wide. Taller plants to 70 cm.
 - 29. *D. hyrcanicus*
- 10. Petal limb entire to crenate. 11
- Petal limb distinctly dentate. 13
- 11. Bracteoles at least 1/2 calyx length.
 - 3. *D. cretaceus*
 - Bracteoles less than 1/2 calyx length. 12
- 12. Calyx 20–30 mm. Stems simple or scarcely branched.
 - 4. *D. denaicus*
 - Calyx ca. 15 mm. Stems branched.
 - 5. *D. inamoenus*

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13. Bracteoles equalling to longer than calyx. 6. *D. talyschensis*
 Bracteoles much shorter. 14
14. Small plants to 10 cm. 15
 Taller plants, 20 cm or more. 17
15. Petal limb barbulate. Calyx 11 mm. 30. *D. seidlitzii*
 Petal limb ebarbulate. Calyx 15 mm or more. 16
16. Lower leaves linear-acuminate; stem leaves similar to lower leaves. 19. *D. orientalis*
 Lower leaves oblong, rounded; stem leaves distinctly different from the lower. 22. *D. diversifolius*
17. Petal limb distinctly barbulate-maculate. Bracteoles aristate. 27. *D. szowitsianus*
 Petal limb not barbulate-maculate. Bracteoles not aristate. 18
18. Petal limb pink, thin, scarcely barbulate. 19. *D. orientalis*
 Petal limb whitish-yellow, rarely pinkish above, thick, ebarbulate. 7. *D. pachypetalus*
19. Flowers often in groups of 2-3. Petal limb with reddish-black spots. Bracteoles with patent apex. 25. *D. libanotis*
 Flowers solitary. Other characters not as above. 20
20. Bracteoles usually 8 or more, rarely 6. 21
- Bracteoles usually 4-6, rarely 8. 27
21. Calyx more than 30 mm. 22
 Calyx up to 25 mm. 23
22. Bracteoles 8. Petal limb 15 x 15 mm. 16. *D. jacobsii*
 Bracteoles more numerous. Petal limb up to 12 x 10 mm. 15. *D. macranthus*
23. Petal limb fimbriate from below the middle down to base. 17. *D. polylepis*
 Petal limb fimbriate to 1/3 or at most to the middle. 24
24. Bracteoles 14-20, lower greatly decreasing in size. Petal limb pink. 21. *D. rudbaricus*
 Bracteoles 8-16, ± equal. Petal limb white or pale pink. 25
25. Calyx 25-45 mm. Bracteoles 12-16. 15. *D. macranthus*
 Calyx up to 25 mm. Bracteoles 8-10. 26
26. Leaf sheath to 7.5 mm. Calyx 20-25 mm. Bracteoles aristate. 22. *D. longivaginatius*
 Leaf sheath to 2 mm. Calyx 15-17 mm. Bracteoles shortly mucronate. 18. *D. elymaiticus*
27. Bracteoles aristate. 28
 Bracteoles acute, sometimes shortly mucronate. 31
28. Petal limb fimbriate to the middle. 29

- Petal limb fimbriate to near the base into narrow filiform segments. 30
29. Calyx 15—20 mm. Petal limb white or pale pink. 30
 8. *D. tabrisianus*
 Calyx 25—30 mm. Petal limb purplish-violet. 24. *D. agrostolepis*
30. Plants up to 20 cm. Calyx 35—40 mm, rarely shorter. Arista of bracteoles long and foliaceous. 37
 13. *D. crossopetalus*
 Plants taller. Calyx 25—35 mm. Arista shorter and coriaceous. 37
 12. *D. crinitus*
31. Stems dichotomously branched. 32
 9. *D. hafezii*
 Stems simple or with few branches, not dichotomously branched. 32
32. Petal limb fimbriate to 1/3. Calyx up to 28 mm. 33
 Petal limb fimbriate from the middle down to base. 36
33. Petal limb barbulate or nearly so. 34
 Petal limb ebarbulate. 35
34. Puberulent-canescant plants. 35
 20. *D. pulverulentus*
 Glabrous plants. 35
 19. *D. orientalis*
35. Petal limb thick, greenish white or pinkish above. Calyx 20—22 mm. 36
 7. *D. pachypetalus*
 Petal limb thin, white or pale rose. 36
- Calyx 20—28 mm. 37
 11. *D. austroiranicus*
36. Calyx 40—50 mm. 37
 14. *D. macranthoides*
 Calyx shorter. 37
37. Petal limb fimbriate down to base. 38
 12. *D. crinitus*
 Petal limb fimbriate to about the middle. 38
38. Calyx ca. 30 mm. Claw exserted. 39
 10. *D. basianicus*
 Calyx ca. 20 mm. Claw included. 39
 17. *D. polylepis*
1. *Dianthus cyri* Fisch. & Mey. 40
 Fischer & Meyer, in Ind. Sem. Hort. Petrop. 4: 34(1837).
Icon. Schishkin, in Komarov Fl. of the USSR 6: 857(1936). — Reeve, in Davis Fl. of Turkey 2: 105(1967).
 Annual, much branched from base, 10—40 cm. Stems profusely branched. Stem leaves to 50 x 3 mm, linear, acute, ciliate at margin and sometimes on the dorsal middle nerve. Flowers solitary. Bracteoles 4, aristate; arista equalling to longer than calyx tube. Calyx 11—14 mm long, narrowed above, punctate-verruculose, nerved on and between the teeth; teeth 4 mm long, lanceolate, acuminate, membranous at margin, soon splitting to the middle of calyx. Petal limb pink, ca. 5 mm long, ovate, some-

times barbulate, dentate.

Type. Caucasia ad amnem cyrum, in desertis districti Elisabethol.

Distribution. Turkey, Caucasia, Iran, Afghanistan, Iraq, Palestine, Syria, Lebanon, Egypt.

Iran. Hormozgan: Minab, Behboudi 479 E. — Sistan: Malek-Heydari, Sharif 5545 E; Naroui, Sharif s.n. — Tehran: 20 km W. of Tehran, 1320 m, Mansoor-Moaied & Amini 12573.

2. *Dianthus strictus* Banks & Sol.

Banks & Solander, in A. Russel, Nat. Hist. Aleppo ed. 2, 2: 252(1794).

Syn. *D. multipunctatus* Ser., in DC., Prod. 1: 362(1824). — *D. paniculatus* Pau, Trab. Mus. Nac. Cienc. Nat. Ser Bot. Madrid 14: 9(1918), *syn. nov.*

Icon. Reeve, in Davis Fl. of Turkey 2: 105(1967).

Perennial, 10–45 cm. Stems branched. Leaves to 50 x 2 mm, ± scabrous at the margin. Flowers solitary. Bracteoles 4, ca. 1/3 calyx length, ovate, broadly membranous at margin, shortly aristate. Calyx 12–15 mm long, narrowed above, punctate-verruculose, nerved on the teeth and along the sinuses; teeth 4–5 mm long, lanceolate, mucronate, broadly membranous at margin. Petal limb pink with darker nerves, 4–8 x 4–7

mm, obovate-cuneate, barbulate, dentate.

Type. Environs of Aleppo, or between Iskenderun and Latakia.

Distribution. Greece, Turkey, Iran, Iraq, Palestine, Syria, Lebanon, Arabia, Egypt (Sinai).

Iran. Gilan: between Assalem and Khalkhal, Abai & Modjib 13080 E. — Azarbajejan: Oroomiyeh, Ghasemlou, 1600 m, Sabeti 6164; S. slope of Bozgoosh mountain (QG1), 2000 m, Mozaffarian & Mohammadi 37444. — Kordestan: Palangan, 1800–2100 m, 2. 8. 1967, Iranshahr & Termeh s.n.; between Baneh and Balakeh, 1700–1900 m, 7. 8. 1967, Iranshahr & Termeh s.n.; Marivan, 1800–2100 m, Iranshahr & Termeh 12157 E; between Marivan and Saghez, 35 km to Marivan, 1700 m, 6. 7. 1971, Termeh s.n. — Hamadan: Alvand, Vaziri, 5540 E; 75 km N. of Hamadan, Chahar Boulagh village, 2080 m, Termeh & Moussavi 16376 E. — Bakhtaran: 41 km SE. of Ghasr-e Shirin on the road to Shahabad, 890 m, 24772 Seraj; Ghasr-e Shirin, Sharif 5538 E; Dalahou, Ghalalan, 26. 7. 1967, Iranshahr and Termeh; Ridjab, 2. 7. 1967, Iranshahr & Termeh; Kuh-e Parrow, 1200–2200 m, 17. 8. 1973, Moussavi & Satei s.n. — Lorestan: 39 km from Khorramabad to Nowjian, 2150 m, Runemark & Lazari 26071; ca. 40 km S. of Dorood, at Bisheh

(US1), 1250–1600 m, Assadi & Mozaffarian 37010; Nahavand, Kuh-e Garrow, 1800–2400 m, Termeh & Moussavi 16393. — Fars: Kazeroon, Chenarshahijan 17411; Noorabad-e Mamasani, Sardabi & Lotfian 43174; 30 km E. of Kazeroon, 1000 m, Bokhari 1635. — Khoozestan: 20 km from Behbahan to Ramshir, 250 m, Riazi 9415; between Haftgel and Izeh, 25 km N. of Haftgel, 550 m, Iranshahr & Moussavi 15678 E; 28 km N. of Bagh-Malek to Izeh, 700 m, 26. 5. 1973, Iranshahr & Moussavi s.n.

(1). I have not seen the type of *D. paniculatus* but, from the description, its identity with *D. strictus* is clear.

3. *Dianthus cretaceus* Adam

Adam in Weber & Mohr, Beitr. 1: 56 (1805); Reeve in Davis Fl. of Turkey 2: 113(1967).

Syn. *D. liboschitzianus* Ser. in DC. Prodr. 1: 360(1824).

Icon. Grossh., Fl. Cauc. ed. 2, 4: tab. 31 f. 2(1945); Reeve, l.c. 105, Fig. 1.

Perennial, many-stemmed from base, 19–30 cm. Stems simple. Leaves to 90 x 1.5–2 mm, linear, acuminate, 3–5 nerved, glabrate to minutely puberulent; sheath 3–4 mm long. Flowers solitary. Bracteoles 4, rarely 2, sometimes purplish, 1/2 to ± equalling calyx length, oblong-

ovate to obovate-oblongate, partly ciliate at margin, aristate; arista ca. 7 mm long. Calyx purplish at base, 20–29 mm long, narrowed above; teeth 7–11 mm long, lanceolate, acuminate or shortly mucronate, membranous and ciliate at margin. Petal limb white or pink, 8–10 x 6–8 mm, orbicular to obovate, ebarbulate, subentire to crenate, or shortly dentate.

Type. Georgia, in Iberiae locis cretaceis.

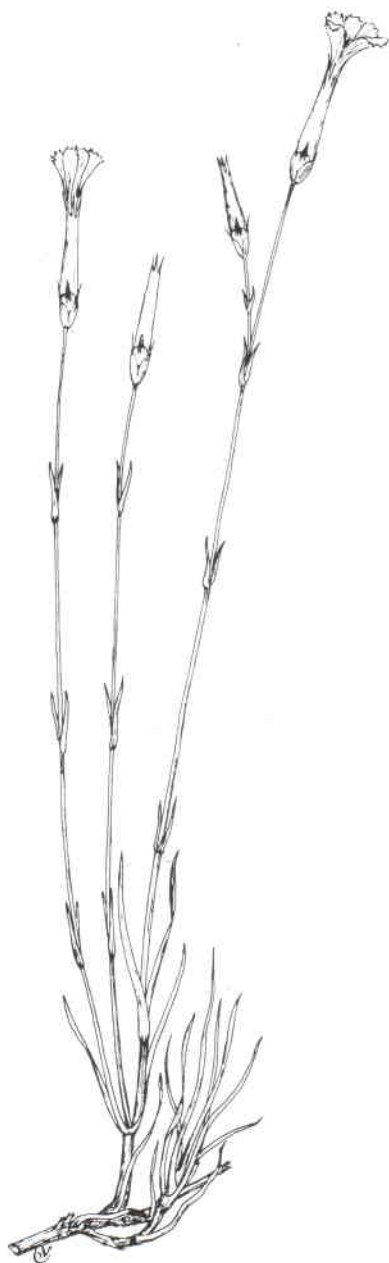
Distribution. Caucasia, Turkey, Iran.

Iran. Azarbayegan: road from Asalem to Khalkhal, W. side of Almas pass, 2150 m, Wendelbo & Assadi 18460; Arasbaran Protected Area, Doghroon mountain, 2500 m, Assadi & Sardabi 23944, 23919, 20962; 45 km from Namin to Germe, near the village Fatmehsul, 2200 m, Mozaffarian & Nowroozi 34579; Salavat, Goli-Daragh mountain, 1500–1800 m, Mozaffarian & Nowroozi 34993; 5 km from Salavat to Goli-Daragh village, 1500 m, Mozaffarian & Nowroozi 35093; 20 km SW. of Kaleibar, 1800–2600 m, Termeh 13092 E.

(1). This species has previously only in Reeve l.c. been recorded from Iran.

4. *Dianthus denaicus* Assadi, sp. nov.

Perennis, 20–30 cm, glaber. Caules simplices vel raro ramosi, floribus 1–3;

Fig.1. *Dianthus denaicus* (x 0.6).

surculi basale steriles adsunt. Folia inferiora ad 40 x 1.5 mm, linearia, 1 vel obscure 3 nervata, ad margines partim ciliata, folia media foliis inferioribus similia sed minora; folia superiora parva et squamiformia, ad margines partim inferiores late membranacea; vagina ca. 2 mm longa. Flores solitarii. Bracteolae 4, ca. 1/3 calycis attingentes, ovato-lanceolatae, cuspidatae; cuspis viridis. Calyx 20–30 mm longus; dentes 6–8 mm longi, lanceolati, acuti vel acuminati, ad marginem vix ciliati. Limbus petali subroseus, flavidus suffusus, 6 x 3–4 mm, obovatus vel oblongo-obovatus, crassiusculus, ebarbulatus, crenatodentatus; unguis exsertus.

Typus. Iran, Kohgilooyeh-Boirahmad; N. of Kuh-e Dena, above Abmalakh, 2600–3000 m, 5. 8. 1978, Assadi & Mozaffarian 31419 (holotypus TARI). — Esfahan: E. of Semirom, Kuh-e Aiineh-Ghabri, 3000–3700 m, Assadi & Mozaffarian 31667.

Perennial, 20–30 cm, glabrous. Stems simple or rarely branched, 1–3-flowered; sterile basal shoots present. Lower leaves to 40 x 1.5 mm, linear, acute, 1- or obscurely 3-nerved, partly ciliate at margin; middle leaves similar to the lower but smaller, upper leaves much smaller and scale-like with broad membranous margin in lower part; sheath ca. 2 mm long. Flowers solitary. Bracteoles 4, ca. 1/3 calyx length, ovate-lanceolate,

cuspidate; cusp green. Calyx 20–30 mm long; teeth 6–8 mm long, lanceolate, acute to acuminate, broadly ciliate at margin. Petal limb pinkish, yellowish-tinged below, 6 x 3–4 mm, obovate, thickish, ebarbulate, crenate-dentate; claw exerted.

Distribution. Endemic.

(1). The new species is related to *D. cretaceus* Adam, but differs in having shorter cuspidate bracteoles to ca. 1/3 calyx length, thick yellowish-tinged petal limb similar to that of *D. pachypetalus* Stapf. In *D. cretaceus*, the bracteoles are aristate and more than 1/2 calyx length, the petal limb thin and white or pink. Comparing the new species with *D. pallens* Adam not known from Iran, the shorter calyx up to 20 mm and profusely branched stems are of the most obvious differences of this species from the new species.

(2). The specimen Assadi & Mozaffarian 31667 (paratypus) differs from the type specimen in having shorter calyx ca. 20 mm, narrower petal limb and coriaceous (not foliaceous) cusp of bracteoles.

5. *Dianthus inamoenus* Schischk.

Schischkin, in Komarov Fl. of the USSR 6: 897(1936); Grossh. Fl. Cauc. 3: 289(1945).



Fig.2. *Dianthus inamoenus* (x 0.5).

Icon. Grossh., l.c. tab. 31.

Perennial, many-stemmed, 10–45 cm, glabrate or puberulent in lower part. Stems branched above, 2–4-flowered. Leaves 30–80 x 1–3 mm, linear, acute, 5–7-nerved, ciliate or scabrous at margin; sheath 2–5 mm long. Flowers solitary. Bracteoles 4, 1/3 to 1/2 calyx length, the inner ovate, the outer lanceolate, apex green, cuspidate to aristate. Calyx ca. 13–15 mm long and up to 6 mm wide, narrowed above; teeth 2–3 mm long, triangular, membranous and sometimes purplish at margin. Petal limb yellowish green to lemon-coloured, 7–8 x 4–6 mm, obovate, ebarbulate, crenate to dentate.

Type. Georgia, Tiflis in declivitatibus ad fl. Vera.

Distribution. Turkey, Caucasia, Talish, Iran.

Iran. Azarbajejan: 6 km from Germe to Ani, W. of Easmar village, 900–1200 m, Mozaffarian & Nowroozi; 40 km from Razi to Germe, 1700 m, Mozaffarian & Nowroozi 34805.

(1). This species is recorded from Iran for the first time.

6. *Dianthus talyschensis* Boiss. & Buhse
Boissier & Buhse, Aufz.:34(1860);Boiss.

Fl. Orientalis 1: 491(1867).

Syn. D. stenocephalus Boiss. var. *glaber* Williams, in Journ. Linn. Soc. 29: 446 (1893).

Perennial, 15–30 cm, glabrous. Stems simple or branched. Leaves 50–120 x 2–3 mm, linear, acuminate, 5–7-nerved; sheath 4–5 mm long. Flowers solitary. Bracteoles 4–6, ± equalling calyx, elliptic-lanceolate, aristate. Calyx 30–36 mm long; teeth long, acuminate. Petal limb white, ca. 10 x 6 mm, obovate-cuneate, ebarbulate (?), dentate.

Type. In sylvis prov. Talysch supra Astara.

Distribution. Caucasia or Iran.

(1). No specimen of this species was seen by the author.

(2). It may be that the type collection of this species is in fact from Iran, near Astara.

(3). Parsa's record of this species in Fl. de l'Iran 1: 989(1951) from the prov. of Gorgan needs confirming.

7. *Dianthus pachypetalus* Stapf

Stapf, in Denkschr. Akad. Wiss. Wien, Math. — Nat. Kl. 51: 278(1886).

Syn. D. pachypetalus var. *coloratus* Bornm., in Verh. Zool. — Bot. Ges. Wien 60: 80(1910); *D. coloratus* (Bornm.)

Hand. — Mzt., in Ann. Nat. Hofmus. Wien 26: 153(1912), *syn. nov.*

Perennial, 15–40 cm, glabrous to puberulent. Stems simple or more often branched. Lower leaves 2–6 cm long, linear, 5–7-nerved; stem leaves to 3.5 cm long, acuminate, 3–5 nerved. Flowers solitary. Bracteoles 4–8, 1/3 calyx length, ovate-lanceolate, broadly membranous at margin, shortly mucronate. Calyx (12–) 20–22 mm long; teeth triangular-lanceolate, acuminate, ciliate at margin. Petal limb whitish to lemon yellow, pink or brownish-tinged, 4–7 x 1–6 mm, ± orbicular-obovate to oblong-obovate, ebarbulate, dentate to fimbriate to above the middle.

Type. Persia in siccis faucium ad Haydere (near Hamadan).

Distribution. Turkey, Iran, Iraq, Syria.

Iran. Azarbayegan: between Tabriz and Marand, after Soofian, 1500 m, Assadi & Mozaffarian 29805; 2 km from Kivi to Khalkhal, 1500–1650 m, Mozaffarian & Mohammadi 37768; near Nazagheh, 7 km from Kharajoo to S. slope of Kuh-e Sahand, 1850 m, Assadi & Mozaffarian 30717; Mianeh, 15 km on the road to Ardabil, 1100 m, Foroughi & Assadi 13729; Jolfa, 780 m, Foroughi 3872; 38 km NW. of Zanjan, 1400 m, Pabot 3692; Khoy, Ghothoor valley, 1700 m, Zahzad & Siami 3575; 40 km from

Namin to Germe, 1900 m, Mozaffarian & Nowroozi 34620; between Sarab and Ardabil, on the road to Taran, 2100 m, Bothmer & Buttler 1712; 3 km NE of Tabriz, mount Eskandar, 1700–2100 m, Mozaffarian & Mohammadi 37558; 18 km from Ardabil-Khalkhal road to Arpachai village, 2550 m, Mozaffarian & Mohammadi 37764; Kuh-e Sahand, 2200–2900 m, Assadi & Mozaffarian 30686. — Kordestan: Divandarreh, Sarab, 2150 m, 4. 7. 1968, Iranshahr & Dez-foulian s.n.; Karaftou, 2100 m, Iranshahr & Termeh 12149 E; 72 km from Bijar to Sanandaj, 1950 m, 1. 7. 1971, Termeh s.n.; Marivan, 1800–2100 m, 4. 8. 1967, Iranshahr & Termeh s.n.; Goubabaali, 2240 m, Iranshahr & Termeh 12158 E. — Hamadan: 137 km from Hamadan to Ghazvin, 2170 m, Assadi & Amini 13625 A; Hamadan, Khoramrood, 1850 m, Safaiyan 800; ca. 20 km S. of Nahavand, Kuh-e Garou, 1800–2200 m, Assadi & Mozaffarian 36910. — Lorestan: Oshtorankuh, 2000–2500 m, Assadi & Mozaffarian 37071; 23 km on the road from Shoulabad to Aligoudarz, 2100 m, Runemark & Lazari 26442. — Tehran: 98 km W. of Karaj, between Vars and Bavars, 1570 m, Foroughian & Hariri 2094; Alamoot, 1800 m, Babakhanlou & Amin 2288.

(1). This species is closely related to *D. tabrisianus* Bienert ex Boiss., but well

distinguishable in the following combination of characters: In this species woody base of plant short or absent, basal leaves soon withering and shorter, stems usually flaccid often bearing more than 2 flowers, calyx 20–22 mm long, rarely shorter. In *D. tabrisianus* woody base well developed, basal leaves well present, stems rigid bearing 1 or rarely 2 flowers, calyx 15–20 mm long.

(2). *D. coloratus* (Bornm.) Hand. - Mzt. is said to differ from this species mainly in purplish calyx and bracteoles (cf. Bornm. l.c.), but as the colour of the calyx varies from purplish at the base to purplish or purple all over, even on the same herbarium sheet, synonymy of the two taxa is clear. It is noticeable that the colour of the calyx in some other species of the genus changes from green to purple.

8. *Dianthus tabrisianus* Bienert ex Boiss.

Boissier, Fl. Or. 1: 496(1867).

Syn. *D. mazanderanicus* Rech. f., in Pl. Syst. Evol. 142: 245(1983), syn. nov.

Perennial, woody at base, 25–40 cm, glabrous or minutely puberulent. Stems simple or branched, bearing at most 2 flowers. Lower leaves dense, ca. 7 cm long, linear; sheath ca. 5 mm long; stem leaves shorter. Flowers solitary. Bracteoles 4–6, 1/3 to 1/2 calyx length, broadly membranous at margin, distinctly

aristate. Calyx 15–20 mm long, ovate-lanceolate to lanceolate; teeth 5–6 mm long, acute to mucronate, ciliolate at margin. Petal limb white or pale pink, 5–8 x 5–8 mm, ovate to oblong-obovate, ebarbulate, deeply dentate or more often fimbriate to above the middle; claw somewhat exerted.

Type. Persia prope Tabriz.

Distribution. Turkey, Caucasia, Iran, Afghanistan (?).

Iran. Mazandaran: S. of Ramsar, between Bagh-e Dasht and Lapasar, 2600 m, Runemark & Masoumi 21742; between Kelardasht and Pitsara, 2000–2700 m, Termeh 15068–E (isotype of *D. mazanderanicus* Rech. f.); Kelardasht, between Vandarbon and Kalahou, 1900–2500 m, 27. 7. 1983, Termeh & Zargani s.n. — Azarbayejan: Ardabil, Neur lake, 1480 m, Foroughi & Assadi 13781; 8 km N. of Khalkhal, Kelarabad road, 1750–1950 m, Mozaffarian & Nowroozi 34137, 34135; 27 km from Khalkhal to Kivi, 1500–1650 m, Mozaffarian & Nowroozi 34193; Arasbaran Protected Area, 2200–2400 m, Assadi & Sardabi 24304; 15 km S. of Marand, Mishodagh mt., 1800–2250 m, Assadi & Mozaffarian 29916; Znajan, Tarom, 2010 m, Makoui 9954; Kuh-e Sahand, S. of Sperkhan, 2500–2850 m, Mozaffarian & Mohammadi 37512; 2 km NE. of Khalkhal, 1800–

2050 m, Mozaffarian & Nowroozi 34034; 16 km S. of Mianeh, 980 m, Pabot 3745; 8 km N. of Khalkhal, Kelarabad road, 1750–1950 m, Mozaffarian & Nowroozi 34083; between Maku and Khoy, 1100 m, Assadi & Mozaffarian 30388; Bostanabad, Kuh-e Sahand, 2620 m, Termeh & Moussavi. s.n.

(1). It is doubtful if S. Iranian records of this species are correct, they may be referable to *D. pachypetalus* Stapf.

(2). var. *pubescens* Boiss. l.c. p. 497 and var. *longifimbriatus* Bornm. & Gauba, in Fedde. Rep. 39: 89(1935) are based on the indumentum of the plant and the deep incision of the petal limb. Both of these characters fall within the continuous variation of the species.

(3). var. *subaphyllus* Lemberg in Fedde. Rep. vol. 50: 259(1941) is recognized from S. Iran. I did not see the type but it may be referable to other related species of the genus.

(4). The isotype of *D. mazanderanicus* Rech. f. was examined, no clear difference could be found separating it from *D. tabrizianus*.

9. *Dianthus hafezii* Assadi, sp. nov.

Perennis, 40 cm, canescens, basi lignosus. Caules a basi dichotome ramosi; ad basin surculi steriles adsunt. Folia inferiora 10–100 x 1.5 mm, linearia,

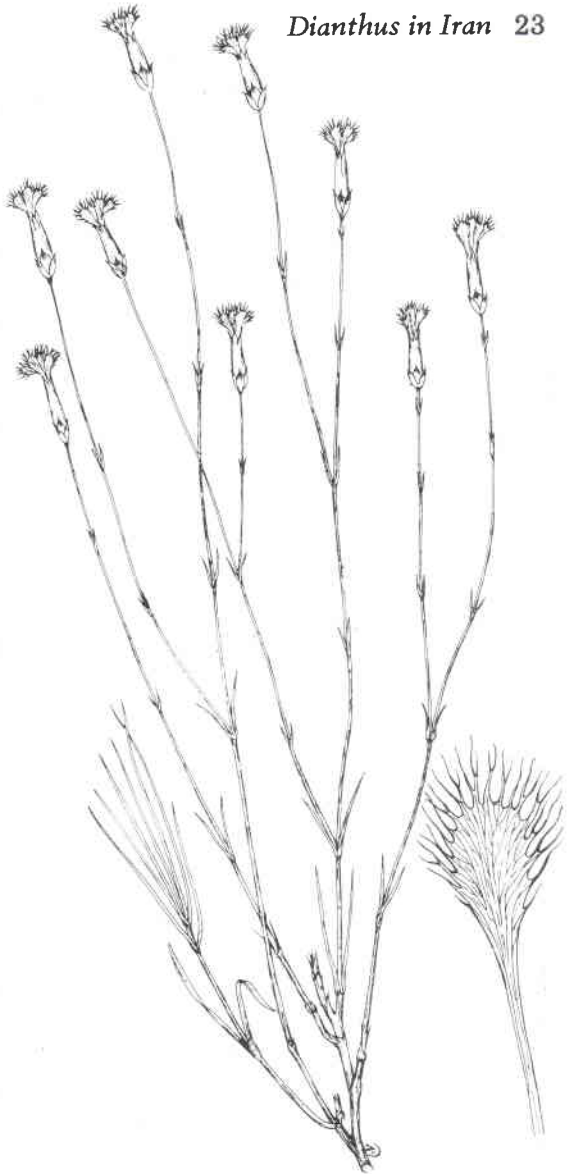


Fig.3. *Dianthus hafezii* (x 0.5; petal x 2). acuta vel acuminata, uni- vel trinervia, ad marginem partim scabrida, folia media 10–20 mm longa, folia summa biparia redacta et squamiformia; vagina usque ad 4 mm longa. Flores solitari. Bracteolae 4–6, 1/3 calycis obtegentes, oblongo-

ovatae, ad marginem membranaceae, acuminatae vel breviter mucronatae, ad basin mucronem tantum virides. Calyx ca. 19 mm longus et 4.5 mm crassus, distincte nervatus; dentes 7 mm longi, lanceolato-acuminati, ad marginem membranacei et ciliati. Limbus petali albus vel roseus, 12 x 9 mm, late obovatus, ebarbulatus, ad medium fimbriatus; unguis inclusus.

Typus. Iran. prov. Fars: Bamu Protected Region, Darreh-Chap, 1650–1900 m, 3. 5. 1975, N. slope, limestone, Wendlbo & Foroughi 17556 (holotypus TARI); between Shiraz and Ardakan, near Goiun (XN1), 1900 m, 24. 7. 1983, Assadi & Abouhamzeh 46626.

Perennial, 40 cm, greyish, woody at base. Stems dichotomously branched from base; sterile shoots present. Lower leaves 10–100 x 1.5 mm, linear, acute to acuminate, 1–or 3–nerved, partly scabrid at margin, middle leaves 10–20 mm long, two uppermost pairs scale-like; sheath up to 4 mm long. Flowers solitary. Bracteoles 4–6, 1/3 calyx length, oblong-ovate, membranous at margin, acuminate to shortly mucronate, greenish only below the mucro. Calyx ca. 19 mm long and 4.5 mm wide, distinctly nerved; teeth 7 mm long, lanceolate, acuminate, membranous and ciliate at margin. Petal limb white to pink, 12 x 9 mm, broadly obovate, ebarbulate, fimbriate up to

1/2; claw included.

Distribution. Iran (endemic).

(1). *D. basianicus* Boiss. & Hausskn. ex Boiss. is closely related to the new species, but the dichotomously branched habit and much smaller calyx are the most obvious differences between the new species and *D. basianicus*.

(2). The new species also differs from *D. tabrisianus* Bienert ex Boiss., in the dichotomously branched habit and more numerous fimbria of the petal limb.

(3). It resembles *D. austroiranicus* Lemperg but has calyx wide and petal limb 12 x 9 mm fimbriate to the middle. *D. austroiranicus* has calyx narrow and petal limb 3.5 x 2.5 mm deeply dentate or fimbriate to 1/3.

10. *Dianthus basianicus* Boiss. & Hausskn. ex Boiss.

Boissier, Fl. Or. suppl. 77(1888).

Perennial, 20–30 cm, woody at base, densely and minutely tomentose to glabrate. Stems many, simple or sparsely branched. Lower leaves 30–60 x 1 mm, subacute; the upper much smaller and scale-like. Flowers solitary. Bracteoles 4–6, ca. 1/3 calyx length, oblong-obovate, broadly membranous and ciliolate at margin, shortly mucronate. Calyx 25–40 mm long; teeth 8–10 mm long, lanceolate, acute, ciliate at margin. Petal

limb white, changes to pinkish with age, 8–10 x 6 mm, obovate, ebarbulate, fimbriate to between 1/3 and 1/2; claw somewhat exserted.

Type. In arenosis ad Derbent i Basian Mesopotamiae.

Distribution. Iran, Iraq.

Iran. Kordestan: between Sanandaj and Mahabad, 4500 ft., Furse & Syngé 713, 712. — Bakhtaran: 41 km SE. of Ghasr-e Shirin on the road to Shahabad, 890 m, Seraj 24770. — Fars: Kazeroon, Kotal-e Felfeli, 130 m, Foroughi 3856; 33 km from Lar to Bastak, mountains SE. of the village Hormood, 1000 m, Assadi & Sardabi 41792; S. of Shiraz, Emamzadeh Sabzepushan, 1650 m, Wendelbo & Foroughi 17796; 8 km S. of Lar, 1000 m, Assadi & Sardabi 41736; 19 km from Khonj to Lar, 700–1200 m, Assadi & Sardabi 41641. — Hormozgan: 85 km N. of Bandarabbas on the road to Sirjan, 750 m, Wendelbo & Foroughi 15757; S. side of Kuh-e Genou, 1620 m; Foroughi 16123; Kuh-e Genou, 600–650 m, Foroughi 16147; E. end of Kuh-e Genou, 200 m, Wendelbo & Foroughi 15723; 8 km N. of Bastak, 500 m, Assadi & Sardabi 41887; 111 km from Bandarabbas to Sirjan, 1000 m, Assadi & Sardabi 42211. — Khuzestan: 9 km to Behbahan on the road from Dehdasht (VP1), 200 m, Assadi & Abouhamzeh

38729.

(1). *D. basianicus* is reported for the first time from Iran.

(2). Plants with shorter calyx resemble to *D. crinitus* Sm. but are distinguished from it in the petal limb which is fimbriate at most to the middle.

11. *Dianthus austroiranicus* Lemperg

Lemperg, Fedde Rep. vol. 50: 260(1941).

Perennial, woody and branched at base, 35–50 cm, glabrate to minutely puberulent. Stem simple or branched. Lower leaves up to 40 x 1.5 mm, linear, acute to acuminate, 3-nerved, middle and upper leaves decreasing in size and becoming scale-like. Flowers solitary. Bracteoles 4–6, 1/3 calyx length, narrowly obovate, membranous at margin, mucronate. Calyx 18–28 mm long, thin; teeth 4 mm long, membranous and ciliate at margin. Petal limb white to pale pink 3–6 x 2.5–5 mm, obovate, ebarbulate, fimbriate up to 1/3; claw included.

Type. S. Iran (ad occidentem urbis Schiraz),

Distribution. Known from S. Iran.

Iran. Kohgiluyeh-Boirahmad: 16 km from Dogonbadan to Choram, near Deal, 1500–1900 m, Assadi & Abouhamzeh 46575; N. of Kuh-e Dena, Ab-Malakh,

2000–2600 m, Assadi & Mozaffarian 31364. — Fars: mountains W. of Shiraz (XN1), 2000 m, Assadi & Abouhamzeh 46606B. — Kerman: S. slope of Kuh-e Khabr, ca. 2000 m, Assadi & Miller 25185.

(1). Specimens cited as *D. austroiranicus* diverge somewhat from the original description of the species in having simple or branched (not dichotomously branched) stems.

12. *Dianthus crinitus* Sm.

Sm. in Trans. Linn. Soc. Bot. 2: 300 (1794).

Syn. *D. crinitus* var. *tomentellus* Boiss. Fl. Or. 1: 496(1867); *D. turcomanicus* auct. Fl. Iran (?) non Schischk. Fl. USSR 6: 687(1936).

Perennial, 25–40 cm, glabrous to sometimes densely puberulent. Stems simple or sometimes branched. Leaves to 80 x 1–2 mm, linear, upper leaves mostly scale-like and straw-coloured. Flowers solitary. Bracteoles 4–6, 1/3 calyx length, ovate to ovate-lanceolate, membranous at margin, acute to mucronate or aristate. Calyx 23–35 mm long, lanceolate, distinctly nerved; teeth 7–12 mm long, lanceolate, acuminate, membranous and ciliate at margin. Petal limb white to pale pink ca. 10 x 3–10 mm, ebarbulate, fimbriate to below the middle or near

the base into numerous filiform segments; claw exerted.

Type. Armenia.

Distribution. Turkey, Caucasia, Iran, Pakistan, Iraq, Syria, N. Africa.

Selected Specimens:

Iran. Gorgan: Golestan forest, 1750 m, Wendelbo & Foroughi 12674, Foroughi 6166. — Azarbayejan: Arasbaran Protected Area, 1000 m, Assadi & Masoumi 20500, Savabi & Raofi 53; near Khoy, Hajioddin mt., 1450–1850 m, Assadi & Mozaffarian 30438; between Makou and Khoy, Haramlou, 1850–1950 m, Assadi & Mozaffarian 30375; Makou, 1230 m, Foroughi 3875; mountains W. of Bazar-gan, 1500–1700 m, Assadi & Mozaffarian 30193; 20 km from Razi to Germe, 1600–2000 m, Mozaffarian & Nowroozi 34687; 6 km from Germe to Ani, 900–1200 m, Mozaffarian & Nowroozi 34968; 15 km from Namin to Chulandarreh, Sirkuh, 1200–1600 m, Mozaffarian & Nowroozi 34554. — Esfahan: Kolah-Ghazi Wildlife Park, 30–50 km E. of Esfahan, 1700 m, 29. 5. 1974, Iran-shahr. — Yazd: Shirkuh, 2780 m, Foroughi 1944; Khorniz, 5 km SW. of Mehriz, NE. of Kuh-e Khoseh, 1700 m, Aryavand & al. 1470. — Khorasan: 31 km N. of Ghuchan on the road to Darrehgaz, 2000 m, Assadi & Masoumi

21420; 70 km on the road from Salehabad to Torbat-e Jam, 1200 m, Runemark & Sardabi 23497. — Semnan: 81 km N. of Sangsar, 1900 m, Renze & Iranshahr 16600, ca. 59 km from Semnan to Sari, 2400–2800 m, Assadi & Massoumi 21541. — Tehran: Haraz road, Jajroud, 1650 m, Foroughi & al. 12413; SW. of Firouzkuh, Wendelbo & Cobham 13649; Kuh-e Karkas, 2740 m, Foroughi 1868.

13. *Dianthus crossopetalus* (Fenzl ex Boiss.) Grossheim

Grossheim, Fl. Kaukaza vol. 2: 428 (1930).

Syn.: *D. crinitus* Sm, var. *crossopetalus* Fenzl ex Boiss., in Boiss. Fl. Or. 1: 496(1867).

Perennial, 9–20 cm, minutely puberulent or glabrate. Stems many, usually simple or sometimes branched, prostrate or ascending, small sterile shoots present. Lower leaves to 5 cm long, linear, obtuse, ciliate at margin; upper leaves to 4 cm long, acute to acuminate. Flowers solitary. Bracteoles 4, rarely 6, 1/3–1/2 calyx length, ovate-lanceolate, membranous at margin, abruptly narrowed to a long and green arista. Calyx 30–45 mm long, greenish or partly purplish; teeth ca. 8 mm long, lanceolate, obtuse or mucronate, membranous and

densely ciliate at margin. Petal limb white or pinkish up to 14 x 12 mm, ebarbulate, deeply fimbriate to near the base into filiform segments; claw exerted.

Type. Persia borealis.

Distribution. Turkey, Caucasus, Iran.

Selected Specimens:

Iran. Gilan: W. of Sefidrood dam, 350 m, Pabot 3645; Kalaj, near Rudbar, 1200 m, Sabeti 2629, 2274, 2576. — Azarbayejan: mts. SW. of Khalkhal on road to Kivi, 1800 m, Wendelbo & Assadi 27859; 20 km to Tehran-Tabriz road on the road from Ahar, 1450 m, Wendelbo & Assadi 28001; Kuh-e Sabalan, 2100 m, Rejamand 6210; 2 km NE. of Khalkhal, 1800–2050 m, Mozaffarian & Nowroozi 34017; 50–60 km to Zanjan from Mianeh, 1200 m, Wendelbo & Assadi 28045. — Kordestan: ca. 15 km N. of Sanandaj, 1700 m, Wendelbo & Assadi 16912. — Hamadan: Bahar, Babai 6659—E. — Esfahan: 55 km from Delijan to Khomein, 1600 m, Babakhanlou & Amin 8785; Sefid-Dasht, 1700 m, Asefi 24619; Aboujeh mountains, 2300 m, Asefi 24338. — Kerman: S. of Kerman, Kuh-e Jupar, 2350–2600 m, Foroughi & Assadi 16177. — Semnan: Shahrood, S. base of Kuh-e Rازه, 1400 m, Freitag & Mozaffarian 28590; between Semnan

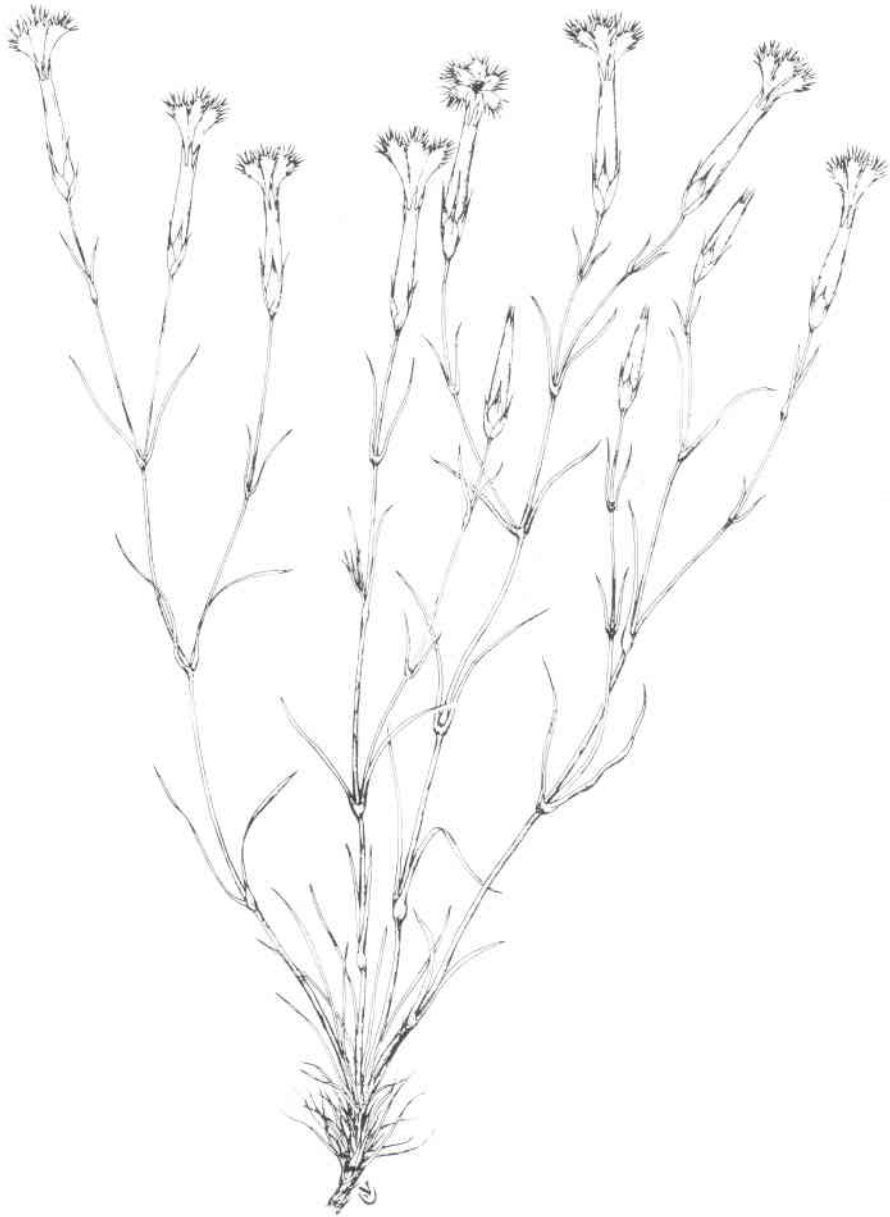


Fig.4. *Dianthus crossopetalus* (x 0.6).

and Sorkheh, 1160 m, Amin & Moussavi 2406; ca. 30 km SW. of Damghan, 1200 m, Wendelbo & al. 11198. — Tehran: between Ghom and Tehran, Hasanabad pass, 1150 m, Wendelbo & Foroughi 11569; Kandavan, Chaloos valley, 2980 m, Riazi 2166; Bibisakineh, 20 km Sw. of Karaj, 1250 m, Foroughian & Hariri 2178, 2211; 44 km from Tehran to Ghom, 1050 m, Shirdelpoor & Amini 11591; ca. 75 km S. of Tehran on road to Ghom, 1250 m, Wendelbo & Foroughi 11388; S. of Karaj, near Mardabad, 1250 m, Assadi & Wendelbo 18136; between Tehran and Karaj, Chitgar, 1320 m, Foroughi 85, 84, Sanii 11321, Assadi 11346, Sanii 11322, Amini 3946, Malekpoor & Foroughian 1741; 41 km from Karaj to Eshtehard, 1100 m, Moussavi & Amin 2507; Karaj, 1320 m, Malekpoor & Foroughian 2508; 85 km SW. of Karaj, Morad-Tappeh, 1210 m, Foroughian 2503; SE. of Tehran, near Aminabad, Kuh-e Bibishahrebanou, 1350 m, Babakhanlou & Amin 2055; 3 km from Karaj to Chaloos, 1280 m, Moussavi & Amin 2430; Firouzkuh road, Homand-e Absard, 2050 m, Dini & Arazm 2341; 60 km from Delijan to Ghom, 1140 m, Amin & Moussavi 2340; 22 km from Tehran to Garmsar, Khatoonabad, 1010 m, Moussavi & Amin 2093; Ghazvin, Alamoot road, Zarnou, 2400 m, 2587; 24 km NNE. of Saveh, 1350 m, Pabot

7230; 34 km from Tehran to Saveh, Parandak, 1000 m, Amin & Bazargan 18417.

14. *Dianthus macranthoides* Hausskn. ex Bornm.

Bornmuller, in Beih. Bot. Cent. 19, 2: 213(1906).

Perennial, woody at base, 25–35 cm, glabrous or partly puberulent at base. Stems simple or branched. Lower leaves to 6 cm long, linear, acuminate; sheath ca. 4 mm long; upper leaves shorter. Flowers solitary. Bracteoles 4(6), 1/4–1/3 calyx length, ovate-lanceolate, broadly mucronate, membranous at margin. Calyx 40–50 mm long; teeth 9–12 mm long, lanceolate, mucronate, ciliate at margin. Petal limb white or pinkish, up to 14 x 10 mm orbicular-obovate, ebarbulate, fimbriate to about the middle; claw exerted.

Type. Iran, Luristania, in monte Shuturunku, prope Kale Rustam.

Distribution. Iran (endemic).

Iran. Bakhtaran: 20 km SW. of Kangavar, 1550 m, Pabot 1769. — Lorestan: Oshtorankuh, above the village Tihun, 2000–2500 m, Assadi & Mozaffarian 37073 (type locality). — Esfahan: Ardestan, near Varian, 2300 m, Foroughi &

Assadi 18045, 18049.

(1) Intermediates between this species and *D. macranthus* Boiss. do occur, therefore further investigation may reveal that it is only a subspecific rank of the latter.

15. *Dianthus macranthus* Boiss.

Boissier, *Diagn. ser.* 1(1): 23(1843).

Syn. D. stapfii Lemperg, in Fedde *Rep.* vol. 50: 261(1941), *syn. nov.*

Perennial, woody and branched at base, 33–60 cm, glabrous or finely puberulent. Stems many, simple. Lower leaves to 50 mm long, narrowly linear, soon withering, middle leaves 10–30 mm long, the upper smaller and scale-like; sheath 1–3 mm long. Flowers solitary. Bracteoles 12–16, rarely 10, $1/3$ – $1/2$ calyx length, ovate-lanceolate, membranous at margin, mucronate. Calyx 25–45 mm long; teeth 8–12 mm long, linear-lanceolate, acute to acuminate, membranous and ciliate at margin. Petal limb white or pinkish, 6–12 x 4–10 mm, obovate, ebarbulate, fimbriate to between $1/3$ and near the middle; claw exerted or included.

Type. Persia australi.

Distribution. S. and W. Iran (endemic).

Iran. Lorestan: 107 km NW. of Khorramabad, 800 m, Pabot 2044; Kuhdasht,

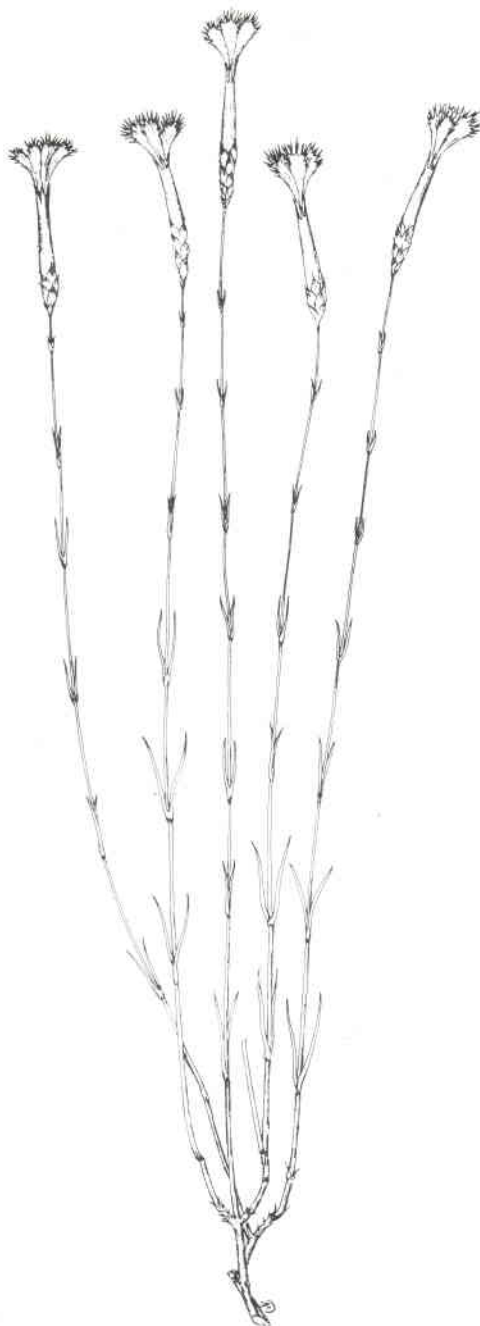


Fig.5. *Dianthus macranthus* (x 0.46).

Darreh-e Symareh, 850 m, Moussavi & Satii s.n.; ca. 40 km S. of Dorood, at Bisheh (US1), 1250–1600 m, Assadi & Mozaffarian 37017; Dorood, between Saravand and Gahar lake (SU1), 2300–3500 m, Mozaffarian & Sardabi 42374; Oshtorankuh (SU1), 2380–3200 m, Mozaffarian & Sardabi 42303. — Esfahan: Semirom, 2300 m, Assadi & Mozaffarian 31598. — Kohgilouyeh-Boirahmad: between Iasooj and Dehdasht, Dilegoon, Kuh-e Saverz (WP1), 2200–3200 m, Assadi & Abouhamzeh 46430; 5 km SW. of Sisakht on the road to Iasooj (WQ2), 2400 m, Assadi & Abouhamzeh 46220; Iasooj, near Abshar, 2200–2500 m, Assadi & Abouhamzeh 46266; Kuh-e Dena, 3100 m, Riazi 6200, Assadi & Mozaffarian 31278; between Sisakht and Boroojen at Meymand, 1600 m, Assadi & Mozaffarian 31333. — Fars: between Shiraz and Ardakan, mountains above Ghalat (XN1), 2300 m, Assadi & Abouhamzeh 46631; 5 km from Ardakan to Iasooj, Assadi & Mozaffarian 31102; 40 km from Shiraz to Ardakan, Assadi & Mozaffarian 31071.

(1). In number Assadi & Abouhamzeh 46631 specimens with long exerted styles, short stamens, small sterile anthers (ca. 1 mm), short calyx (ca. 25 mm) and tinged pinkish petal limb differ from specimens with short styles, long stamens, big fertile anthers (ca. 2 mm), long

calyx (ca. 35 mm) and white petal limb. I have not seen the type specimen of *D. stapfii* Lemperg but from the description, specimens of the first group (female) agree well with the description of *D. stapfii*.

16. *Dianthus jacobsii* Rech. f.

Rechinger f., in *Pl. Syst. Evol.* 142: 213(1983).

Perennial, woody at base, 40–50 cm, glabrous or puberulent. Stems branched. Lower leaves soon withering, middle leaves linear-lanceolate, the upper decreasing. Flowers solitary or rarely in groups of two ± approximate flowers. Bracteoles 8, 1/3–1/2 calyx length, indistinctly membranous at margin, aristate; arista 3–6 mm long. Calyx 30–35 mm long; teeth 7–9 mm long, linear-lanceolate, acute. Petal limb pale rose, ca. 15 x 15 mm, ebarbulate (?), fimbriate to 1/3; claw included.

Type. Persia, prov. Kurdistan: Sanandaj, 1200–1400 m.

Distribution. W. Iran (endemic).

(1). No material has been seen by the author but from the description, it seems that this species is related to *D. macranthus* Boiss. and the differences are in the size of petal limb and number of

bracteoles.

17. *Dianthus polylepis* Bienert ex Boiss.

Boissier, Fl. Or. 1: 497(1867).

Syn. *D. binaludensis* Rech. f., in Pl. Syst. Evol. 142: 242(1983), syn. nov.

Perennial, woody and branched at base, 30–40 cm, glabrate to minutely puberulent. Stems simple or branched above. Lower leaves to 5 cm long, linear, acute, middle and upper leaves decreasing in size; sheath ca. 2 mm long. Flowers solitary. Bracteoles 4–12, 1/3–1/2 calyx length, ovate-lanceolate, acuminate, membranous at margin. Calyx 18–30 cm long, narrow; teeth 8–11 mm long, lanceolate, acute to acuminate, membranous at margin. Petal limb cream-coloured to pinkish 4–8 x 4–7 mm, obovate, ebarbulate or sparsely barbulate, fimbriate to below the middle or near the base, claw included or excluded.

Type. In montis prov. Khorasan Persiae prope Meshed (Mashhad).

Distribution. NE. Iran (endemic).

Iran. Khorasan: ca. 96 km from Mashhad on the road to Torbat-e Heydarieh, Robat-Sefid, 1800–2000 m, Assadi & Maasoumi 21305; 50 km N. of Mashhad on the road to Kalat-e Naderi, 1850 m, Assadi & Maasoumi 21379; 30 km N. of Torbat-e Heydarieh, 1900 m, Assadi &

Maasoumi 21309; 45 km N. of Mashhad, 1800 m, Assadi & Maasoumi 21309; 45 km N. of Mashhad, 1800 m, Assadi & Maasoumi 21372; 20 km to Kashmar on the road from Neyshabour, 1800 m, Assadi & Mozaffarian 35536; 14 km from Kashmar to Neyshabour, 1400–1500 m, Assadi & Mozaffarian 35585; 50 km NNE of Kashmar, Kuh-e Bezgh, 1900–2500 m, Assadi & Mozaffarian 35738; Kuh-e Binaloud, above the village Zoshk, Mozaffarian 48826 (locus classicus of *D. binaludensis*).

(1). Hermaphrodite and female plants connected with changes in the number of bracteoles is seen in this species.

(2). Specimens from the type locality of *D. binaludensis* Rech. f. which perfectly agreed with the description of *D. binaludensis* were examined. Similar plants occur in many parts of the prov. Khorasan but the number of bracteoles varies from 4–10 or rarely 12. Therefore it seems that the type specimens of the two species, *D. polylepis* and *D. binaludensis* are at opposite extremes of the variation of bracteoles number.

18. *Dianthus elymaiticus* Hausskn. & Bornm. ex Bornm.

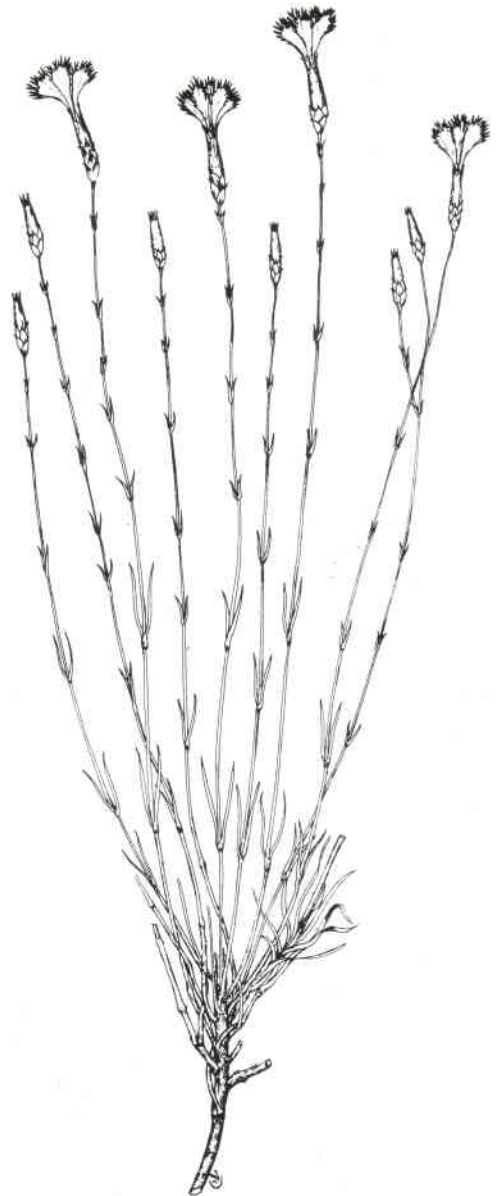
Bornmuller, in Beih. Bot. Cent. 19(2): 213(1906).

Perennial, woody and branched at base, 20–50 cm, glabrous to minutely pubescent. Stems simple or branched. Lower leaves to 50 mm long, linear, acute, 3- or indistinctly 5-nerved; stem leaves gradually decreasing in size and finally becoming scale-like, ca. 3 mm long. Flowers solitary. Bracteoles 8–10 rarely to 12, 1/3 calyx length, broadly obovate, coriaceous, obscurely nerved, shortly mucronate. Calyx 15–17 mm long; teeth 4 mm long, triangular-lanceolate, mucronate, villous at margin. Petal limb white to pale pink, 5–7 x 4–6 mm, orbicular to orbicular-obovate, ebarbulate, fimbriate to 1/3; claw exserted.

Type. In montibus Persiae occidentalis inter Dilegun et Maregun.

Distribution. Iran (endemic).

Iran. Prov. Kohgilouyeh-Boirahmad; ca. 50 km E. of Dehdasht, Kuh-e Nil (VQ4), 2400–3200 m, 21. 7. 1983, Assadi & Abouhamzeh 46499 between Iasuj and Dehdasht, Dilegoon, Kuh-e Saverz (WP1), 2200–3200 m, Assadi & Abouhamzeh 46405 (locus classicus); between Iasuj and Dehdasht, near Sadat (WQ2), 2300 m, Assadi & Abouhamzeh 46455; Iasuj, beginning of the road Kakan, 2400 m, Assadi & Abouhamzeh 46363.



(1). *D. elymaiticus* differs from *D.*

Fig. 6. *Dianthus elymaiticus* (x 0.5).

tabrisianus in having more numerous, mucronate (not aristate) bracteoles. It also differs from *D. polylepis* in the petal limb that is fimbriate to only 1/3 (not beyond the middle), well exerted claw and obovate-mucronate (not ovate-lanceolate-acuminate) bracteoles.

19. *Dianthus orientalis* Adams

Adams in Weber & Mohr, Beitr. 1: 54 (1805).

Syn. *D. fimbriatus* Bieb., Fl. Taur. — Cauc. 1: 332(1808); *D. canescens* Koch in Linnaea 15: 710(1841); *D. fimbriatus* Bieb. var. *brachyodontus* Boiss. & Huet., in Boiss., Diagn. ser. 2(5): 53(1853); *D. fimbriatus* Bieb. var. *stenocalyx* Boiss., Fl. Or. 1: 495(1867); *D. macronyx* Fenzl, in Kotschy, Pl. Pers. Bor. (1846) nom. nud.; *D. dumulosus* Boiss. & Huet in Pl. Arm. exs. (1853) nom. nud.; *D. scoparius* Fenzl ex Boiss., in Boiss., Fl. Or. 1: 494(1867); *D. nassireddini* Stapf in Denk. Akad. Wiss. Wien; *D. orientalis* Adams var. *brachyodontus* Boiss. & Huet. f. *foliaceo-squamata* Bornm., in Beih. Bot. Cent. 19, 2: 213(1906); *D. orientalis* Adams ssp. *scoparius* (Fenzl ex Boiss.) Bornm. in Beih. Bot. Cent. 27, 2: 310 (1910); *D. orientalis* Adams ssp. *scoparius* (Fenzl ex Boiss.) Bornm. f. *major* Bornm., l.c. 311; *D. fallax* Rech. f. & Esfandiari, in Bot Jahrb. 75: 362(1951),

syn. nov.

Perennial, woody and branched at base, 10–25 cm. Stems simple or branched. Lower leaves to 60 mm long, linear, acute to acuminate, upper leaves shorter; sheath ca. 2 mm long. Flowers solitary. Bracteoles 4–8, rarely to 10, sometimes purplish, 1/3 calyx length, ovate or obovate, rarely the 2 outer foliaceous and subulate, membranous at margin, acute or shortly mucronate. Calyx 18–27 mm long, pale green to green or purplish to deep purple; teeth 7–9 mm long, lanceolate, acuminate. Petal limb various shades of pink, up to 10 x 7 mm, obovate or orbicular-obovate, thin, sparsely to densely barbate, fimbriate to 1/3, rarely dentate; claw exerted.

Type. Georgia vicinity of Tbilisi

Distribution. Turkey, Caucasia, Iran, Pakistan, Iraq, Syria, Lebanon.

Selected specimens:

Iran. Gorgan: 8 km S. of Chencharan, near road from Maraveh to Gonbad, 1100 m, Hewer 3941. — Mazandaran: Noor valley, 9 km from Haraz road to Chaloos road, 1150 m, Mozaffarian & Abouhamzeh 42625; 21 km from Ab-e Garm-e Larijan to Malard, 2350 m, Mozaffarian & Abouhamzeh 42591; 27 km from Kandavan to Haraz road, 1550 m, Assadi & Mozaffarian 33100; Lar

valley, 2450 m, Wendelbo & Assadi 13282; S. of Ramsar, Javaherdeh, 2900 m, Runemark & Maasoumi 21849; Chaloos valley, near Marzanabad, Assadi 40298; Dasht-e Nazir, Veisar, 850 m, Gheissari 2360; Pol-e Veresk, 1640 m, Rowshan 6178; N. side of Kandavan, 2700 m, Wendelbo & al. 14450; Kelardasht, above Rudbarak, 1800–2000 m, Runemark & Mozaffarian 2587; Haraz road, above Rineh, 2350 m, Assadi & Salehi 31768; Polsefid, 450 m, Assadi 25528: — Azarbajejan: Oroomiyeh lake, Espire Island, 1330 m, Wendelbo & al. 12045, Ashk Island, 1350–1400 m Zehzad 83322; Ghoyondaghi Island, 1350 m, Foroughi 3867; Oroomiyeh, Razhan, Robot valley, 1900 m, Siami & Zehzad 493, Arasbaran Protected Area, 2200–2400 m, Runemark & Assadi 21945; 30 km on the road from Mianeh to Ardabil, 2500 m, Foroughi & Assadi 13748; Kuh-e Sahand, 2200–2900 m, Assadi & Mozaffarian 30687; Naghadeh, 1450 m, Foroughi 1616; 30–35 km SE. of Shahindez, 1500 m, Wendelbo & al. 12134; Tabriz, near Siahchaman, 1800 m, Foroughi 3825; Oroomiyeh, Solook, 2200 m, Sabeti 6189, Ghasemloo, 1600 m, Sabeti 6161; between Marand and Jolfa, Kiamaki-Dagh, 1400–2000 m, Assadi & Mozaffarian 30000; Shahbil, Kuh-e Sabalan, 2650 m, Foroughi & Assadi 13875, 2850 m, Foroughi 6207, Abai & Mojib 17086—E. — Kordestan:

mountains E. of Bijar, 1970 m, Assadi & Amini 13588. — Hamadan: ca. 20 km S. of Nahavand, Kuh-e Garou, 1800–2200 m, Assadi & Mozaffarian 36914; Ghazvin to Hamadan, after Avaj, 2100 m Assadi & Mozaffarian 36693; Kuh-e Alvand, 2700 m, Assadi & Mozaffarian 36793, Assadi & Amini 13597. — Bakh-taran: Kuh-e Parrow, 1200–2200 m, 17. 8. 1973, Moussavi & Satei s.n. — Lorestan: Dorood, between Saravand and Gahar lake (SU1), 2300–3500 m, Mozaffarian & Sardabi 42332; Between Aligoodarz and Shoolabad, Ghalikuh, 2200–3500 m, Mozaffarian & Sardabi 42518, Runemark & Lazari 26204; 39 km on road from Khoramabad to Nowjian, 2300–2550 m, Runemark & Lazari 26138; 12 km on road from Aligoodarz to Khomein, 2600–2850 m, Runemark & Lazari 26540. — Esfahan: Naein, Kuh-e Karkas, 2740 m, Foroughi 1868; Chadegan, Kuh-e Bidak, 2500 m, Nowroozi 1069; E. of Semirom, Kuh-e Aiineh-Ghabri, 3000–3700 m, Assadi & Mozaffarian 31679; 10 km to Semirom on the road from Shahreza (WQ3), 2600 m, Assadi & Abouhamzeh 46009; Boin, Tangdoozan, Kuh-e Hashted, 2700–2800 m, Nowroozi & Etemadi 1323; Semirom, N. side of Kuh-e Aiineh-Ghabri, 2600–2800 m. Assadi & Mozaffarian 31617. — Bakhtiari: 57 km W. of Shahr-e Kord, 2220 m, Pabot 2228; Kuhrang, 2600 m, Riazi 10303. — Kohgilouyeh-

Boirahmad: between Iasuj and Dehdasht, Dilegoon, Kuh-e Saverz (WP1), 2200–3200 m, Assadi & Abouhamzeh 46414; Kuh-e Dena, Gardaneh-e Bijan, 3500–3900 m, Assadi & Mozaffarian 31265, 31201, Riazi 10299; 25 km E. of Iasuj. on the road to Ardakan, 2600 m, Bokhari 1644; N. of Kuh-e Dena, Abmalakh, 2600–3000 m, Assadi & Mozaffarian 31420; ca. 50 km E. of Dehdasht, Kuh-e Nil (VQ4), 2400–3200 m, Assadi & Abouhamzeh 46503. — Fars: 10 km from Ardakan to Komhar, 2600–3300 m, Assadi & Abouhamzeh 46322. — Baluchestan: 59–74 km from Zahedan-Khash road on the road to Bazman, 1500 m, Assadi 22971. — Khorasan: Kopet-Dagh range, 45 km NNE. of Shirvan, 2350 m, Edmondson 1218; Esfarayen, Shahjahan mt., near Noushivan village, 1400–2500 m, Mozaffarian 48644, 48645. — Semnan: Shahrood, Kuh-e Ghatri, 1980 m, Foroughi 9795; ca. 20 km NW. of Shahrood, Kuh-e Shahvar (CF2), 2300–2700 m, Assadi & Mozaffarian 40781; 12 km NW. of Shahmirzad (YV2), 2400 m, Assadi & Mozaffarian, 40382; ca. 50 km N. of Semnan (YV1), 2400 m, Assadi & Mozaffarian 40640; 69 km from Shahrood to Azadshahr (CF3), 2000 m, Assadi & Mozaffarian 40975. — Tehran: Haraz road, Abask, 1750 m, Assadi & Mozaffarian 33195; 19 km from Karaj to Chalous, 1800 m, Babakhanlou & Amin 2682;

NE. of Tehran, near Oushan, Kolukan, 1850–1900 m, Dini & Arazm 2096; between Tehran and Karaj, above Kalak village, 1500–1900 m, Assadi & Mozaffarian 27570, 27571; NW. of Tehran, Suleghun valley, 1600 m, Assadi & al. 33665; S. of Firouzkuh, 2000 m, Pabot 4346; Ghazvin; Alamoot road, 22 km above Yazdjerd, Siahkuh, 2050 m, Mirfakhari 2399; NE. of Tehran, Ghuchak, 1900 m, Babakhanlou 25256; 52 km W. of Arak, 2150 m, Pabot 1304; Chaloos valley, Siah-Bisheh, 2180 m, Pabot 4627; Shahrestanak, 2600 m Riazi 3891; between Arak and Khomein 2700 m, Runemark & Lazari 26575; near Damavand, Havir, 2600 m, Assadi & Salehi 31786; 26 km NW. of Firouzkuh, 2150 m, Amin & Bazargan 2338; Karaj, Taleghan, 2080 m, Foroughian 2186; Karaj, Sirachal, 1400 m, Foroughi 1653; pass between Ghazvin and Manjil, 1500 m, Wendelbo & Assadi 18295; between Karaj and Chaloos, Nesa, 2200 m, Assadi & Salehi 31705.

(1). The most variable species of the genus in Iran. Extreme forms are easily distinguishable but intermediates are always found and it is therefore difficult to give a subspecific classification.

(2). Plants differing in sexuality were seen in the species in many places, which itself is a source of variability. In a single locality in Khorasan province (no.

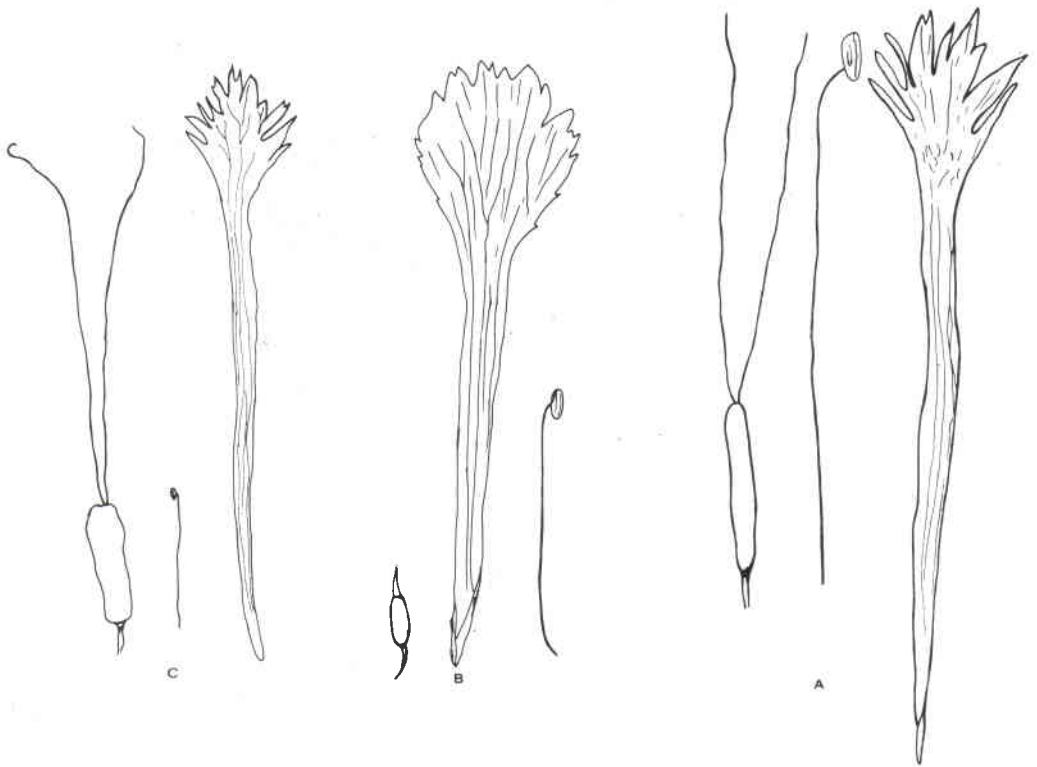


Fig.7. Petal, stamen and ovary shapes of *Dianthus orientalis* (Mozaffarian 48644 & 48645), (x3). — A. Hermaphrodite. — B. Sterile. — C. Female.

48644 and 48645) three forms occur together: (a). Hermaphrodite plants with well-developed stamens and styles, in combination with a deeply fimbriate and pale pink petal limb. (b). Female plants with well-developed styles but abortive sterile stamens, in combination with a less fimbriate and darker petal limb. (c). Sterile plants with abortive styles and \pm developed stamens but sterile, in combination with a deeply dentate and deep purple petal limb (Fig.

7). It is noteworthy that only the petal limb of the first group is barbulate.

(3). Within the variation of the species the following groups are recognized which at present I prefer not to give them any taxonomic recognition.

(a). Specimens with usually unbranched, short stems; rigid leaves; often purplish calyx, confined to high mountain areas. (typical of *D. scoparius* and *D. fallax*).

(b). Specimens with tall well-branched

stems.

(c). Specimens with a large petal limb.

(d). Specimens with a narrow thin calyx.

Naturally intermediates frequently occur between these groups.

20. *Dianthus pulverulentus* Stapf

Stapf, Denk. Akad. Wiss. Wien, Math. — Nat. kl. 51: 279.

Perennial, 30–40 cm, woody at base, whole plant pubescent. Stems many, branched. Lower leaves 50–80 mm long, linear, acute, 3–5-nerved; stem leaves similar to the lower but gradually decreasing in size. Flowers solitary. Bracteoles 6, ca. 1/2 calyx length, oblong, membranous at margin, shortly aristate. Calyx 25 mm long; teeth ca. 8 mm long, lanceolate, acute, membranous at margin. Petal limb pink, 10 x 6 mm, barbate, deeply dentate.

Type. In saxi ad radices montis Demavand prope Karu.

Distribution. Iran (endemic).

(1). no specimen of this species was seen by the author, but from its description it may be one of the forms of *D. orientalis* Adams.

(2). *D. pulverulentus* Stapf var. *glabra* Bornm., in Beih. Bot. Cent. 28: 134.

was described on glabrous plants.

21. *Dianthus rudbaricus* Assadi, sp. nov.

Perennis, 30–35 cm, glaber. Caules multi, simplices vel ramosi. Folia inferiora 10–35 x 1 mm, linearia, acuta, uni- vel triplinervia, scabra; folia media foliis inferis similia sed minora; folia superiora decrescentia, 3–4 mm longa, subulata, gradatim a bracteola transformata. Flores solitarii. Bracteolae 14–20, 1/3–1/2 calycis obtegentes, lanceolatae, obtusae, distincte nervatae, purpureo viridulae, ad margines membranaceae. Calyx ca. 25 mm longus, viridis vel purpurascens; dentes ca. 6 mm longi, oblongi, obtusi, ad margines membranacei et ciliati. Limbus petali roseus, 5–7 x 5–6 mm, orbiculari-obovatus, ebarbulatus, ad tertium partem fimbriatus, unguis exsertus.

Typus. Iran, prov. Gilan: after Rudbar on the road to Rasht, 200 m, on rocks, Assadi 30832 (Holotypus TARI); E. of Rudbar, 200 m, Wendelbo & Assadi 18297.

Perennial, 30–35 cm, glabrous. Stems many, simple or branched. Lower leaves 10–35 x 1 mm, linear, acute, 1–3-nerved, scabrous; middle leaves similar to the lower but smaller; upper leaves decreasing in size, 3–4 mm long, subulate and gradually changing into bracteoles. Flowers solitary. Bracteoles 14–20, 1/3–

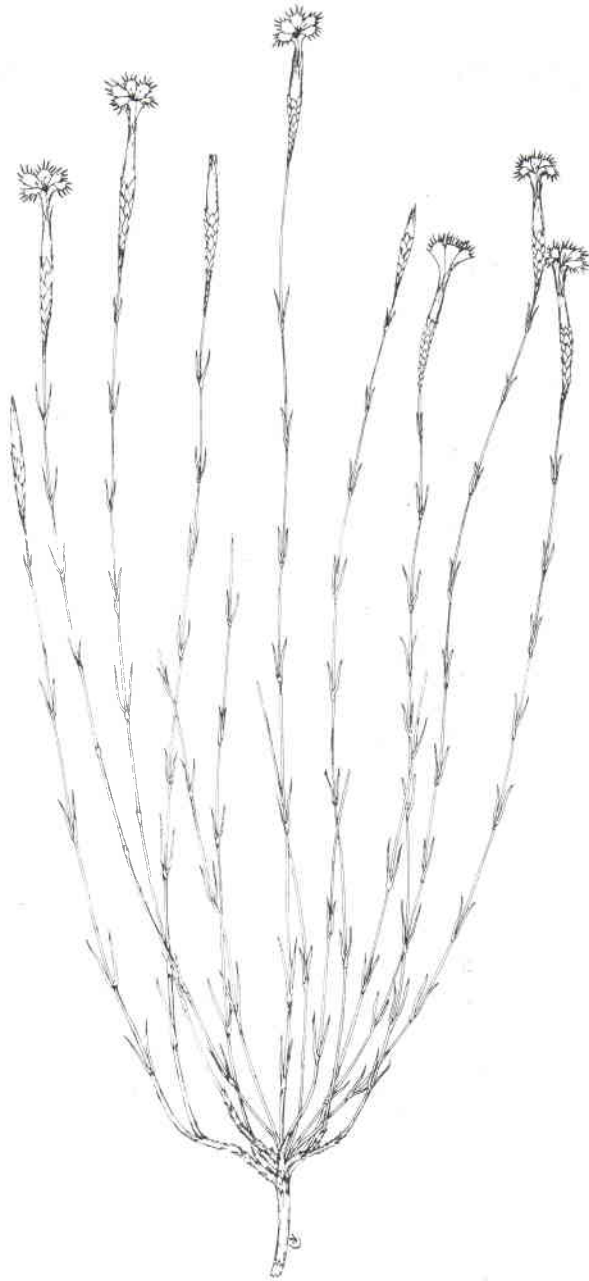


Fig.8. *Dianthus rudbaricus* (x 0.5).

1/2 calyx length, lanceolate, obtuse, distinctly nerved, greenish tinged purple, membranous at margin. Calyx ca. 25 mm long, green or purplish; teeth ca. 6 mm long, oblong, obtuse, membranous and ciliate at margin. Petal limb pink, 5–7 x 5–6 mm, orbicular-ovovate, ebarbulate, fimbriate to 1/3; claw exerted.

Distribution. N. Iran (endemic).

(1). The most remarkable character of the new species is the number of bracteoles which is about 18.

(2). The new species should be most closely related to *D. orientalis* Adams, but is distinguished from it in the numerous bracteoles to 20 and ebarbulate petal limb. In *D. orientalis* the bracteoles are up to 8 and the petal limb is usually barbulate.

22. *Dianthus diversifolius* Assadi, sp. nov.

Perennis, 8–10 cm, glaber. Caules multi, simplices; internodia 1.5–3 cm longa. Folia inferiora 10 x 3 mm, oblonga, apicibus rotundatis interdum apiculatis, uni- vel obscure triplinervia; folia caulina a foliis inferis valde diversa, 3–4 x 1 mm, subulata, acuta, uni- vel obscure triplinervia, cauli appressa; vagina ca. 1 mm longa. Flores solitarii. Bracteolae 6, 1/3 calycis obtegentes ovatae vel obovatae, purpuracentes, apicibus nervatae, ad marginem late membranaceae, acutae,

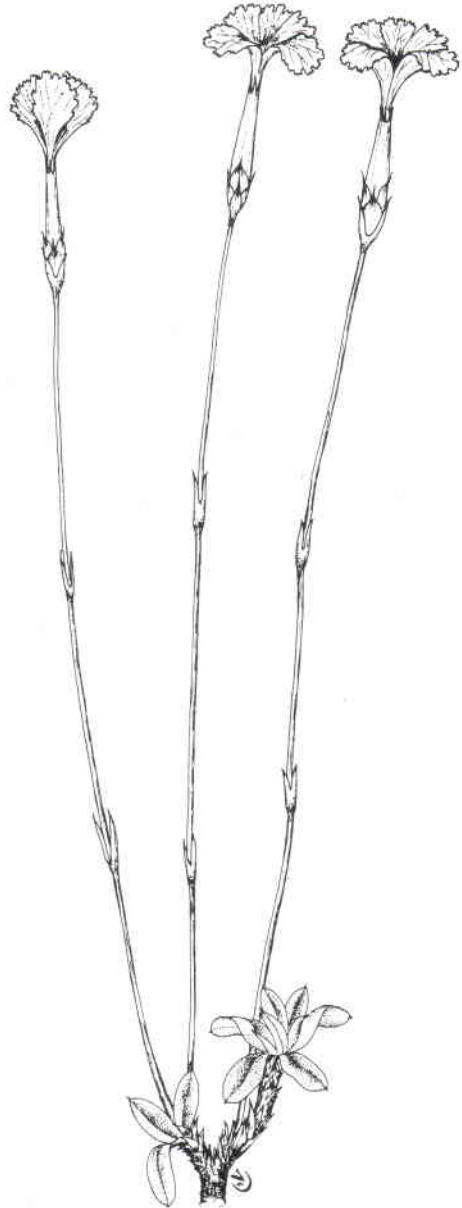


Fig.9. *Dianthus diversifolius* (x 0.6).

subtiliter mucronatae. Calyx 15 mm longus, 4 mm crassus, atropurpureus; dentes 4 mm longi, triangulares, obtusi, ad marginem ciliati. Limbus petali roseus, 8 x 7 mm, orbicularo-obovatus, ebarbulatus, profunde dentatus; unguis exsertus.

Typus. Iran, prov. Lorestan: Boroojerd. Kuh-e Parrow, 2000—2900 m, 18. 8. 1973, Moussavi & Satei s.n. (holotypus EVIN).

Perennial, 8—10 cm, glabrous. Stems many, simple; internodes 1.5—3 cm long. Lower leaves 10 x 3 mm, oblong, rounded and sometimes apiculate at the apex, 1- or obscurely 3-nerved; stem leaves markedly different from the lower, 3—4 x 1 mm, subulate, acute, 1- or obscurely 3-nerved, appressed to stem; sheath ca. 1 mm long. Flowers solitary. Bracteoles 6, 1/3 calyx length, ovate to obovate, purplish, nerved at the apex, membranous at margin. Calyx 15 mm long, 4 mm wide, dark purple; teeth 4 mm long, triangular, obtuse, ciliate at margin. Petal limb pink, 8 x 7 mm, orbicular-obovate, ebarbulate, deeply dentate; claw exserted.

Distribution. Iran (endemic).

(1). The new species is characterized by the markedly different shape and size of the stem and lower leaves.

(2). *D. orientalis* Adams is the closest relative of the new species but, the short habit to 10 cm, the oblong lower leaves, the short calyx, the glabrous and dentate petal limb in the new species separate the two species.

23. *Dianthus longivaginatus* Rech. f. Rechinger f., in Pl. Syst. Evol. 142: 244.

Perennial, woody and branched at base, 30—48 cm. Stems simple or more often branched; sterile shoots present. Lower leaves to 70 x 2 mm, linear, soon withering; middle and upper leaves similar to the lower but smaller; sheath to 7.5 mm long. Flowers solitary. Bracteoles 8—10 rarely 6, 1/3—1/2 calyx length, ovate, membranous at margin, aristate; arista to 5 mm long. Calyx 20—25 mm long; teeth 5—7.5 mm long, triangular-lanceolate. Petal limb white or pinkish 8—9 x 4—9 mm, obovate to oblong-obovate, barbulate, fimbriate to between 1/3—1/2; claw exserted.

Type. Persia prov. Kurdistan, in graminosis siccis jugi Salvatabad, 25 km E. of Sanandaj, 2300 m.

Distribution. Iran (endemic).

Iran. Kordestan: between Sanandaj and Hamadan, Salavatabad pass, 2400 m, Termeh 14435—E (type locality); 40 km SW. of Saghez, 1950 m, Pabot 5541;

32 km from Marivan to Paveh, 1330–1400 m, Runemark & Mozaffarian 29365; Marivan, 1800–2100 m, Iranshahr & Termeh 12155–E; Baneh, Gardaneh-e Khan, 2100 m, sine leg. 2970–E. — Lorestan: Dorood, Gahar lake (SU1), 2250–2900 m, Mozaffarian & Sardabi 42256.

24. *Dianthus agrostolepis* Rech. f.

Rechinger f., in *Pl. Syst. Evol.* 124: 246(1983).

Perennial, woody and branched at base, 20–40 cm, minutely scabrid at base. Stems simple or sometimes once branched above. Lower leaves 25–70 x 1–2.5 mm, linear, acute to acuminate; middle and upper leaves similar to the lower, but decreasing in size; sheath ca. 3 mm long. Flowers solitary. Bracteoles 6–8, ca. 1/2 calyx length, oblong-ovate, distinctly aristate; arista green and foliaceous. Calyx 25–30 mm long, teeth ca. 8 mm long, lanceolate, acuminate, membranous at margin. Petal limb purplish-violet, ca. 10 x 8 mm, orbicular-ovate, ebarbulate, fimbriate to 1/3; claw exerted.

Type. Persia, prov. Gilan, in Fagetis saxosis supra Sefid-Poshteh, inter Assalem et Khalkhal, 1900–2100 m,

Distribution. N. and NW. Iran (endemic).

Iran. Gilan: Assalem to Khalkhal, above



Fig.10. *Dianthus agrostolepis* (x 0.5).

Sefid-Poshteh, 1900–2100 m, Wendelbo & Assadi 18537 (type); Hashtpar, Lisar valley, 420 m, Amini 6192; between Deylaman and Laroukhani, 1500–1600 m, 9. 7. 1972, Termeh s.n. — Azarbayejan: between Astara and Ardabil, Hayran, 29. 8. 1968, Abai & Mojib 13081—E.

25. *Dianthus libanotis* Lab.

Labillardière. Ic Pl. Syr. Rar. 1: 14(1791).
Syn. D. atomarius Boiss., Diagn. ser. 1(8): 71(1849).

Icon. Grossheim, Fl. Cauc. 3: tab. 31 (1945).

Perennial, 30–55 cm, glabrous. Stems freely branched. Lower leaves up to 80–100 mm long, linear to linear-lanceolate, acute, distinctly nerved; middle leaves narrower, sheath up to 4 mm. Flowers solitary or in groups of up to 4, sessile or pedicellate. Bracteoles 4–8, ca. 1/2 calyx length, lanceolate, distinctly aristate; arista green and usually patent. Calyx 36–50 mm long, glabrous; teeth 9–15 mm long, lanceolate, mucronate, membranous and finely ciliate at margin. Petal limb white with reddish-black spots, up to 17 x 14 mm, obovate, barbulate, fimbriate to below the middle; claw exerted.

Type. In altis montibus Libani.

Distribution. Turkey, Caucasia, Iran, Iraq,

Palestine, Syria, Lebanon, Jordan, Egypt (Sinai).

Iran. Mazandaran: Noor, Kamarband, ca. 2400–2600 m, Rechinger 6226; Koojor, Kamarbon 6426—E. — Azarbayejan: near Khoy, 1280 m, Babakhanlou 24585; 89 km to Ahar from Tabriz, 1450 m, Mozaffarian & Mohammadi 37568; 22 km to Ahar on the road from Tabriz, 1900–2000 m, Mozaffarian & Mohammadi 37595; Oroomiyeh, Amini 4128. — Kordestan: Marivan, 1800–2100 m, Iranshahr & Termeh s.n. — Hamadan: 75 km N. of Hamadan, Chahar-Boulagh village, 2080 m, Termeh & Moussavi 16377—E; Alvand, 2450 m, Pabot 1634. — Fars: Shiraz, 40 km on the road to Ardakan, 2130 m, Assadi & Mozaffarian 31077. — Kerman: 65 km SW. of Rafsanjan, 2500–2600 m, Jadidi 23804. — Tehran: 20 km to Abali on the road from Tehran, 2300 m, Dini & Arazm 2090; 40 km from Karaj to Chalous, 1900 m, Amin 2573; Haraz road to Pol-e Mobarakabad, Kuh-e Siahchal, 2300–2500 m, Dini & Arazm 2184; mountains NW. of Tehran, Suleghun valley, 1900 m, Assadi & al. 33607, between Karaj and Chalous, Sirachal, 1980 m, Babakhanlou & Amin 2704; 40 km from Karaj to Chalous, Amin & Bazargan 19422; Haraz road, Abegarm Poloor, Behboudi 124—E (locus classicus of *D. atomarius*); Marounek, Behboudi 172—E.

(1). Specimens from the type locality of *D. atomarius* Boiss. l.c. with flaccid leaves and \pm appressed arista of bracteoles (differential characters of this species compared to *D. libanotis*) were examined. These differences fall within the range of variation of *D. libanotis* and there is continuous variation from this type to the other with more rigid leaves and patent arista.

26. *Dianthus stenocephalus* Boiss.

Boissier, Diagn. ser. 1(1): 19(1843).

Perennial, many-stemmed, 50–60 cm, minutely puberulent. Stems simple. Leaves 50 x 1.5–2 mm, linear, 3–5-nerved; sheath up to 15 mm long. Flowers solitary or up to 3 together subtended by a pair of bracts; bracts equalling or somewhat shorter than the flowers, oblong-lanceolate, acuminate. Bracteoles 6–8, as long as calyx, ovate-lanceolate, distinctly nerved, membranous at margin, aristate. Calyx 4.5–5 cm long; teeth 8–10 mm long, lanceolate, acuminate. Petal limb whitish, ca. 6 x 4 mm, obovate, barbulate, crenate to subentire; claw included.

Type: in Persia occidentali.

Distribution: Iran (endemic).

Iran. Bakhtiari: 80 km S. of Gandoman, 2300 m, Pabot 2283. — Kohgilouyeh-Boirahmad: near Dilegoon (WP1), 2300



Dianthus stenocephalus (x 0.5).

m, Assadi & Abouhamzeh 46367. — Fars: 40 km from Shiraz to Ardakan, 2130 m, Assadi & Mozaffarian 31067.

(1). This species in spite of having short rigid hairs on the petal limb has been placed by Boiss. (1867 p. 491) in the group *Leiopetalis*.

27. *Dianthus szowitsianus* Boiss.

Boissier, Fl. Or. 1: 503(1867).

Perennial, 25–70 cm, puberulent or rarely glabrous. Stems usually branched above, ca. 5 but up to 9-flowered. Lower leaves variable in size, usually 20–40 mm but up to 100 mm long, linear, 1–3- or rarely 5-nerved, soon withering; middle and upper leaves to 50 mm long, gradually decreasing in size, acuminate, 1- to 5-nerved. Flowers solitary. Bracteoles 4–6, 1/3 to 1/2 calyx length, oblong-ovate, membranous at margin, distinctly aristate. Calyx 20–22 mm long; teeth 5–8 mm long, triangular-lanceolate, acuminate, membranous and ciliate at margin. Petal limb pink to reddish above with dark spots at centre, yellowish-green below, 10–13 x 6–14 mm, orbicular to orbicular-obovate, barbate, dentate, claw included.

Type. In montibus Seidkhodji (Seyed-Haji) prov. Aderbidjan (Azarbayejan).

Distribution. Iran (endemic).

Iran. Azarbayejan: near Khoy, Hajioddin (Seyed-Haji) mountain, 1450–1850 m, Assadi & Mozaffarian 30458 (type locality); Salmas, Haghghi 6252–E; between Marand and Jolfa, Kuhe Darrehdiz, 1100–1500 m, Termeh s.n. — Bakhtaran. Dalahou, Ghalalan, 2000 m, Iranshahr & Termeh s.n.; Sarab-e Kerend, 1620–2030 m, Iranshahr & Termeh 12162–E. — Tehran: N. of Tehran, 2000 m, Assadi 19993; NE. of Tehran, above Tehran-Pars, 1500 m, Dini & Arazm 2347; 3 km from Karaj to Chaloos, 1280 m, Moussavi & Amin 1959; above Iranian Botanical Garden, 1700 m, Wendelbo & al. 12530, Assadi 25432; Karaj, Kuh-e Dashte, 1500–2000 m, Assadi & Mozaffarian 32763, Riazi 3949; above Shirpala 1850 m, Wendelbo & Cobham 12309; W. of Tehran, Suleghoon valley, Assadi & Mozaffarian 32675; Ghuchak, 1700 m, Foroughi 577, Babakhanlou & al. 2191, Moussavi 22811; Rudehen to Firouzkuh, 1830 m, Rowshan 6156; near Karaj, Kalak, 1500 m, Moussavi 2273.

28. *Dianthus sahandicus* Assadi, sp. nov.

Perennis, 10–25 cm, ± glaber. Caules plures, ascendentes, supra ramosi, Folia inferiora mox emarcida, caulina 4–7 juga, 15–30 x 1–2 mm, linearia, acutiuscula, 1–3 nervata, ad marginem apprime ad basem obscure scabra. Flores solitarii

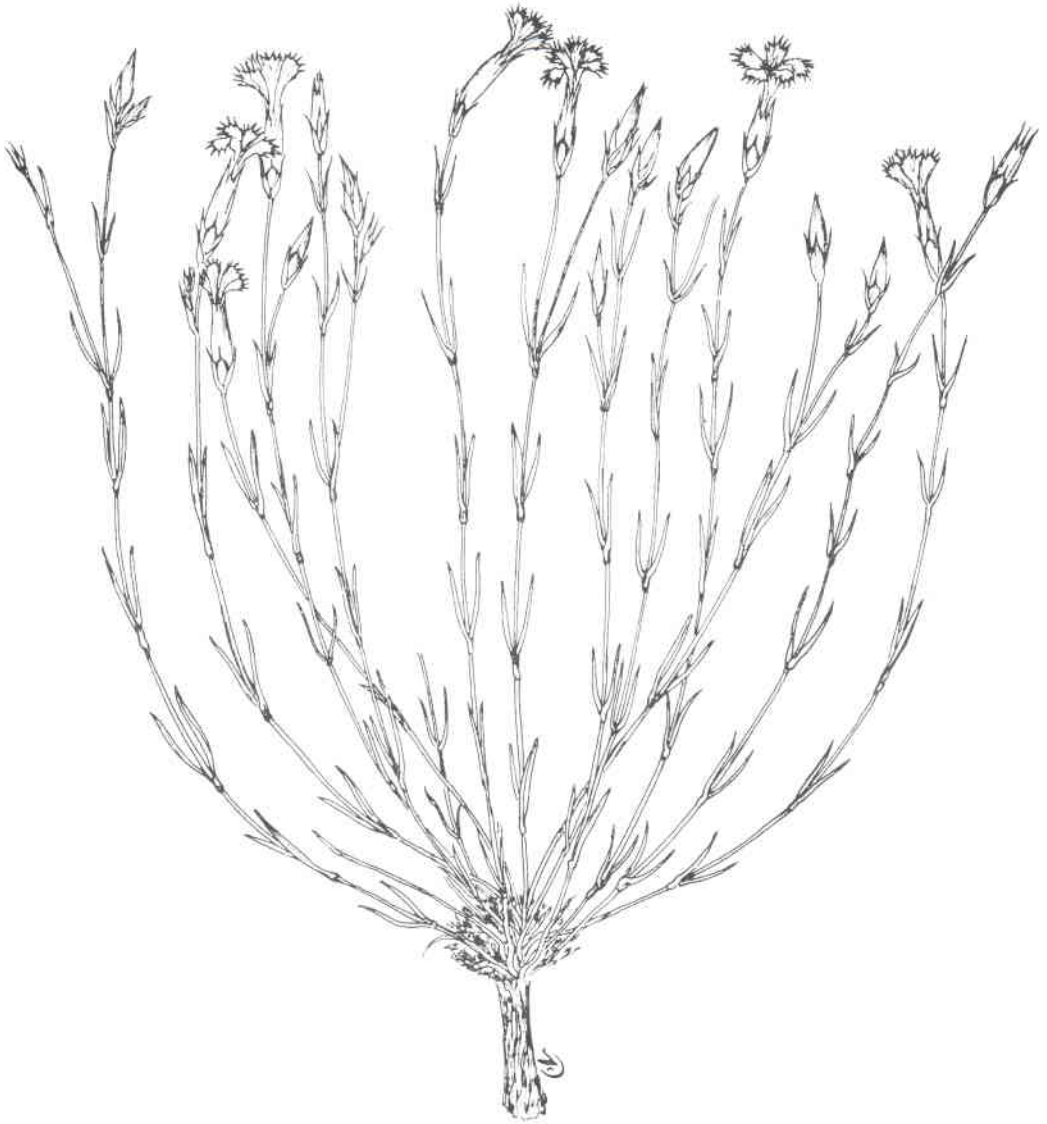


Fig.12. *Dianthus sahandicus* (nat. size).

vel usque ad 3 aggregati. Bracteolae 4, 1/2 ad 2/3 calycis attengentes, purpurascens, exteriores lanceolatae, interiores obovatae-oblancheolatae, ad marginem late membranaceae, aristatae; arista viridis et nervata. Calyx ca. 12 mm longus, apice attenuato, purpurascens; dentes ca. 3.5 mm longi, lanceolati, mucronati, ad marginem late membranacei et ciliati. Limbus petali roseus, 4 x 3 mm, obovatus, barbatus, dentatus.

Typus. Iran, prov. Azarbayejan, S. slope of Kuh-e Sahand, 2500 m, 4.7. 1978, Assadi & Mozaffarian 30731 (holotypus TARI).

Perennial, many-stemmed, 10–25 cm long, ± glabrous. Stems ascending, branched above. Lower leaves soon withering; stem leaves 4–7 pairs, 15–30 x 1–2 mm, linear, ± acute, 1–3-nerved, obscurely scabrous at margin especially near the base. Flowers solitary or in groups of up to 3. Bracteoles 4, 1/2 to 2/3 calyx length, purplish, the outer lanceolate, the inner obovate-oblancheolate, broadly membranous at margin, aristate; arista green and nerved. Calyx ca. 12 mm long, narrowed above, purplish; teeth ca. 3.5 mm long, lanceolate, mucronate, broadly membranous and ciliate at margin. Petal limb rose, 4 x 3 mm, obovate, barbulate, dentate.

Distribution: Iran (endemic).

(1). The new species is distinct, its closest relative being *D. grossheimii* Schischk. from Caucasus. The narrower, shorter and 1–3-nerved leaves; the shorter calyx and fewer bracteoles are the main differences between it and *D. grossheimii* with ca. 3 mm broad and 5-nerved leaves, 15–17 mm long calyx and 8 bracteoles.

29. *Dianthus hyrcanicus* Rech. f.

Rechinger f., in *Pl. Syst. Evol.* 142: 241(1983).

Perennial, ca. 60 cm, glabrate. Stems branched, ca. 30-flowered. Leaves up to 70 x 7 mm, linear-lanceolate, acuminate, 3–5-nerved; upper leaves narrower; upper most pair ± equalling flowers; sheath short ca. 1.5 mm long. Flowers usually in groups of 2–3, rarely solitary. Bracteoles 6–10, ca. 1/2 calyx length, oblong-ovate, membranous and ciliate at margin, partly nerved, distinctly aristate; arista foliaceous. Calyx ca. 23 mm long, partly purplish; teeth 6–7 mm long, lanceolate, pungent-acuminate, membranous and ciliate at margin. Petal limb reddish-purple, 10–15 x 8–10 mm, obovate, barbulate, dentate; claw exserted.

Type. Persia, prov. Gilan, inter Foumen et Massuleh.

Distribution. N. Iran (endemic).



Fig.13. *Dianthus hyrcanicus* (x 0.5).

Iran. Gilan: between Foumen and Masouleh, 450 m, Wendelbo & Assadi 18592 (type). — Mazandaran: between Ramsar and Neydasht, 11. 8. 1966, Abai s.n.:

30. *Dianthus seidlitzii* Boiss.

Boissier, Fl. or. 1: 506(1867).

Syn. *D. pusillus* Bornm., in Ver. Zool. Bot. Gessel. in Wien 60: 80(1910), non Freyn & Sint., in Bull. Herb. Boiss. 3: 75(1895) (?).

Perennial caespitose plant. Stems ca. 1 cm long, simple, somewhat exserted from the tuft. Leaves ca. 1 cm long, linear, obtuse, distinctly nerved. Flowers solitary. Bracteoles 4, greenish-red, 1/2 calyx length, oblong-lanceolate, cuspidate. Calyx red, 11 mm long, distinctly nerved; teeth oblong-lanceolate, ± acute. Petal limb obovate, distinctly barbate, dentate.

Type. In monte Scahend in prov. Aderbidjan Persiae bor. (Azarbayejan, Kuh-e Sahand).

Distribution. NW. Iran (endemic).

Iran. Known only from the type.

(1). Bornmuller. l.c. records *D. pusillus* from Kuh-e Sahand; due to the similarities of the description of this species with that of *D. seidlitzii*, it is probable that the record should in reality be *D.*

seidlitzii.

(2). *D. pusillus* Freyn & Sint. in l.c. was described from Armenia Turcica, but not mentioned in Davis Flora of Turkey vol. 2. It may be that the name is in reality a synonym of *D. seidlitzii* Boiss.

(3). No specimen of this species has been seen by the author.

31. *Dianthus armeria* L.

Linnaeus, Sp. Pl. 410(1753); Boiss. Fl. Or. 1: 508(1867); Reeve in Davis Fl. Turkey 2: 124(1967).

Icon. Grossh., Fl. Cauc. 3: tab. 29 f. 10(1945).

subsp. *armeria*

Annual or biennial, 5–13 cm, hairy throughout. Stems one to many, simple or branched. Lower leaves 20–40 x 2–4 mm, linear-lanceolate, obtuse to subacute, 3–5-nerved; stem leaves narrower, acute to acuminate; sheath 1 mm long. Flowers in groups of 2 or more. Bracteoles leaf-like reaching the summit of the calyx. Calyx 19 mm long; teeth ca. 8 mm long, linear-lanceolate, acuminate or aristate. Petal limb ca. 5 x 2–3 mm obovate to ovate, dark red, barbate, dentate.

Type. Gotlandiae.

(1). New for Iran.



Fig.14. *Dianthus armeria* subsp. *armeria* (nat. size).

Distribution. Europe, Turkey, Caucasia, Iran.

Iran. Mazandaran: Kelardasht, Abasabad, Makaroud forest, 1100–1200 m, 19. 7. 1983, Termeh & Zargani s.n. — Gilan: between Damesh and Jirandeh, 2000 m, Wendelbo & Ala 13520; Assalem, Pisason forest, 1350 m, Izadyar 14399—E. — Azarbayejan: Ardabil, Gardane-Heyran, 1550 m, Foroughi 6147.

32. *Dianthus calocephalus* Boiss.

Boissier *Diagn. ser.* 1(6): 23(1845).

Icon. Reeve in Davis *Fl. of Turkey* 2: 109(1967). — Schischkin in Komarov *Fl. of USSR* 6: tab. 51, fig. 11(1936).

Perennial, ca. 50 cm, glabrous. Stems simple. Lower leaves ca. 60 x 2.5 mm, linear, acuminate, 3–5-nerved, ± scabrous at margin; stem leaves similar to the lower, gradually decreasing in size; sheath 20 mm long. Bracts coriaceous, shorter than the capitulum, ovate-lanceolate, broadly membranous at margin, aristate. Flowers capitulate. Bracteoles 4–6, coriaceous, 1/2 calyx length, ovate, broadly membranous at margin, aristate. Calyx purplish, 18 mm long, teeth 4 mm long, lanceolate, acuminate. Petal limb red, 5 x 3 mm obovate-cuneate, burbulate, dentate.

Type. In rupibus declivitatibus septentrionalis Tmoli, inter Bozdagh et Sardez (Turkey).

Distribution. Turkey, Caucasia, Iran.

Iran. Azarbayejan: Khoy, Mirzagol valley, 2500–3000 m, Zehzad & Siami 421.

(1). One of the specimens of the only herbarium sheet seen by the author is annual or biennial and bears a 1-flowered

stem (flowers solitary), therefore the number of flowers of the capitulum in young plants may be reduced even to one.

(2). This species is new for Iran.

33. *Dianthus persicus* Hausskn.

Haussknecht, in Mitth. Bot. Ver. Jena 9: 16(1890).

Syn. D. persicus Hausskn. var. *velutina* Bornm., in Bull. Herb. Boiss., ser. 2, 5: 61(1905).

Perennial, to 50 cm, glabrous or sometimes pubescent. Stems simple. Lower leaves up to 60 x 8 mm, linear or linear-lanceolate, acuminate, 3- to 5-nerved; stem leaves similar to the lower but decreasing gradually in size, sheath 3-5 mm long. Bracts foliaceous, green or partly purplish, shorter to equalling the capitulum, linear or linear-lanceolate, acuminate, distinctly nerved. Flowers capitate. Bracteoles 4, coriaceous, sometimes purplish equalling to longer than calyx tube, the outer lanceolate, the inner ovate, aristate; arista foliaceous. Calyx ca. 20 mm long, green except the teeth, teeth purple, 5-6 mm long, lanceolate-mucronate, ciliate at margin. Petal limb 6-7 x 5-6 mm, obovate-cuneate, barbulate, dentate.

Type. Persia, Oshtorankuh, between Ghale-Rostam and Tihun.



Fig.15. *Dianthus persicus* (x 0.6).

Distribution. Iran (endemic).

Iran. Kordestan: Marivan, Miandagh, 2000 m, Myrzayan & Abai s.n.; Palangan, 1800–2200 m, Iranshahr & Termeh s.n.; 110 km to Sanandaj on the road to Marivan, 1600 m, Termeh 14451–E. — Tehran: 24 km from Ghazvin to Alamoot, 1800 m, Assadi & Maasoumi 50971; 66 km NW of Karaj, hills above Atanak and Kahvan, 2060 m, Foroughian & Hariri 2443; Arak, Kuh-e Rasband, 2000 m, Mozaffarian 48374.

(1). Variation in the indumentum seen on the same herbarium sheet from glabrous to hairy.

Species imperfectly known

1. *Dianthus*, sp. nov.

Perennial, woody at base, 40 cm, glabrous. Stems simple; middle internodes 6–8 cm long. Lower leaves linear to linear-lanceolate, 3-to obscurely 5-nerved, soon withering; middle leaves 40 x 1–3 mm linear or linear-lanceolate, 1- or obscurely 3-nerved; upper leaves ± scale-like; sheath 2–3 mm long. Flowers solitary. Bracteoles 4, 1/3 calyx length, obovate, broadly coriaceous, abruptly aristate; arista 2–3 mm long. Calyx 24 mm long, tubular-lanceolate; teeth 7 mm long, triangular-lanceolate, mucronate. Petal limb greenish-lemon-coloured,

10 x 2.5–3 mm, oblong, thick, ebarbulate, subentire to obscurely crenate; claw exerted.

Lorestan: Oshtorankuh, between Ghaleh-Rostam and Gahar 2400–2700 m, 11. 7. 1969 Iranshahr s.n. (Evin).

(1). A poor specimen seen in the herbarium of Evin which I prefer not to describe it before having good material.

(2). It is a very distinct species with the appearance of *D. macranthoides*, but the petal limb subentire and oblong.

(3). *D. inamoenus* Schischk. and *D. pallens* Sibth. & Sm. are probably close relatives but the new species distinguishable from both of them mainly in calyx length and the simple stem, etc.

Doubtful records

1. *Dianthus pallens* Sibth. & Sm.

This species in Boissier (1867 p. 485) was mentioned from N. Iran. Reeve (1967 p. 114) mentioned this species and a related species namely *D. cretaceus* Adams from Iran, *D. pallens* having the calyx 15–19 mm and *D. cretaceus*, 19–25 mm long. Calyx length of *D. pallens* in Boissier l.c. is ca. 22–25 mm which is within the variation of *D. cretaceus*, therefore it may be that what has been recorded as *D. pallens* from Iran is in reality *D. cretaceus*.

2. *Dianthus strictus* Sibth. & Sm.

This illegitimate name in Parsa (1951 p. 987) was doubtfully used for a taxon from NW. Iran. The correct name for the species (cf. Tutin 1964 p. 97) is *D. stefanoffii* Eig. supposed to be endemic to Greece, therefore Parsa's record is certainly incorrect.

3. *Dianthus tripunctatus* Sibth. & Sm.

This species was recorded by Reeve (1967 p. 106) from W. Iran, but no specimen has been seen by the author. It may be that the record was based on an incorrect identification of *D. strictus* Banks & Sol.

Acknowledgments

Thanks are due to Mr. E. Moradi, the artist of the Research Institute of Forests and Rangelands for preparing the illustrations.

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