

Family 19. EPHEDRACEAE

H. FREITAG & M. MAIER-STOLTE

Dioecious, or rarely monoecious, erect or climbing spartoid shrubs. Leaves opposite or whorled, fused towards the base, usually reduced to membranous sheaths, rarely linear. Flowers in small cones. Male flowers each subtended by a bract and consisting of two united scales surrounding a staminal column bearing (2-)3-8(-9) sessile or stipitate anthers. Female flowers solitary or in groups of 2-3 subtended by 2-4 pairs of free or fused bracts; ovules with the integument prolonged into a slender tube; bracts scarious or swollen and fleshy in fruit.

Meyer, C.A. (1846). *Vers. Monogr. Ephedra* 225-226; Stapf, O. (1889). *Akad. Wiss. Wien., Math.-Naturwiss. Kl., Denkschr.* 56 (2): 1-112; Freitag, H. & Maier-Stolte, M. (1989). The *Ephedra* species of Forsskal: identity and typification. *Taxon* 38: 545-556; Freitag, H. & Maier-Stolte, M. (1992). A new species and combination in the genus *Ephedra* from Arabia. *Edinb. J. Bot.* 49: 89-93 (1993).

EPHEDRA L.

Description as for the family.

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|----|--|--------------------------|
| 1. | Pith dark brown; plant erect with conspicuously parallel branches | 2 |
| + | Pith white; plant erect with divaricate branches or procumbent or climbing | 3 |
| 2. | Margins of the bracts and leaf sheaths glabrous; female cones usually 1-seeded with the inner bracts fused for $\frac{1}{3}$ – $\frac{1}{2}$ their length; male flowers with 6–8 anthers | 6. E. pachyclada |
| + | Margins of the bracts and leaf sheaths minutely ciliate; female cones usually 2-seeded with the inner bracts fused for $\frac{1}{2}$ – $\frac{3}{4}$ their length; male flowers with 6–8 anthers | 7. E. milleri |
| 3. | Stems and main branches erect, divaricately branched; anthers distinctly (0.5–1.0mm) stipitate (if anthers sessile see <i>E. aphylla</i>) | 4 |
| + | Stems and main branches climbing, spreading or procumbent; anthers sessile | 5 |
| 4. | Shrub up to 1m tall; twigs coarse, always more than 1mm thick; bracts of the female cones free to the base, with broad scarious and erose margins at maturity | 1. E. alata |
| + | Small shrub up to 0.5m tall; twigs usually thinner, at least some less than 1mm thick; bracts of the female cones fused for more than $\frac{1}{2}$ their length, margins ciliate | 2. E. transitoria |
| 5. | Margins of the leaf sheaths and bracts glabrous; peduncles of the female cones usually conspicuously curved; anthers 4–6 per flower | 4. E. foeminea |
| + | Margins of the leaf sheaths and bracts minutely ciliate; peduncles of the female cones usually straight; anthers 3–4 per flower | 6 |
| 6. | Leaves often up to 10–15(–40)mm long; immature female cones ovoid, (1–)2(–3)-seeded | 5. E. foliata |
| + | Leaves up to 3mm long; immature female cones narrowly cylindrical, 1(–2)-seeded | 3. E. aphylla |

1. E. alata Decne in Ann. Sci. Nat. Bot., sér. 2, 2: 239 (1834). Illustr.: O. Stapf, op. cit.: t.1/1 as *E. alata* var. *decaisnei*; Fl. Iraq 2: 85 (1966); Fl. Palaest. 1: t.20 (1966); Collenette (1985 p.230).

Erect shrub up to 1m, forming dense clumps by creeping rhizomes; stems divaricately branched; twigs coarse, more than 1mm thick, smooth or scabridulous. Leaves up to 3(–6)mm long. Margins of leaf sheaths and bracts minutely ciliate. Male cones usually sessile, in dense axillary clusters; flowers with 4–6 anthers, most or all anthers distinctly (0.5–1.0mm) stipitate. Female cones usually sessile, 2-seeded; immature cones ovoid; bracts spreading, free to the base, with broad scarious and erose margins at maturity. **Map 67, Fig. 10.**

Desert plains and sandy runnels; (350–)500–1000m.

Saudi Arabia. From Algeria to Iraq, including Sinai, Negev and S Jordan.

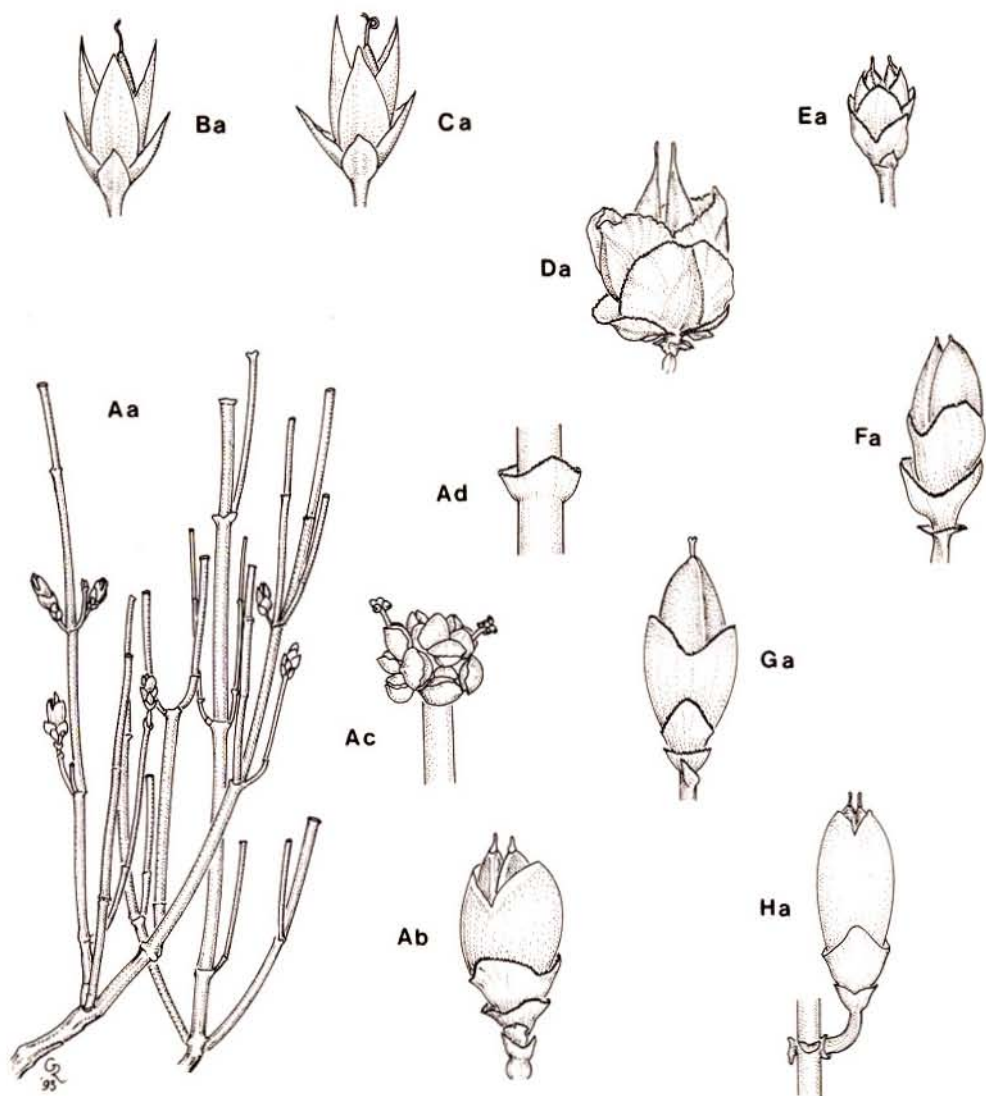


Fig. 10. Ephedraceae. A, *Ephedra milleri*: Aa, habit, female plant ($\times 0.6$); Ab, fruit ($\times 4$); Ac, male cone ($\times 4$); Ad, leaf ($\times 4$). Ba–Ha, *Ephedra* fruits (all $\times 4$); B, *E. pachyclada* subsp. *pachyclada*; C, *E. pachyclada* subsp. *sinaica*; D, *E. alata*; E, *E. transitoria* (immature); F, *E. foliata*; G, *E. aphylla*; H, *E. foemina*.

2. *E. transitoria* H. Riedl in Anz. Oest. Akad. Wiss, Math.-nat. Kl. 98: 27 (1961). Illustr.: Fl. Iraq 2: 87 (1966); Collenette (1985 p.232).

Erect shrub up to 0.5m, forming loose clumps by creeping rhizomes; stems divaricately branched; twigs (at least some) less than 1mm thick, scabridulous. Leaves up to 3(-7)mm long. Margins of leaf sheaths and bracts minutely ciliate. Male cones at the tips of side branches or in axillary clusters; flowers with 4(-5) distinctly (0.5-1.0mm) stipitate anthers. Female cones usually at the tips of side branches, 2-seeded; immature cones ovoid; innermost bracts fused for over $\frac{1}{2}$ their length; ripe cones fleshy, red. **Map 68, Fig. 10.**

A rare plant of sandy runnels on limestone in the extreme north of Arabia; 800-900m.

Saudi Arabia. Syria, Jordan and Iraq.

3. *E. aphylla* Forsskal (1775 p.170). Syn.: *E. alte* C.A. Mey. (in part - male specimens) op. cit.: 265 (1846). Illustr.: C.A. Mey., op. cit.: t.3/4 (1846) male specimen as *E. alte*; Fl. Palaest. 1: t.21 (1966) as *E. alte*.

Erect or hanging, rarely climbing shrub up to 1.5m; stems usually scabridulous. Leaves up to 3mm long. Margins of leaf sheaths and bracts minutely ciliate. Male cones in dense axillary clusters or on side branches; flowers with 3-4 sessile anthers. Female cones axillary or on side branches, 1(-2)-seeded; immature cones narrowly cylindrical; innermost bracts fused for at least $\frac{3}{4}$ their length; ripe cones fleshy, red. **Map 69, Fig. 10.**

Shallow runnels in soft limestone; 700m.

Saudi Arabia. From Libya to Lebanon, Syria and E Jordan.

In Arabia a rare plant occurring only in the extreme north of Saudi Arabia.

4. *E. foeminea* Forsskal (1775 p.219). Syn.: *E. campylopoda* C.A. Mey., op. cit.: 263 (1846). Illustr.: C.A. Mey., op. cit.: t.2 (1846) as *E. campylopoda*; O. Stapf, op. cit.: t.2/12 as *E. fragilis* var. *campylopoda*; Fl. Palaest. 1: t.22 (1966) as *E. campylopoda*; Collenette (1985 p.231) as *E. sp. aff. foliata* 1410.

Climbing or hanging shrub up to 5m; stems scabridulous. Leaves up to 2.5mm long. Margins of leaf sheaths and bracts glabrous. Male cones usually in axillary clusters; flowers with 4-6 sessile anthers; often with (1-)2 female flowers at the tips of the male cones. Female cones in axillary clusters, usually on conspicuously curved stalks, (1-)2-seeded; immature cones narrowly cylindrical; innermost bracts fused for at least $\frac{3}{4}$ their length; ripe cones fleshy, bright red. **Map 70, Fig. 10.**

Cliffs, ravines and in *Juniperus* woodland; 1700-2800m.

Saudi Arabia, Yemen (N). E Mediterranean region, including Sinai and Jordan; Ethiopia and Somalia.

Rare in the Hijaz mountains; common in the Asir mountains. It requires more humid conditions than the other Arabian species.

5. *E. foliata* Boiss. ex C.A. Mey., op. cit.: 297 (1846). Syn.: *E. ciliata* C.A. Mey., op. cit.: 290 (1846); *E. peduncularis* Boiss., Fl. orient. 5: 717 (1884). Illustr.: C.A. Mey., op. cit.: t.3/4 (1846) female specimen as *E. alte*; O. Stapf, op. cit.: t.2/10; Fl. Palaest. 1: t.23 (1966) as *E. peduncularis*; Fl. Pakistan 186: 29 (1987) as *E. ciliata*; Collenette (1985 p.231 as *E. aff. foliata* 2443 & p.232 as *Ephedra* sp. 1481).

Climbing or prostrate shrub up to 4m; stems smooth or minutely hispidulous. Leaves up to 10–15(–40)mm long. Margins of leaf sheaths and bracts ciliate. Male cones at the tips of slender branches; flowers with 3–4 sessile anthers. Female cones usually on long loosely branched twigs, (1–)2(–3)-seeded; immature cones ovoid; innermost bracts fused for over half their length; ripe cones fleshy, translucent white.

Map 71, Fig. 10.

Rocky slopes and wadi-sides; often scrambling over trees and shrubs; 0–1500 (–2100)m.

Saudi Arabia, Yemen (N & S), Oman, UAE, Qatar, Bahrain, Kuwait. N Africa east to India and C Asia south to Somalia

A common and widespread species in the deserts of Arabia. An abnormal form with many-flowered male cones occurs sporadically. It has been described from S Iran as *E. polylepis* Boiss. & Hausskn.

6. *E. pachyclada* Boiss., Fl. orient. 5: 713 (1884). Syn.: *E. alte* sensu Schwartz (1939 p.22); *E. fragilis* sensu Schwartz (1939 p.23).

Erect, densely branched shrub up to 0.75(–1)m; stems scabridulous. Margins of leaf sheaths and bracts glabrous. Male cones in dense axillary clusters; flowers with (5–)6–8(–9) sessile or shortly stipitate anthers. Female cones in axillary clusters or shortly stalked, 1-seeded; immature cones ovoid; innermost bracts fused up to a third their length; ripe cones fleshy, red. **Map 72, Fig. 10.**

subsp. ***pachyclada***. Illustr.: O. Stapf, op. cit.: t.2, 14; Fl. Pakistan 186: 29 (1987) as *E. intermedia*.

Micropyle 1–2mm, straight or with the upper part densely twisted.

Open rocky slopes and cliffs in *Juniperus* woodland; (1000–)1500–3000m.

Oman. S Iran to N Pakistan.

subsp. ***sinaica*** (H. Riedl) Freitag & Maier-Stolte in Edinb. J. Bot. 49: 92 (1992). Syn.: *E. sinaica* H. Riedl in Notes Roy. Bot. Gard. Edinburgh 38: 291 (1980). Illustr.: H. Riedl op. cit.: 292; Collenette (1985 p.232) as *E. intermedia*.

Micropyle 2–2.5(–3)mm, loosely and irregularly coiled.

Open rocky slopes and cliffs; 1750–3300m.

Saudi Arabia, Yemen (N). Sinai.

Rare in the higher Hijaz mountains; more common in the Asir mountains and N Yemen where it is frequent on the high plateau and inner rain-shadow regions.

7. *E. milleri* Freitag & Maier-Stolte in Edinb. J. Bot. 49: 89 (1992). Illustr.: Freitag & Maier-Stolte op. cit.: 90, 91. Type: Oman, *A.G. Miller* 7667B (fem.) (E, K).

Erect, densely branched shrub up to 80cm; stems thick, tuberculate. Leaves up to 1.5–2(–2.5)mm long. Margins of leaf sheaths and bracts minutely ciliate. Male cones pedunculate, solitary or 2–3 in axillary clusters; flowers usually with 5 sessile anthers. Female cones solitary or 2–3 in shortly pedunculate axillary clusters, 2-seeded or 1-seeded by abortion; immature cones ovoid; innermost bracts fused up to $\frac{1}{2}$ to $\frac{2}{3}$ their length; ripe cones fleshy, red. **Map 73, Fig. 10.**

Rocky slopes in open *Acacia-Commiphora* shrubland; 900–1200m.

Oman, ?Yemen (S). Endemic.

A sterile, stunted specimen (22 iii 1854, *Perrotet* in *Defflers*) from near Aden probably belongs here. *E. milleri* can be expected to be found in dry, rocky areas in the Mahra and Hadramaut Governorates of Yemen.