EDINB. J. BOT. 51(1): 33–47 (1994)

STUDIES IN THE FLORA OF ARABIA: XXVII. SOME NEW TAXA FROM THE ARABIAN PENINSULA

A. G. MILLER* & J. A. NYBERG*

The following new taxa from the Arabian Peninsula are described: *Diplotaxis kohlaanensis* A. Miller & J. Nyberg (Cruciferae), *Phragmanthera austroarabica* A. Miller & J. Nyberg (Loranthaceae), *Commicarpus adenensis* A. Miller (Nyctaginaceae), *Forsskaolea griersonii* A. Miller & J. Nyberg, *Parietaria umbricola* A. Miller (Urticaceae), *Trianthema sheilae* A. Miller & J. Nyberg (Aizoaceae), *Reseda pentagyna* Abdallah & A. Miller (Resedaceae), *Aerva artemisoides* subsp. *batharitica* A. Miller & J. Nyberg (Amaranthaceae). The following new combinations are made: *Boerhavia elegans* subsp. *stenophylla* (Boiss.) A. Miller (Nyctaginaceae), *Oncocalyx doberae* (Schweinf.) A. Miller & J. Nyberg (Loranthaceae).

Revision of families for Volume One of the *Flora of the Arabian Peninsula and Socotra* has resulted in the following new taxa and combinations.

AIZOACEAE

Trianthema sheilae A. Miller & J. Nyberg, **sp. nov.**

Herba *T. crystallinae* (Forssk.) Vahl affinis sed habitu erecto (haud prostrato) multo ramoso, floribus pallide luteis (non viridibus), calycis lobis longioribus differt.

Bushy annual or perennial herb. *Stems* ascending, much branched, papillose, somewhat glandular above, drying white. *Leaves* in unequal pairs, elliptic to obovate, 2–10 × 1–6mm, acute to rounded at the tip, obtuse at the base, yellowish green, drying blackish green with a white reticulate surface pattern of collapsed papillae; petioles 0.5–5mm, dilated at the base and with a pair of stipule-like fimbriate and membranous flaps. *Flowers* yellow, sessile, solitary or in clusters of 1–5 in the leaf axils. *Calyx* tubular below, with 5 unequal lobes each with a subterminal dorsal appendage; tube obconical, 1–1.5mm, sometimes glandular externally; lobes erect, narrowly triangular, tip acute, the 3 longer lobes 1.5–2.5mm (incl. appendage), the 2 shorter lobes 1–1.5mm (incl. appendage), with small projections below the sinuses at the base of the lobes; terminal appendages 0.5–1mm, fleshy. *Stamens* 5, anthers scarlet, orange or yellow. *Style* c.1mm. *Capsule* enclosed within the persistent calyx, (1–)2-seeded; operculum ± hemispherical, c.0.7–1mm long; seeds oblong-reniform, c.1.2 × 1mm, black, finely reticulate.

* Royal Botanic Garden Edinburgh, Inverleith Row, Edinburgh EH3 5LR, UK.

The previous paper in the *Studies in the Flora of Arabia* series was: Bruyns, P. & Forster, P. I. (1991). Studies in the Flora of Arabia: XXVI. A new species of *Sarcostemma* from Arabia. *Edinb. J. Bot.* 48: 333–335.

Type: Saudi Arabia, 12km N of Muhayl road junction, Jizan to Qunfudhah road, among lava blocks near the sea, erect bushy shrublet, 20cm tall and 50cm wide, with pale stems and pale green slightly twisted leaves, bright yellow flowers 6mm wide with scarlet anthers, 4 ii 1984, *Collenette* 4718 (holo. E).

Habitats: open stony places, hard sand, sandy depressions, dry gravel and alluvial plains, rocky slopes, coral sand, lava blocks and near alkaline seepages; sea level to 1370m.

Other specimens seen:

SAUDI ARABIA. Al Wahbah Crater, 22°54'N 23°08'E, among rocks near alkaline seepage inside lip of crater, 1370m, 13 iv 1983, *Collenette* 4297 (E); Farasan Island, coral plateau near sea, south of village, in shallow sand, 6m, 4 ii 1985, *Collenette* 5026 (E); 55km N of Madinah, Khayber rd, hard sand, 640m, 30 x 1989, *Collenette* 7286 (E); Mahazat Assaid reserve, 2km SE of the Khurmah to Riyadh rd, in depressions in sand, 915m, 15 vii 1991, *Collenette* 7852 (E); Between Jeddah and Mecca, 1837, *Fischer* 28 (BM, K); Tihama Plain nr Jeddah, dry gravelly plain, sea level, 25 ii 1933, *Furlonge* 21 (K); 1950, *Kercher* AL 102 (K); 15 ii 1936, *Philby* s.n. (BM); In montibus vallis Fatme, 27 xii 1836, *Schimper* 883 (E, K); J. Sidir, 30 miles NE of Jedda, 150m, 5 iv 1940, *Trott* 182 (K); Nr Bureiman, 14km NNE of Jedda, open stony ground, 120m, 12 v 1950, *Trott* 1521 (K); Wadi Hanakiya, 24°40'N 40°30'E, 790m, 11 xi 1947, *Vesey-Fitzgerald* 1678/4 (BM); Jedda, rocky foothills, 75m, 20 xii 1946, *Vesey-Fitzgerald* 16636/4 (BM); J. Waqad, 20°30'N 42°50'E, alluvial plain, 790m, 21 vi 1947, *Vesey-Fitzgerald* 16974/4 (BM); Jeddah, viii 1881, *Zohrab* 273 (K).

REPUBLIC OF YEMEN. Perim Island, 1894, *Farmer* s.n. (BM, K).

ETHIOPIA. 20km S of Thio, sea level, 13 ii 1954, *Popov* 1387 (K); N Eritrea, J. Halibai, 29 iii 1949, *Bally* 6907 (K).

Trianthema sheilae is most closely related to *T. crystallina* (Forssk.) Vahl but is a much-branched, ascending, bushy annual or perennial herb with yellowish green (rather than grey-green or dark green) leaves and yellow (not green) flowers. This last character shows up very well in the photographs in Collenette (1985: 39, as ' T. sp. nov. aff. crystallina'). As well as the above differences the calyx lobes in *T. sheilae* are erect and connivent in fruit thus effectively concealing the capsules, whereas in *T. crystallina* the calyx lobes are spreading and the fruit readily visible. The calyx lobes in *T. sheilae* also tend to be longer and narrower than in *T. crystallina.*

Typical forms of *T. sheilae* and *T. crystallina* are readily distinguished, at least in Arabia, although there are a few intermediate specimens. Two specimens from Saudi Arabia (*Collenette* 7286 and 7852) are bushy with yellow flowers but the calyx lobes are spreading in fruit and smaller than in typical *T. sheilae*. The two specimens from Ethiopia (*Popov* 1387 and *Bally* 6907) seem referable to *T. sheilae*: they have yellow flowers and long calyx lobes but unlike typical *T. sheilae* are prostrate.

At present, notwithstanding these few somewhat intermediate specimens, we prefer to recognize *T. sheilae* as a distinct species, particularly bearing in mind the extreme forms of the two taxa found in Saudi Arabia. Few of the specimens examined have field notes on habit or flower or leaf colour. Additional collections from Arabia and Ethiopia with notes on these points are highly desirable.

This new species was first recognized by Sheila Collenette in whose honour it is named.

AMARANTHACEAE

Aerva artemisioides Vierh. & O. Schwartz subsp. **batharitica** A. Miller & J. Nyberg, **subsp. nov.**

A subsp. *artemisioide* foliis brevioribus pro ratione latioribus basi cuneato, et petiolo distincto differt.

Type: Sultanate of Oman, Dhofar, above Wadi Schuwaimayah, 17°56'N 55°32'E, wadi dominated by *Acacia tortilis* and *Aerva artemisioides*, low subshrub, flowers yellow, on limestone cliffs, 50m, 28 iv 1984, *A. Miller* 6421 (holo. E; iso. K, KWT, ON, UPS).

Habitats: dry limestone cliffs, dissected limestone plateau, rocky slopes and wadi banks; 20–300m.

Other specimens seen:

SULTANATE OF OMAN. Sharbithat, 18°05'N 56°29'E, 20m, 10 v 1983, *Gallagher* 6750/3 (E, ON); Wadi NW of Sudh, 17°04'N 55°03'E, 50m, 17 ii 1984, *Gallagher* 7010 (E, ON); Schwamiya, 26 vi 1985, *McLeish* 547 (E); J. Quinqari nr Sudh, 17°02'N 55°01'E, 4 xi 1983, *Lawton* 2520 (E); Sharbithat, 240km ENE of Salalah, 20m, 14 x 1979, *Miller* 2753 (E); Cliffs above Schuwaimayah, 300m, 27 ix 1984, *Miller* 6404 (E, K, KWT, ON, UPS); Edge of escarpment above Schuwaimiyah, 300m, 17 ix 1989, *Miller & Nyberg* 9408 (K, KTUH).

Aerva artemisoides is endemic to southern Arabia. Within it two subspecies can be recognized: subsp. *artemisoides* from the Mahra and Hadramaut Governorates of the Republic of Yemen as far east as Ras Fartak and subsp. *batharitica* from the coastal regions of southern Oman (Fig. 1). Subsp. *batharitica* grows on cliffs and dry rocky areas along the coast from Sudh to Ras Madraka. The name of the new variety is named in honour of the Bathari tribe who live in this area.

The two subspecies can be separated using the following key:

1. Leaves linear-oblong to linear-oblanceolate, 10–40 × 2–5mm, long-attenuate at base into petiole or ± sessile _____ subsp. **artemisioides**
+ Leaves elliptic to ovate, 4–25 × 5–12mm, base cuneate, petiole short __subsp. **batharitica**

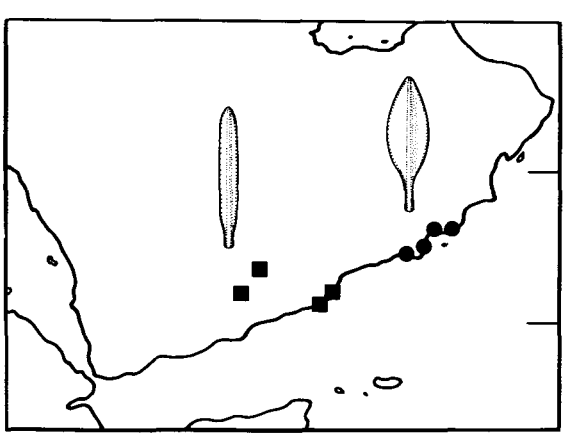

FIG. 1. *Aerva artemisioides*: ■, subsp. *artemisioides*; ●, subsp. *batharitica*.

CRUCIFERAE

Diplotaxis kohlaanensis A. Miller & J. Nyberg, **sp. nov.** (sect. *Catocarpum* DC.).

D. harra (Forssk.) Boiss. similis sed herba perennis glabra caespites magnos formans, fructu etiam plerumque rostro stipiteque longiore petalisque generaliter longioribus recedit.

Perennial herb or shrublet, glabrous throughout excepting the sepals; stems many, arising from a woody rootstock, ascending or hanging, 25–50(–200)cm long, much branched. *Leaves* petiolate, slightly fleshy, yellowish or bluish green, sometimes pinkish tinged on the midrib and beneath with age, ovate to oblong-ovate, 8–80 × 5–30mm, obtuse at the tip, the margin unevenly serrate with 4–6 pairs of teeth or sinuate to entire, the base attenuate into the petiole; upper leaves smaller and narrower. *Inflorescence* ebracteate, ascending or hanging, ± corymbose with the flowers overtopping the buds, in fruit lax and elongating to 30cm; pedicels 10–18mm long. *Sepals* erect-spreading, oblong, c.6mm long, externally hairy particularly at the base and on the midrib; inner sepals 2–2.5mm broad, somewhat saccate at the base, slightly hooded at the tip; outer sepals 1.5–2mm broad, the base not saccate, distinctly hooded at the tip. *Petals* clear yellow, broadly obovate and narrowing below into a linear claw, 9.5–13.5 × 4.5–6mm, the tips rounded. Nectarial glands prominent at the base of the median stamens. *Ovary* cylindric, glabrous, shortly stipitate; stigma bilobed. *Median stamens* 7.5–11mm long; lateral stamens 5.5–7mm; anthers 2.25–3mm long. *Fruit* erect or hanging, linear to linear-oblong, flattened, 15–40 × 2.25–3.5mm, with the seeds in two rows; valves thin, glabrous, becoming yellowish; beak seedless, 1.5–2mm long; stigma bilobed; stipe 1.25–3.5mm long. *Seeds* numerous, pale reddish brown, ± oblong, flattened, 1–1.5 × 0.5–1mm, without prominent surface sculpturing, mucilaginous on wetting. (Fig. 2).

Type: Republic of Yemen, Amran to Kuhlan [Kohlaan] road, on limestone cliffs, 15km E of Kuhlan, 2800m, 26 iii 1981, *A. G. Miller & D.G. Long* 3213 (holo. E; iso. K).

Habitats: limestone and sandstone cliffs; 2300–3000m.

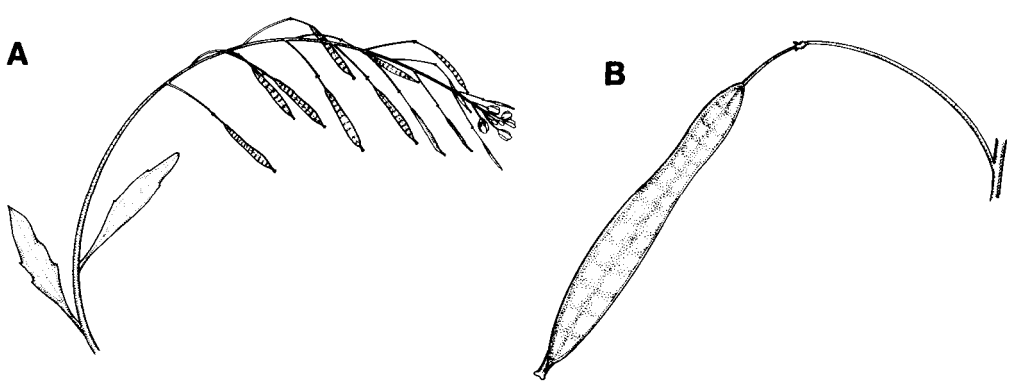

FIG. 2. *Diplotaxis kohlaanensis*: A, fruiting and flowering branch (× 0.6); B, fruit (× 2.5).

Other specimens seen:

REPUBLIC OF YEMEN (N). Bait al Alama, J. al Mahdad, 20km W of Amran, SW facing sandstone cliffs, 2900m, 26 ix 1978, *Miller* 236 (E, K); On a cliff above Kohlaan, 2300m, 17 ii 1973, *J. Wood* 2250 (E); On cliffs on the SW edge of J. Mahdad, 3000m, 26 ix 1978, *J. Wood* 2518 (E, K, KTUH); On cliffs just above Kohlaan, 2700m, 31 i 1979, *J. Wood* 2691 (E, K, KTUH).

Diplotaxis kohlaanensis is endemic to a small area in the inner escarpment mountains of N Yemen where it grows at altitudes from 2300 to 3000m near the town of Kohlaan and on the south-west slopes of Jebel Mahdad between Bait Alama and Bait Athaqa. It is more or less restricted to steep limestone and sandstone cliffs, only occasionally being found on the rocky slopes beneath. It forms much-branched bushes, often hanging from the cliffs, with the branches reaching up to two metres in length. *D. kohlaanensis* is most closely related to *D. harra* (Forssk.) Boiss., an erect annual or biennial herb found in deserts and semi-desert regions from Morocco east to Afghanistan and from Syria south to Somalia. In N Yemen *D. harra* is found on the dry interior plateau — a much drier region than the inner escarpment mountains where *D. kohlaanensis* occurs. The most obvious differences between the two species are those of habit and indumentum: *D. kohlaanensis* is a glabrous, much-branched perennial forming large, often hanging, bushy clumps whereas *D. harra* is a hispid, erect or ascending annual to biennial or perhaps rarely perennial herb. More or less glabrous plants of *D. harra* (var. *subglabra* (DC.) O.E. Schulz) are known, particularly from Palestine and at higher altitudes in the mountains of northern Oman. However, these are usually hairy at the base of the stems and never have the bushy habit of *D. kohlaanensis*.

The main problem in recognizing *D. kohlaanensis* as a distinct species is that the characters which serve to distinguish it from *D. harra* in Arabia, such as longer beak, stipe and petal, break down when plants from populations across the full range of *D. harra* are examined. Nevertheless, the combination of these characters taken with the differences in habit and indumentum, together with the geographic isolation of *D. kohlaanensis*, all serve to make it an immediately recognizable taxon. It is possible that when the variation of *D. harra* across its entire range is better understood that it may be given infraspecific status within that species but for the moment we prefer to recognize it as a distinct species.

LORANTHACEAE

Phragmanthera austroarabica A. Miller & J. Nyberg, **sp. nov.**

Syn.: *Loranthus regularis* sensu Blatter in *Rec. Bot. Surv. India* 8 (4): 421 (1923) and Schwartz in *Mitt. Inst. Allg. Bot. Hamburg* 10: 30 (1939) non Steud. ex Sprague (1910); *L. rufescens* sensu Deflers, *Voyage au Yemen*: 196 (1889) non DC.

A *Phragmanthera regulari* Sprague floribus colore pallidioribus et corollis e pilis brevibus aequisque dense tomentosis (non indumento inaequali e pilis brevibus densis et longioribus laxis composita) differt.

Shrub up to 1.5m diameter. *Twigs* shortly and densely tomentose with rust-coloured dendritic and stellate hairs, glabrescent. *Leaves* opposite or subopposite, ovate, 5–13 × 3–7cm, acute or obtuse, rounded or subcordate at the base, densely tomentose with rust-coloured dendritic and stellate hairs, soon glabrescent, with 4–8 pairs of obscure lateral veins; petioles 1.5–3.5cm. *Flowers* subsessile, in dense axillary fascicles, densely tomentose with short rust-coloured hairs; bracts

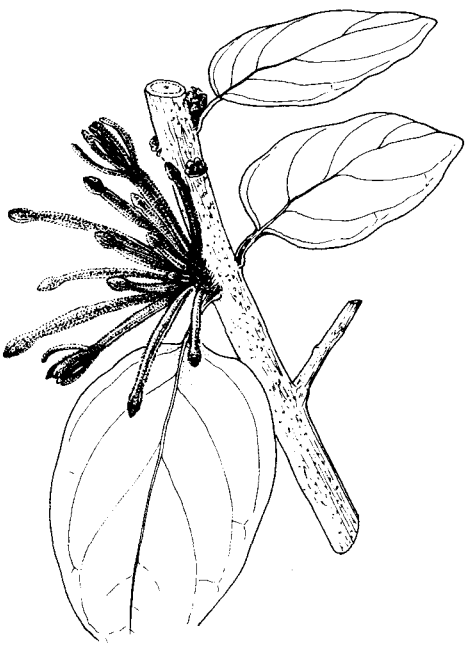

FIG. 3. *Phragmanthera austroarabica*: flowering branch (× 0.6).

triangular, c.1.5 × 1.5mm. *Calyx* a toothed rim, densely tomentose and with longer simple hairs around the rim. *Corolla* pale yellow or pale olive-brown, creamy orange inside, the exterior concealed by a dense indumentum of short stellate and dendritic, rust-coloured hairs, 35–45mm; lobes c.10mm, linear with an ovoid tip. *Fruit* 6–14 × 4–8mm, greenish brown, obovoid crowned by the persistent calyx, densely tomentose, glabrescent. (Fig. 3).

Type: Republic of Yemen (N), Kuhlan, on *Ziziphus spina-christi*, shrub to 1.5m diameter; flower buds yellow; fruit greenish, brownish tomentose, 2200m, 26 iii 1981, *A.G. Miller & D.G. Long* 3226 (holo. E; iso. K).

Habitat: *Acacia–Commiphora* woodland and succulent shrubland dominated by *Euphorbia* spp.; 1200–2500m. Hosts recorded include: *Acacia* spp., *Ficus vasta, F. salicifolia* and *Zizyphus spina-christi.*

Distribution: Saudi Arabia, Republic of Yemen.

Other specimens seen:

SAUDI ARABIA. Souk al Ithnayn, 60km S of Abha, 2438m, 5 iv 1979, *Collenette* 1248 (K); 30km SW Kamish Mushayt, 2200m, 27 iii 1984, *Frey, El-Sheikh & Kürschner* 84-271 (E); Abha & Taif, 1983, *Kadri* 2 (K); Baljarshi, c.250km S of Taif, vi 1978, *Saad* (E).

REPUBLIC OF YEMEN (N). 5km N of Qa'idah, Taiz-Ibb rd, 1800m, 14 iii 1981, *Miller* 3053 (E, K); Mawiyah, E of Taiz, 1500m, 13 ii 1984, *Miller & King* 5146 (E); Wadi Sharaz, near ?Kuhlan, 1200m, 12 x 1982, *Müller-Hohenstein & Deil* 831 (E); Wadi Hadaba, Udayn, due W of Ibb, 1400m, 22 x 1975, *Hepper & Wood* 5972 (K).

REPUBLIC OF YEMEN (S). Naqil Al-Dhala, 10–16km S of Dhala town, 1300–1350m, *Boulos, Rowaished et al.* 16768 (E, K).

P. austroarabica is widespread and locally common in the mountains of SW Arabia. In the Arabian literature it has previoulsy been confused with the tropical African species *Phragmanthera* (*Loranthus*) *regularis* which differs in its brighter coloured flowers and unevenly tomentose indumentum on the corollas.

The following new combination is necessary:

Oncocalyx doberae (Schweinf.) A. Miller & J. Nyberg, **comb. nov.** Basionym: *Loranthus doberae* Schweinf. in Bull. Herb. Boissier 2, 4 app. II: 151 (1896). Syntypes: Yemen (N), *Schweinfurth* 216 & 940 (B n.v.).

NYCTAGINACEAE

Commicarpus adenensis A. Miller **sp. nov.**

C. ambiguo Meikle et *C. boissieri* (Heimerl.) Cuf. similis, ambobus fructibus fusiformibus non clavatis perigonioque minore (2–3mm, non 3–8mm) differt; a *C. boissieri* etiam staminibus duobus, non 3(–4), recedit.

Woody-based perennial herb or subshrub, 30–60cm tall. *Stems* terete, glabrous or occasionally minutely scabridulous, the old woody stems becoming white and often prostrate. *Leaves* ovate to suborbicular, simple or sinuately lobed, 20–80 × 20–80mm, rounded or shortly acuminate at the tip, the margin entire to sinuate and sometimes crisped, rounded or subcordate at the base; petiole 10–20mm long. *Inflorescence* a lax terminal panicle of irregular whorls; whorls 2–3 on each peduncle, 2–5(–8)-flowered, the distance between the whorls 1–3cm; pedicels 2–5mm long extending to 10mm in fruit. *Perianths* (including anthocarp) 2–3mm long, pink or mauve, widely funnel-shaped with a short inconspicuous basal tube, externally glabrous. *Stamens* 2, exserted; anthers c.0.5mm long. *Stigma* exserted, disc-shaped, c.0.3–0.5 in diam. *Fruit* fusiform, ribbed, c.6–7 × 1–1.25mm, tapering to the apex and base, glabrous, with a single prominent whorl of large dark, subsessile glands at the apex and with scattered pale sessile glands along the ribs. (Fig. 4).

Type: Republic of Yemen (S), N slopes of J. Madaran, J. Areys, dry basaltic slopes, sub-desert succulent shrubland with scattered trees dominated by *Euphorbia balsamifera, Lycium shawii, Dodonaea viscosa* and *Salvia areysiana*, 1100m, 11 ii 1989, *A.G. Miller, L. Guarino, N. Obadi, M. Hassan & N. Mohammed* 8067 (holo. E).

Habitats: dry volcanic slopes, sandy plains and dry wadi beds; 45–1100m.

Other specimens seen:

> REPUBLIC OF YEMEN (S). Aden, 1880, *Balfour* s.n. (K); J. Al-'Aris, NE Shuqra, 6km from the coastal road, volcanic soil, 240m, 15 iii 1988, *Boulos et al.* 17260 (KWT); Aden, Maala Plain, 60m, 4 iv 1894, *Lunt* 354 (K); Aden, Upper Crater, dry wadi, 45m, iii–iv 1958, *Waring* 39 (E); Aden, 1878, *Wykeham-Perry* s.n.(K).

Meikle (1983) first drew attention to *C. adenensis* when he commented on a number of problematic specimens from Aden under his discussion of the newly described *C. ambiguus* Meikle. However, because of insufficient material, he found it impossible to ascertain whether the specimens represented a variant of *C. ambiguus* or whether they should be assigned to *C. boissieri* (Heimerl.) Cuf. Recently, better specimens have been collected from and near Aden and it is now clear that this material in fact represents a distinct new species.

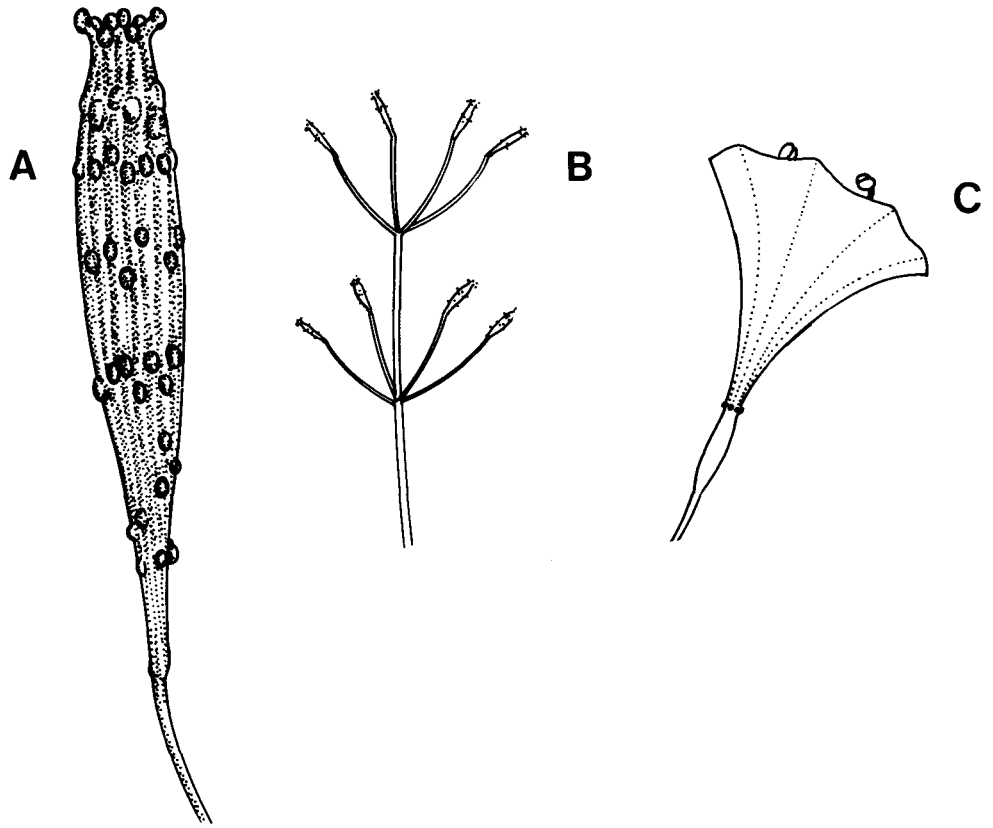

FIG. 4. *Commicarpus adenensis*: A, fruit (× 7); B, inflorescence (× 1); C, flower (× 10).

Commicarpus adenensis differs from both *C. ambiguus* and *C. boissieri* in its fusiform not clavate anthocarps, its smaller perianths (2–3mm not 3–8mm long) and from *C. boissieri* in possessing only 2 (not 3–4) stamens. *C. adenensis* is restricted to the Aden peninsula and the nearby volcanic massif of Jebal Areys.

Boerhavia elegans subsp. **stenophylla** (Boiss.) A. Miller, **stat. nov.** Basionym: *B. elegans* var. *stenophylla* Boiss., Fl. Orient. 4: 1046 (1879). Type: Oman, *Aucher-Eloy* 5250 (G? n.v.).

Boerhavia elegans Choisy extends from tropical NE Africa to India and is widely distributed in southern Arabia. Throughout most of its range it is readily recognized by its open, regularly dichotomizing panicles of long-pedicelled flowers and fruits which produce a delicate, 'mist-like' effect, particularly when viewed from a distance (Fig. 5A). However, plants from the extreme south-west part of the Republic of Yemen and from near Jeddah in Saudi Arabia have a different branching pattern, with smaller secondary branches arising from a continuous primary axis (Fig. 5B), and in consequence never produce the delicate open panicles so characteristic of the more widespread form. There is also a correlation between leaf shape and inflorescence type, plants with the open, dichotomizing panicles usually having narrowly lanceolate to narrowly

oblong leaves and the plants with non-dichotomizing panicles having ovate to ovate-lanceolate leaves. The type of *B. elegans* (*Schimper* 744) is from near Jeddah and matches the broad-leaved, non-dichotomizing form. Boissier (1879) described var. *stenophylla* based on plants from Oman with narrow leaves but did not mention the differences in inflorescence structure. In view of the geographical separation of the two taxa it is preferable to treat them as subspecies rather than varieties.

Subsp. *stenophylla* is widespread in the SE of the Arabian peninsula, but in the west is restricted to the dry, limestone plateaux of the interior; outside Arabia it is distributed from W India to E Africa. It found on open rocky slopes, wadi-beds and roadsides in semi-desert and usually on limestone at altitudes of 100 to 900m.

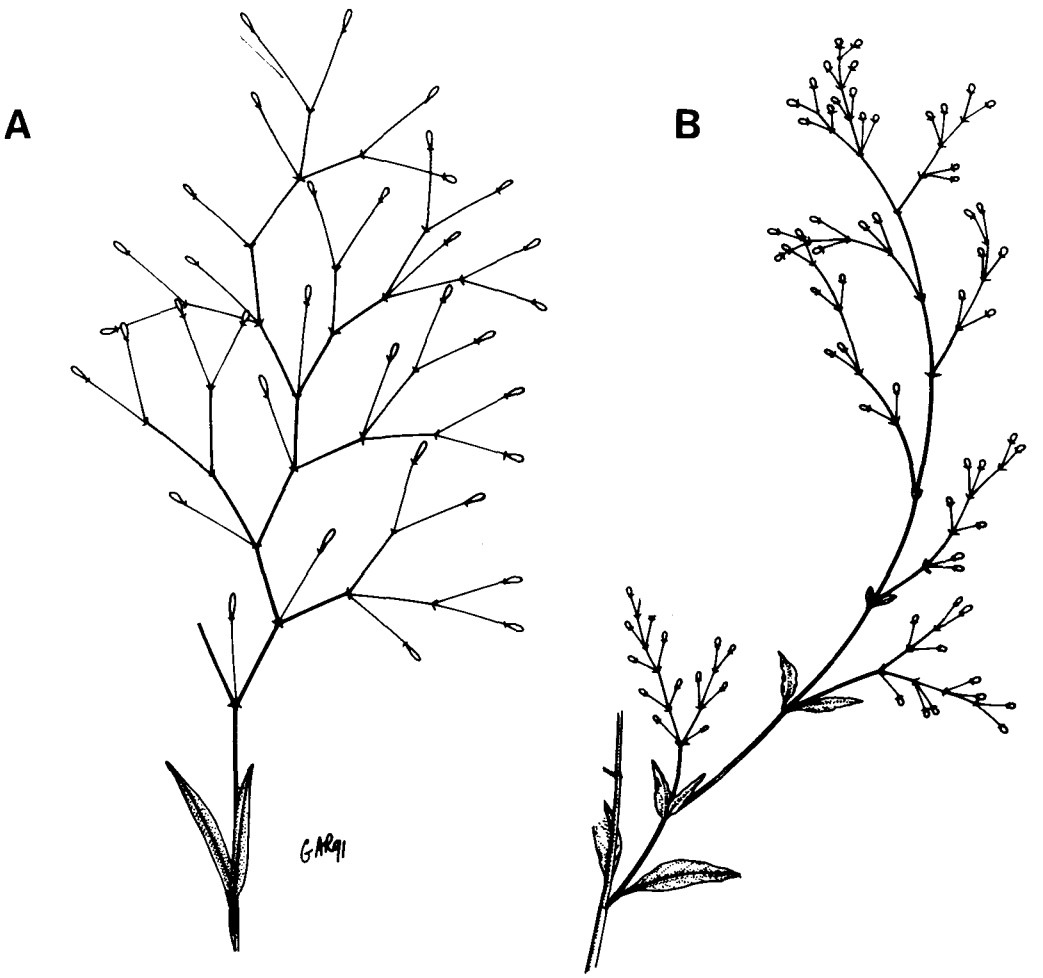

FIG. 5. *Boerhaavia elegans*, flowering shoots: A, subsp. *elegans*; B, subsp. *stenophylla* (both × 0.6).

Subsp. *elegans* is endemic to Arabia where it has a disjunct distribution in two small areas, apparently always on basalt, around Jeddah in Saudi Arabia and around Aden in Yemen. It is found on dry rocky slopes and wadi-beds in semi-desert and usually on basaltic rocks at altitudes from sea-level to 650m.

The two subspecies can be distinguished using the following key.

1. Inflorescence ± regularly dichotomously dividing; pedicels usually more than 1.5cm long; leaves usually narrowly lanceolate to narrowly oblong _____ subsp. **stenophylla**

\+ Inflorescence with smaller secondary branches arising from a ± continuous primary axis; pedicels usually less than 1cm; leaves ovate to ovate-lanceolate _____ subsp. **elegans**

Selected Arabian specimens of subsp. *elegans*:

SAUDI ARABIA. 20km E of Jeddah, 30m, 12 iii 1992, *Collenette* 7946 (E); Buraiman nr Jeddah, ii 1950, *Kercher* AL119A (BM); 24 miles NNE of Jedda, 105m, 30 xii 1949, *Trott* 1259 (K); Buraiman, 21°35'N 39°10'E, 60m, 17 i 1947, *Vesey-Fitzgerald* 16720/24 (BM).

REPUBLIC OF YEMEN (S). Aden, Wadi Goldmohur, 20–60m, 6 vi 1987, *Boulos et al.* 16515 (K); Abiyan, Wadi Dheiqa, 24km W of Al-Mahfid, 520m, 12 vi 1987, *Boulos et al.* 16886 (BM, K); Lahij. Governorate, 40–48km N of Lahij along the road to Dhala, N of J. Marif, 650m, 9 vi 1987, *Boulos et al.* 16618 (K); Shugra, 19 v 1881, *Schweinfurth* 98 (K); Aden, Khusaf Valley, 15–30m, iii–v 1958, *Waring* 35 (BM, K).

Selected Arabian specimens of subsp. *stenophylla* (Boiss.) A. Miller:

SAUDI ARABIA. Al-Kharj, 21 iv 1981, *Chaudhary* E660 (E); Najran, 1370m, 24 i 1980, *Collenette* 1637 (E, K); 35km E of Hamdah, 1220m, 25 x 1981, *Collenette* 3100 (E); Wadi Khanaq, 19°40'N 42°50'E, 25 iv 1947, *Vesey-Fitzgerald* 16982/2 (BM).

REPUBLIC OF YEMEN (N). Jouf to Marib, 16°00'N 45°00'E, 5–10 viii 1962, *Zeller* 24001 (BM).

REPUBLIC OF YEMEN (S). Wadi N of Saiyun, 610m, 30 i 1952, *Popov, Tillin & Gilliland* 4158 (K); Hadramaut, Wadi bin Ali, viii 1949, *Guichard* 169 (BM); *Rowaished et al.* 2930 (KTUH).

SULTANATE OF OMAN. Muscat, *Aucher-Eloy* 5251 (BM, K); Wadi Hatta, 2–3km E of Suhaylah, 300m, 29 iii 1980, *Edmondson* 3513 (E); Wadi Qid, 23°15'N 58°37'E, 600m, 24 iv 1975, *Mandaville* 6805 (BM); Wadi Adownib, 50m, 26 x 1977, *Radcliffe-Smith* 5563 (K).

U.A.E. Fujairah to Dhail road, 20 iv 1979, *Lumley* 41 (K); Hatta, 300m, 15 iii 1986, *Müller-Hohenstein* 86194 (E); Hatta, 110km ESE of Dubai, near Oman border, 250m, 23 iv 1982, *Western* 66 (E).

RESEDACEAE

Reseda pentagyna Abdallah & A. Miller, **sp. nov.** (Subgen. *Reseda*, sect. *Reseda*).

Species in genere propter capsulas 5–6-dentatas insueta. *R. stenostachyae* Boiss. similis sed foliis latioribus, capsula breviore latioreque 5–6-dentata differt.

Erect or ascending annual herb to 40cm. *Stems* sparsely branched, glabrous, longitudinally striate clothed with colourless flap-like papillae. *Leaves* acrid-smelling, mainly entire or a few 2–3-lobed, narrowly oblong or oblanceolate, 30–80mm × 3–12mm, glabrous or covered with flap-like papillae. *Inflorescence* a dense terminal raceme, 5–10cm long, lengthening to 25cm in fruit and becoming lax. *Bracts* deciduous, linear, 1–4mm long. *Pedicels* c.1mm long in flower, lengthening to 2–5mm in fruit. *Flowers* sweetly scented. *Sepals* 6–7, deciduous, narrowly oblong, 2–3mm ×

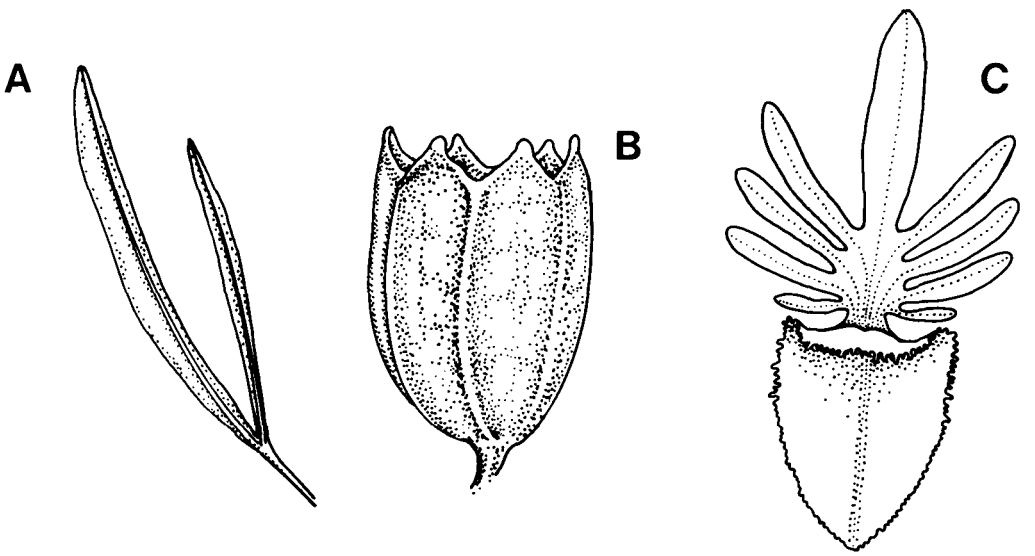

FIG. 6. *Reseda pentagyna*: A, leaf (×1); B, fruit (×4); C, upper petal (×20).

0.2–0.8mm. *Petals* 5, white; superior petals 3–4mm long, deeply divided with 7–9 lobes, the central lobe longer than the laterals and all the lobes dilated above; anterior and lateral petals gradually becoming more reduced, the anterior petal entire. *Stamens* c.20; anthers c.1.5mm long. *Ovary* cylindric, 5–6-toothed at the apex, the teeth inflated; ovules c.30 on each placenta; placenta not forked. *Capsules* erect, gaping, 5–6-toothed, oblong or obtriangular, c.5 × 4mm, the apex truncate, glabrous or with flap-like papillae. *Seeds* c.0.6 × 0.5mm, black, finely tuberculate, with a narrow sinus. (Fig. 6).

Type: Saudi Arabia, Wadi Sawawin Iron ore camp, 78km SW of Tabuk, in hard sand in compound, sparely branching herb with stems 30cm long and entire narrow leaves. White flowers 8mm wide, strong sweet scent, 610m, 7 iii 1984, *Collenette* 4812 (holo. E; iso. K).

Other specimens seen:

SAUDI ARABIA. Wadi Sawawin, 610m, 22 iii 1978, *Collenette* 472 (K); Nr J. Dibbagh, 1988, *National Commission for Wildlife Conservation and Development* s.n. (E).

Reseda pentagyna is known from three gatherings in the extreme NW of Saudi Arabia. Sheila Collenette (pers. comm.) remarks that it is locally common in Wadi Sawawin and adjacent areas where it is found on hard sand and in low rocky hills at around 600m. It is readily distinguished from all other species of Arabian *Reseda* by its 5–6-toothed capsule — a number otherwise almost unknown in this large genus. The three gatherings show some variation in the degree of leaf-division and the density of the colourless flap-like papillae which cover most parts of the plant. However, we can see no evidence to suggest that they should be split into more than one taxon, even at varietal rank.

URTICACEAE

Forsskaolea griersonii A. Miller & J. Nyberg, **sp. nov.**

F. candidae L. forma indumentoque foliorum similis sed bracteis involucralibus late obovatis usque late spathulatis differt; a *F. tenacissima* L. bracteis involucralibus late obovatis et foliis lobatis recedit; *F. viridi* Ehrenb. ex Webb bracteis involucralibus similis sed habitu perenne, foliis lobatis haud crenato-serratis diversa.

Low subsucculent shrub to 1m. *Young stems* erect or ascending, densely scabrid to hispidulous with white tuberculate-based hairs; older stems flaking. *Leaves* hard and brittle-textured, discolorous, green above, white with prominent green veins beneath, ovate, 5–15 × 3–15mm, acute, the margin slightly revolute with 2–3 pairs of acute triangular lobes, attenuate at the base, pinnately veined, scabrous with tuberculate-based hairs and shorter hooked hairs above, densely white woolly and scabrous on the veins beneath; petiole shorter than the leaf, 3–5mm. *Stipules* narrowly triangular, 1–3 × 0.5–1.5mm, the midvein pale brown, the margin membranous. *Inflorescences* axillary, subsessile, solitary or in groups of 2–3. *Receptacle* 5–8mm across, densely woolly within. *Receptacular bracts* usually 4, broadly obovate, c.4 × 3–4mm, acute or obtuse, the margin shallowly toothed or undulate, cuneate at the base, externally scabrous and densely clothed with stiff sericeous hairs at the base. *Male flowers* with the perianth becoming 3-lobed, the longest lobe c.3.5mm; filament reddish. *Female flowers* with an ellipsoid ovary and c.3mm style. *Fruit* unknown. (Fig. 7).

Type: Republic of Yemen (S); Between Shuqra and Mudia, volcanic rock slopes, 610m, a subsucculent shrub about 15cm high. Leaves hard with whitish tomentum underneath, flowers pinkish green, 8 iv 1953, *A. Grierson* 152 (holo. E; iso. BM).

REPUBLIC OF YEMEN (S). N slope of J. Madaran, J. Areys area, dry basaltic slopes, sub-desert shrubland with *Euphorbia balsamifera, Lycium shawii, Dodonaea viscosa* and *Salvia areysiana*, 1440m, 11 ii 1989, *Miller et al.* 8076 (E); J. Areys, mist-zone dominated by *Euphorbia balsamifera*, 1300m, 11 ii 1989, *Miller et al.* 8089 (E); Hinterland von Aden, Aqabat Marma to Aqabat Talh, 1 iv 1939, *Wissmann* 2725a (BM).

Forsskaolea griersonii is known only from Jebal Areys, a frequently mist-covered volcanic massif c.120km north-east of Aden. It is found on basaltic slopes in *Acacia–Commiphora* open shrubland and succulent shrubland dominated by *Euphorbia balsamifera* at altitudes from 600 to 1440m. It is somewhat intermediate between the only other representatives of the genus found in Arabia, namely *F. viridis* Ehrenb. ex Webb and *F. tenacissima* L. It resembles the former in the shape of its receptacular bracts but has the indumentum of the latter. In habit there are also differences: *F. viridis* and *F. tenacissima* are annual or perennial woody-based herbs, whereas *F. griersonii* is a subsucculent shrub up to one metre tall. The leaves of *F. griersonii* also differ in having two to three acute, triangular lobes on each margin somewhat reminiscent of the South African *F. candida* L. whereas *F. viridis* and *F. tenacissima* both have serrate or crenate-serrate margins.

Jebal Areys is botanically one of the least explored areas in Arabia. The French botanist Deflers visited it at the end of the last century, and his collections included several interesting new species including *Salvia areysiana* Defl. and *Cystostemon kissenioides* (Defl.) A. Miller & H. Riedl.

The species is named in honour of Andrew Grierson who collected the species during his National Service in Aden in 1953.

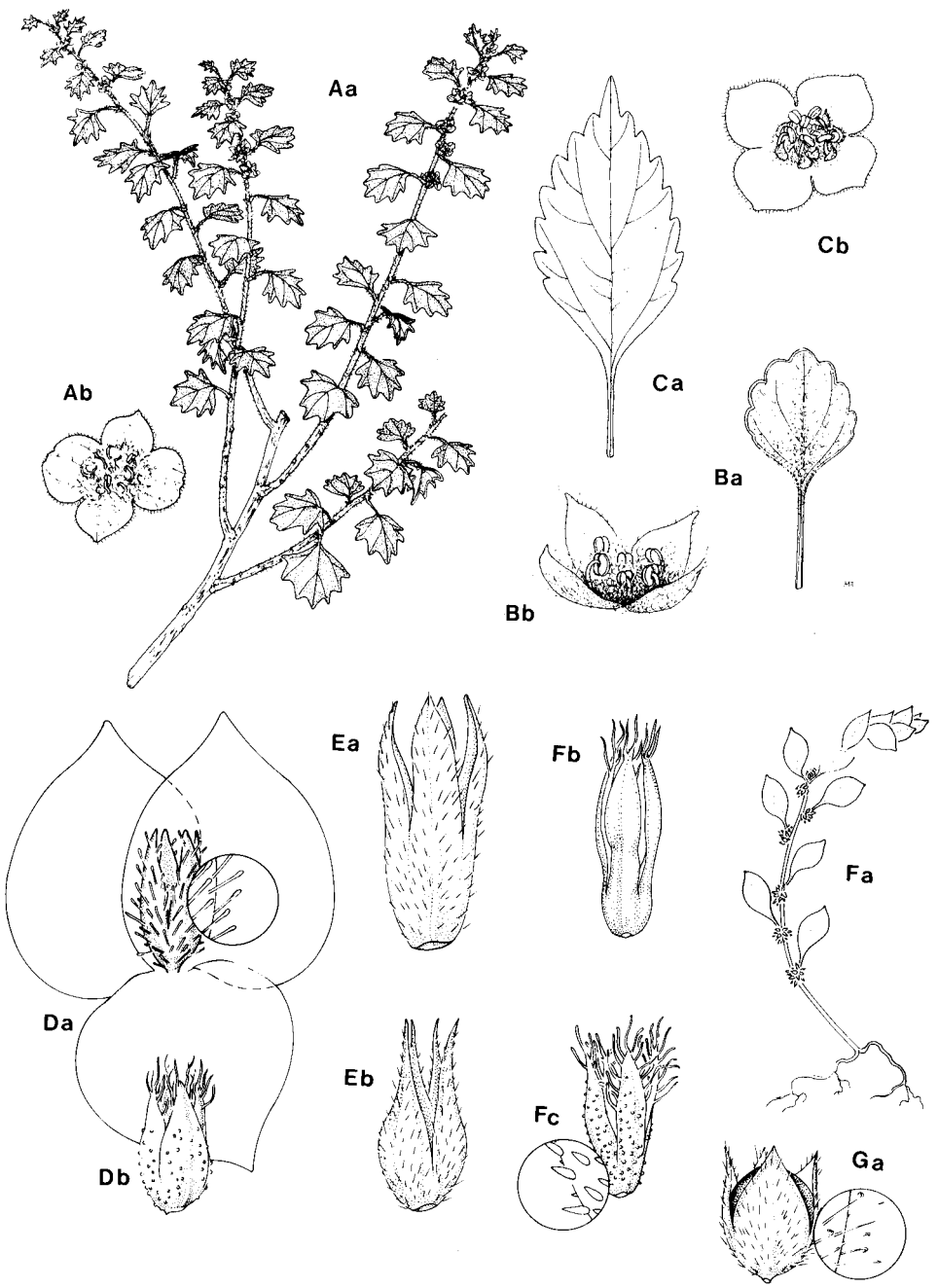

FIG. 7. A. *Forsskaolea griersonii*: Aa, flowering branch (× 0.6); Ab, inflorescence (× 4). B. *F. tenacissima*: Ba, leaf (× 1); Bb, inflorescence (× 4). C. *F. viridis*: Ca, leaf (× 1); Cb, inflorescence (× 4). D. *Parietaria alsinifolia*: Da, fruiting female flower and enlarged bracts (× 25) with detail of hairs; Db, fruiting hermaphrodite flower (× 25). E. *P. judaica*: Ea, fruiting hermaphrodite flower (× 25); Eb, fruiting female flower (× 25). F. *P. umbricola*: Fa, habit (× 0.6); Fb, fruiting hermaphrodite flower (× 25); Fc, fruiting female flower (× 25) with detail of hairs. G. *P. debilis*: Ga, fruiting hermaphrodite flower (× 25) with detail of hairs.

Parietaria umbricola A. Miller, **sp. nov.**

A *P. judaica* perigonio fructifero florum hermaphroditorum minore, indumento florum femineorum (perianthium versus apicem pilis longis patentibus, versus basin papillis clavatis provisum), fructibus anguste ovoideis (non ovoideis) differt.

Diffuse or somewhat bushy annual or perennial herb. *Stems* much branched, prostrate or ascending up to 25cm, villous. *Leaves* ovate to broadly elliptic or subcircular, often constricted towards the apex, 5–20 × 5–13mm, acute or obtuse, cuneate to rounded at the base, pubescent to villous; petiole 3–18mm. *Flowers* ± sessile, in axillary clusters; clusters typically consisting of a solitary bisexual flower surrounded by several female flowers. *Bracts* free or shortly fused, ovate to narrowly oblong-ovate, ± equalling or shorter than the flowers. *Male flowers* apparently absent. *Female flowers* ovoid, c.0.8 × 0.5mm, externally with long spreading hairs above and round papillae below, accrescent in fruit; perianth lobes narrowly ovate; stigma protruding from the connivent tip of the perianth; fruiting perianth ovoid, 1.3–1.5mm long, with the lobes connivent at the tip. *Bisexual flowers* cup-shaped, c.1 × 1–1.2mm, externally with long spreading hairs above and glabrous below, accrescent in fruit; perianth lobes ovate-triangular; fruiting perianth tubular, 1.8–2mm long, with the lobes inflexed. *Fruits* reddish brown, narrowly ovoid, c.0.8 × 0.4mm.

Type: Republic of Yemen (N), Shaharah, 2200m, 22 ix 1978, *Miller* 190 (holo. E).

Other specimens seen:

SAUDI ARABIA. J. Fayfa, 100km NE of Jizan, 1730m, 28 iii 1988, *Collenette* 6618 (E); J. Shada, 25km N of Mikhwa, 1250m, 20 ii 1990, *Collenette* 7310 (E).

The discovery of *P. umbricola* brings to four the number of *Parietaria* species recorded from Arabia:

1. *P. umbricola* was previously confused with the widespread and polymorphic *P. debilis* G. Forst. from which it differs in its ovoid not cup-shaped female flowers and the tubular not cup-shaped bisexual flowers. Amongst the species found in Arabia, *P. umbricola* is most similar to *P. judaica* L. but differs in being a smaller, weaker-stemmed plant with smaller bisexual flowers, narrowly ovoid (not ovoid) fruits, and with the perianths of the female flowers covered with long spreading hairs above and papillae below not thinly white-hairy throughout.

P. umbricola is found on the SW escarpment mountains at altitudes from 1250 to 2200m and, like the other Arabian species, prefers humid and shady places on cliffs and under boulders.

2. *P. judaica* L. in Arabia is known only from around the town of Menacha in N Yemen and was presumably introduced. It is a relatively clear-cut species and not easily confused with the other Arabian species.

3. *P. alsinifolia* Del. is found in Saudi Arabia, Oman and the United Arab Emirates. It is readily distinguished from the other Arabian species by its accrescent bracts and the presence of clavate hairs on the female flowers. Material of *P. alsinifolia* has previously been confused with *P. debilis* G. Forst. and with *P. lusitanica* L. (which has distinctive female flowers and is now shown not to occur in Arabia).

4. *P. debilis* in Arabia is found in N Yemen and Socotra. Specimens previously determined as this species from Saudi Arabia and Oman have now been assigned to *P. alsinifolia*.

A key to the Arabian species is provided below.

1. Perianths of the female flowers covered in clavate hairs; bracts of the female flowers strongly accrescent and hiding the flowers in fruit _____ **P. alsinifolia**
+ Perianth of female flowers with straight or hooked (never clavate) hairs; bracts of female flowers not strongly accrescent, not hiding the flowers in fruit _____ 2
2. Fruiting perianths of the bisexual and female flowers similar, cup-shaped with erect lobes; bracts often glandular; usually a weak-stemmed plant with rather inconspicuous flowers _____ **P. debilis**
+ Fruiting perianths of bisexual flowers, strongly accrescent, tubular, with inflexed lobes; fruiting perianths of female flowers ovoid, with connivent lobes; bracts not usually glandular; plants usually not particularly weak-stemmed, the flowers conspicuous _____ 3
3. Perianths of fruiting bisexual flowers 1.8–2mm long; perianths of female flowers covered with long spreading hairs at the lobes and with round papillae towards the base; fruits narrowly ovoid, c.0.8 × 0.4mm _____ **P. umbricola**
+ Perianths of fruiting bisexual flowers 2.8–3.5mm long; perianths of female flowers thinly white-hairy; fruits ovoid, c.1 × 0.7mm _____ **P. judaica**

ACKNOWLEDGEMENTS

We are grateful to Dr Robert Mill for translating the Latin, to Mike Gilbert for useful discussions on the Loranthaceae, to Mary Bates, Glenn Rodriguez and Margaret Tibbs for the illustrations, and to the curators of the Royal Botanic Gardens, Kew (K) and the Natural History Museum, London (BM) for the loan of specimens.

REFERENCES

COLLENETTE, I. S. (1985). *An illustrated guide to the flowers of Saudi Arabia.* London.

MEIKLE, R. D. (1983). Additional notes on *Commicarpus* (Nyctaginaceae). *Kew Bull.* 38: 481–484.