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NEW SPECIES IN *ECHIDNOPSIS* AND *SECAMONE* AND NEW RECORDS OF *CEROPEGIA* (*APOCYNACEAE*) FROM SOCOTRA

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The new species *Echidnopsis inconspicua* (*Apocynaceae–Asclepiadoideae*) and *Secamone cuneifolia* (*Apocynaceae–Secamonoideae*) are described from Socotra. An account of *Echidnopsis* is provided for the island, where five species are now known to occur. The first species of *Ceropegia* is recorded for Socotra.

Keywords. *Apocynaceae*, *Ceropegia*, *Echidnopsis*, new species, *Secamone*, Socotra.

THE GENUS *ECHIDNOPSIS* HOOK.F. ON SOCOTRA

Echidnopsis belongs to the group of practically leafless stem-succulents known as 'stapeliads' (Bruyns, 2000) in the tribe *Ceropegieae* of the *Asclepiadoideae*. The genus is found in NE Africa and Arabia. In the most recent revision (Bruyns, 1988), 19 species are recognized with only a single species in Socotra. Since then two more Socotran species have been described (Lavranos, 1993) and the long-lost *E. bentii* N.E.Br. ex Hook.f., assumed by Hooker to have originated in the Hadramawt of Yemen, has been rediscovered on Socotra. In this account another new species is described, bringing the number of species on Socotra to five. Consequently *Echidnopsis* is the most diverse genus of stapeliad on the island, by a considerable margin. It is also remarkable that on the whole of the Arabian Peninsula only four species are known: *E. scutellata* (Defl.) A.Berger, *E. squamulata* (Decne.) P.R.O.Bally, *E. globosa* Thulin & Hjertson (including *E. fartaqensis* McCoy & Orlando) and *E. seibanica* Lavranos; of these all but *E. scutellata* are endemic. On Socotra all five known species are endemic to the island. In this respect Socotra is more similar to Somalia and Ethiopia, where the genus is more diverse.

Key to the species of Echidnopsis *on Socotra*

1a. Corolla tube at least 6mm long ____ **3. E. insularis**
1b. Corolla tube not more than 2mm long ____ 2

2a. Inner corona lobes ± 1.5mm long or more, rising up in small column in centre of flower; corolla often rotate ____ 3
2b. Inner corona lobes less than 0.5mm long, not rising up in centre of flower; corolla usually somewhat campanulate ____ 4

Bolus Herbarium, University of Cape Town, Private Bag 7701, Rondebosch, South Africa.

3a. Corolla pale pink and smooth inside; outer corona lobes with small free part ± spreading on surface of corolla, clearly divided by deep groove opposite inner lobes ——— **4. E. milleri**

3b. Corolla deep maroon and finely papillate inside; outer corona lobes without any clearly free part, not divided opposite inner lobes ——— **1. E. bentii**

4a. Outer corona lobes forming continuous ring around top of column, somewhat exceeding anthers; inner corona lobes equalling anthers and covering them ——— **2. E. inconspicua**

4b. Outer corona lobes forming 5 discrete pockets between swollen lower parts of inner lobes, lower than anthers; inner lobes consisting only of swollen lower parts, apices broadly truncate, touching and covering bases of anthers only ——— **5. E. socotrana**

1. Echidnopsis bentii N.E.Br. ex Hook.f., Bot. Mag. 127: t.7760 (1901). **Fig. 1.**
Type: ?Yemen, Hadramawt, fl. Kew 1899, *Bent* (K!).

Stems decumbent, 30–150 × 8–20mm, green to brownish, finely papillate; *tubercles* arranged on 6–8 angles along stem, ±6-angled, flattened-conical, each bearing a small spreading to retrorse leaf-rudiment 1–1.5mm long. *Inflorescences* many, arising near tips of young stems, each bearing 1–3 flowers facing outwards; *pedicels* 0.5–1.5 × c.1mm, spreading; *sepals* 1.2–1.5mm long, 1mm wide at base, ovate, acuminate. *Corolla* 10–13mm across, rotate to slightly campanulate; outside green with purple spots, glabrous and smooth; inside deep maroon, finely papillate all over; *tube* 1.5–2mm deep, 3–5mm across at mouth, where corolla slightly thickened, sides slightly separated from gynostegium; *lobes* 3–4mm long, 3–4mm wide at base, ovate, acute, strongly spreading, somewhat convex above from reflexed margins. *Corona* 2–2.5 × 2.5–3mm, without basal stipe, maroon; *outer lobes* c.2mm long, erect, fused into continuous pentagonal cupular structure with somewhat flattened

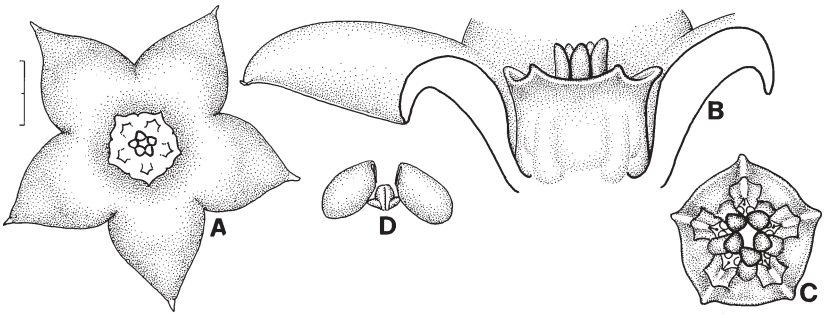

FIG. 1. *Echidnopsis bentii.* A, face view of flower; B, side view of dissected flower; C, face view of gynostegium; D, pollinarium. The scale bar represents 2mm for A, 1mm for B, C and 0.25mm for D. All drawn from *Miller et al.* 16086.

margin and acute slightly spreading tips; *inner lobes* c.1.5mm long, adpressed to backs of anthers then connivent in centre and rising up in column, dorsiventrally flattened and slightly thickened towards obtuse tips.

Ecology. Woodland on granite or limestone slopes, 600–800m.

Additional specimens examined. SOCOTRA. Haggier Mtns, 780m, 2 ix 1998, *Miller et al.* 16050 (E); western Haggier, 650m, 27 ix 1998, *Miller et al.* 16086 (E).

Echidnopsis bentii has comparatively large, deep maroon flowers which are usually more or less rotate. In the centre there is a depression which completely contains the corona and, unusually for *Echidnopsis*, the sides of the corolla around this tube are distinctly thickened above the base. This is not obvious unless dissections are made, since a true annulus is not present. The outer corona forms a comparatively deep, cup-like structure which has no hairs inside and a rather flattened margin. The inner corona lobes rise up in a column in the centre. These corona features suggest that *E. bentii* is a member of section *Vadosicorona* Bruyns.

2. Echidnopsis inconspicua Bruyns, **sp. nov. Fig. 2.**
Ab *E. scutellata* A.Berger caulibus hexagonis (non octagonis) et scypho loborum coronae exteriorum erecto differt.
Type: Socotra, Wadi Eyek, 190m, 5 ii 2000, *Miller et al.* 19104 (holo. E!).

Stems decumbent, 30–80 × 5–10mm, green, finely papillate; *tubercles* arranged in 6(–7) rows, ± 6-sided, flattened, each bearing a small ovate-deltoid leaf-rudiment c.1mm long. *Inflorescences* many, arising near tips of young stems, each bearing 1–3 slightly nodding flowers; *pedicels* 2–3 × 0.5mm, spreading to slightly decurved, finely papillate; *sepals* c.1.5mm long, 0.5mm wide at base, lanceolate, acuminate, reflexed towards tips, finely papillate. *Corolla* 7–9mm across, campanulate; outside pale green to pinkish cream, finely papillate; inside cream to pale yellow with dark maroon ring around mouth of tube, cream below, finely papillate especially around

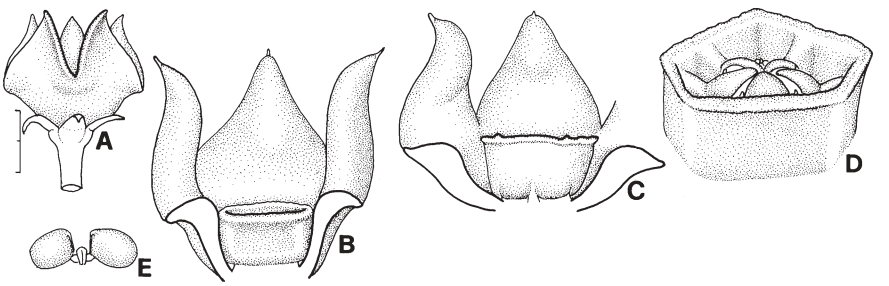

FIG. 2. *Echidnopsis inconspicua*. A, side view of flower; B, C, side view of dissected flower; D, partial side view of gynostegium; E, pollinarium. The scale bar represents 2mm for A, 1mm for B, C, 0.5mm for D and 0.25mm for E. A, B, D, E drawn from *Miller et al.* 19104; C from *Miller et al.* 19103.

mouth of tube (where epidermal cells markedly elongate), otherwise glabrous; *tube* c.1mm deep, 2mm across at mouth, where corolla slightly thickened, cupular, closely to laxly enclosing gynostegium; *lobes* 1.7–2.5mm long, 1.5–2.5mm wide at base, erect to slightly spreading, ovate-deltate, acuminate, convex above especially in upper half from slight longitudinal folding and recurved margins. *Corona* 1 × 1.5mm, on very short stipe; *outer lobes* c.0.6mm long, erect, fused into continuous pentagonal structure with flattened slightly crenulate, spreading margin, outside cream with black-maroon margin, inside pale yellow densely flecked with maroon, somewhat exceeding anthers; *inner lobes* c.0.25mm long, adpressed to backs of anthers and ± equalling them, deltate, acute, pale yellow with maroon-black margins.

Ecology. Base and steep sides of gully, among stones and in crevices on limestone cliffs, succulent shrubland.

Additional specimen examined. SOCOTRA. Wadi Eyek (western plateau), 120m, 5 ii 2000, *Miller et al.* 19103 (BOL).

Most similar to *E. scutellata*, from Arabia and Africa, *E. inconspicua* differs by the 6-angled stems which are always 8-angled in *E. scutellata*. The other main difference lies in the erect cup formed by the outer corona, which is always spreading in *E. scutellata*. The margin of this outer coronal cup is much narrower in *E. inconspicua* and it also lies somewhat higher above the inner lobes than in *E. scutellata*. In *E. scutellata* the inner corona lobes are longer than the anthers and they rise up in the centre in a column of variable height whereas in *E. inconspicua* they just equal the anthers. In *E. inconspicua* (as in some forms of *E. scutellata*) the small and rather unexcitingly coloured corolla has a bright band of maroon around the mouth of the corolla tube. The epidermal cells are more elongated in this area than over the rest of the corolla.

3. Echidnopsis insularis Lavranos, Cact. Succ. J. (US) 42: 136 (1970). **Fig. 3.**
Type: Socotra, southern slopes of Hama de Roh, 7 iv 1967, *Radcliffe-Smith & Lavranos* 310 (K!).

Stems decumbent, 20–100 × 5–11mm, brown to green, finely papillate; *tubercles* arranged in 6–8 rows, ± 6-sided, flattened to conical, each bearing a minute ovate-deltoid spreading to retrorse leaf-rudiment 0.5–1.5mm long. *Inflorescences* many, arising near tips of young stems, each bearing 1–3 slightly nodding flowers, finely papillate; *pedicels* 1–3 × 1mm, spreading to slightly decurved; *sepals* 1–1.5mm long, c.0.5mm wide at base, deltate, acuminate, reflexed towards tips. *Corolla* 9–11mm long, 4–5mm across near base, narrowing to 2–3mm near mouth of tube, urceolate; outside greenish yellow to pale pink, glabrous and smooth; inside greenish yellow with thin longitudinal purplish lines, glabrous and smooth; *tube* 7–8mm long, sometimes narrowing very strongly towards mouth; *lobes* 1.5–3mm long, 1–1.75mm wide at base, deltate, acuminate, slightly convex above, with slightly reflexed margins and tips. *Corona* 2–2.5 × 2.5–3mm, without basal stipe, yellow; *outer lobes* fused into

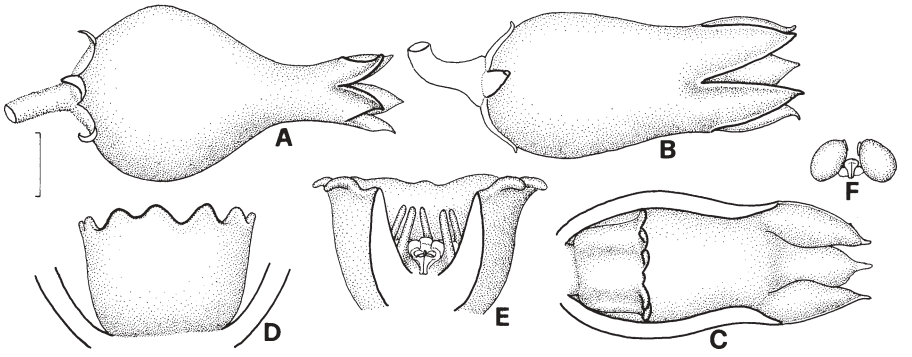

FIG. 3. *Echidnopsis insularis*. A, B, side view of flower; C, side view of dissected flower; D, side view of gynostegium; E, side view of dissected gynostegium; F, pollinarium. The scale bar represents 2mm for A–C, 1mm for D, E and 0.25mm for F. A, D, F drawn from *Miller et al.* 20010; B, C, E from *Radcliffe-Smith & Lavranos* 310.

erect, cupular, pentagonal structure much exceeding anthers, shallowly divided into 10 erect to spreading deltate lobules around margin; *inner lobes* 0.5–1mm long, wide at base, much narrowed above into linear, nearly cylindric lobes ascending towards centre but not touching, much exceeding anthers in length.

Ecology. Woody-herb community on stony limestone slopes.

Additional specimen examined. SOCOTRA. Above Shu'ub, 220m, ii 2001, *Miller et al.* 20010 (E).

This is the only *Echidnopsis* from Socotra in which the corolla is at all tubular and, as in several other species from Arabia and NE Africa, the corolla tube is considerably longer than the lobes.

As Fig. 3 shows, *Miller et al.* 20010 differs somewhat from the type. In particular the flower has a much narrower mouth and therefore a much more flask-like shape. Also the outer corona has erect rather than recurved lobules around the mouth while the inner lobes are slender as in the type, although a bit shorter.

4. Echidnopsis milleri Lavranos, Cact. Succ. J. (US) 65: 294–295 (1993). **Fig. 4.**
Type: Socotra, Jabal Ma'Lih, 550m, 28 i 1990, *Miller et al.* 10145 (E!).

Stems procumbent, 30–80 × 6–10mm, dark green, finely papillate; *tubercles* arranged loosely in 6 rows, ± 6-sided, flattened-conical, each bearing a small retrorse, ovate-deltoid leaf-rudiment c.1mm long. *Inflorescences* many, arising near tips of young and short stems, each bearing 1–3 flowers, often opening towards stem bases; *pedicels* c.1 × 0.5mm, spreading; *sepals* 1.5mm long, c.0.7mm wide at base, ovate, acuminate, reflexed towards tips. *Corolla* 10–12mm across, rotate; outside pale green, glabrous and smooth; inside pale pink, glabrous and smooth; *tube* c.0.5mm deep, shallowly bowl-shaped, formed from slightly raised and thickened fused corolla below lobes; *lobes* 3–4mm long, 3mm wide at base, deltate, acute, slightly

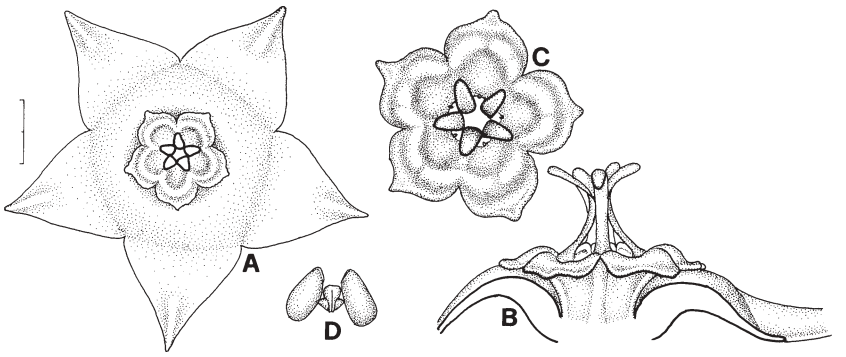

FIG. 4. *Echidnopsis milleri*. A, face view of flower; B, side view of centre of dissected flower; C, face view of gynostegium; D, pollinarium. The scale bar represents 2mm for A, 1mm for B, C and 0.25mm for D. All drawn from *Miller et al.* 10145.

convex above towards tips, with reflexed margins. *Corona* c.2.5 × 3–3.5mm, on short and slightly pentagonal stipe; *outer lobes* nearly 1mm long, broadly ovate, apiculate, cream, laterally fused to backs of inner lobes in lower half to form deep cup around guide-rails, free parts ± spreading on surface of corolla and each clearly divided from adjacent lobe by deep groove opposite inner lobe; *inner lobes* linear, obtuse, adpressed to backs of anthers then connivent in centre and rising up in column and diverging towards tips, cream towards base, pink in upper half.

Ecology. Summit of limestone plateau with open dwarf shrubland.

In *Echidnopsis* there is a marked tendency for the corolla to become tubular (Bruyns, 1988) and there must be considerable pollinator pressure encouraging adaptation and diversification in this direction. *Echidnopsis milleri* exhibits the opposite tendency. In this species the corolla is more than usually flat and spreading. *Echidnopsis milleri* is also unique in the genus in that the united part of the corolla (i.e. below the lobes and beyond the corolla tube) is somewhat thickened and forms a slight annulus (see character 25, Bruyns, 2000). In this species the outer corona forms a series of five fairly shallow bays beneath the guide-rails, with the margins spreading onto the corolla. There are no hairs on the inside of this structure. The inner lobes are connivent in the centre and rise up well above the style-head. All of these features are typical of section *Vadosicorona*, to which this species clearly belongs. It differs from all other species in this section in the much flatter corolla and the more deeply indented outer corona lobes.

5. Echidnopsis socotrana Lavranos, Cact. Succ. J. (US) 65: 294 (1993). **Fig. 5.**
Type: Socotra, Jabal Ma'Lih, 550m, 28 i 1990, *Miller et al.* 10139 (E!).

Stems decumbent, 30–80 × 6–10mm, green, finely papillate; *tubercles* arranged in (5–)6 angles along stem, ± 6-sided, flattened-conical, each bearing a small retrorse ovate-deltoid leaf-rudiment c.1mm long. *Inflorescences* many, arising near tips of

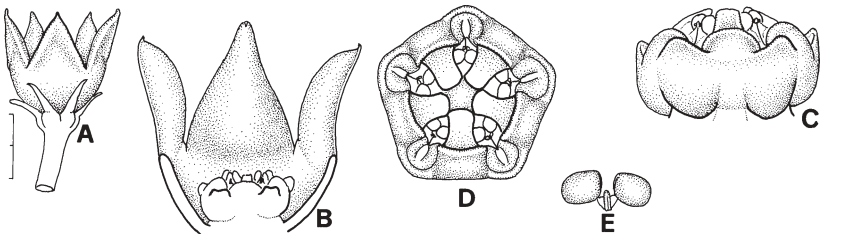

FIG. 5. *Echidnopsis socotrana*. A, side view of flower; B, side view of dissected flower; C, side view of gynostegium; D, face view of gynostegium; E, pollinarium. The scale bar represents 2mm for A, 1mm for B, 0.5mm for C, D and 0.25mm for E. All drawn from *Miller et al.* 14088.

young stems, each bearing 1–3 flowers; *pedicels* 1–3 × 0.5mm, spreading to decurved; *sepals* 1.5mm long, c.0.5mm wide at base, ovate, acuminate, reflexed towards tips. *Corolla* 3–5mm across, campanulate; outside reddish green, glabrous and smooth; inside greenish yellow, glabrous and smooth; *tube* 1mm deep, 2.5–3.5mm across at mouth, bowl-shaped, not thickened; *lobes* 2–3mm long, 2–3mm wide at base, erect to slightly spreading, deltate, acute, distinctly convex above from longitudinal fold but margins not reflexed. *Corona* c.0.7 × 1.5–2(–3)mm, on short somewhat pentagonal stipe; *outer lobes* c.0.3mm long, erect, truncate, red-brown towards tips, not exceeding anthers, laterally fused to backs of inner lobes for most of length to form cup around guide-rails; *inner lobes* c.0.1mm long, consisting of swollen broadly truncate lower parts only, adpressed to backs of anthers but not exceeding their bases, pale red-brown.

Ecology. Sparse herb cover on open limestone slopes.

Additional specimen examined. SOCOTRA. Western Plateau, 700m, 5 iii 1996, *Miller et al.* 14088 (E).

Along with *E. inconspicua*, *E. socotrana* has relatively small flowers which tend to remain campanulate, with the corolla lobes rarely spreading and usually remaining erect.

In *E. socotrana* the outer corona lobes are erect, forming a deep bay between the broad bases of the inner lobes. They have a narrow edge which is neither crenulate nor folded outwards and they lack hairs on the inside.

Lavranos (1993) described the inner corona lobes as 'with their lower part covered by a bent-in flap of the outer rim of the corona, strap-shaped with a rounded apex, yellow', but there is no trace of any such inner coronal structure in the material examined. Each lobe consists of a relatively broad, truncate flap adpressed to the back of the anther but not rising up at all onto the horizontal part of the anther, as is usually the case. Consequently the horizontal parts of the anthers on the top of the style-head are entirely exposed. This explains the small, roughly square yellowish structures which can be seen clearly in fig. 2 of Lavranos (1993). Such reduced inner

corona lobes are common in *Echidnopsis* (see illustrations of *E. archeri* P.R.O.Bally, *E. sharpei* A.C.White & B.Sloane in Bruyns, 1988) and are also known more widely amongst the *Ceropegieae* in several species of *Brachystelma* Sims and in *Pectinaria longipes* (N.E.Br.) Bruyns.

Despite the lack of hairs on the inside of the outer corona lobes there seems to be no reason not to include this species in section *Profundicorona* Bruyns, as the corona structure indicates. While the corona is rather similar to that of *E. bihendulensis* P.R.O.Bally from Somalia, the stems of the latter are more erect, 16-angled and distinctly spinescent.

The genus *Secamone* L. on Socotra

Secamone is one of nine genera in *Apocynaceae* subfamily *Secamonoideae* (Endress & Bruyns, 2000), and with 81 species is by far the largest in the subfamily. In Madagascar and the surrounding islands there are 62 species, with 15 in mainland Africa. Two other species are found from India to northern Australia.

So far the only *Secamone* on Socotra was thought to be *S. socotrana* Balf.f., of which two varieties have been recognized (Goyder, 1992). *Secamone socotrana* is more variable than was previously realized and its description is here modified to include this variation. In addition a new endemic species is described.

Key to the species of Secamone *on Socotra*

1a. Petioles 3–5mm; staminal corona lobes c.1mm long, style-head conspicuously exserted above anthers for 0.7–1.5mm ——— **2. S. socotrana**

1b. Petioles absent; staminal corona lobes c.0.15mm long, style-head inconspicuous, exserted for up to 0.5mm above anthers ——— **1. S. cuneifolia**

1. Secamone cuneifolia Bruyns, **sp. nov. Fig. 6A–E.**

A ceteris speciebus foliis saepe cuneatis et lobis coronae staminalis brevissimi bases antherae tantum prementibusque differt.

Type: Socotra, Dixsam Plateau, 700m, 4 iv 1996, *Miller, Alexander & Ali* 14289 (holo. E!).

Shrub or climber to 1–2m; stems, leaves, young shoots and inflorescence sparsely pubescent. *Leaves* opposite, coriaceous, sessile, tapering gradually to base, 15–50 × 2–6mm, cuneiform to linear-cuneiform or linear-retuse, apex rounded or retuse, often apiculate, margins flat or slightly recurved. *Peduncle* c.1mm long; *bracts* to 0.5mm long; *pedicels* 1–5mm long, ±glabrous; *sepals* c.1mm long and 0.5mm wide in lower half, obtuse, sparsely pubescent on margins only. *Corolla* 2 × 2–4mm, ellipsoid in bud; *tube* c.0.6mm long, c.1mm across at mouth, cupular; *lobes* 1–1.5 × 1mm, ovate, obtuse; *corolline corona* of 5 pairs of fleshy ridges prominent to middle of lobes, sparsely and very shortly pubescent. *Staminal corona*

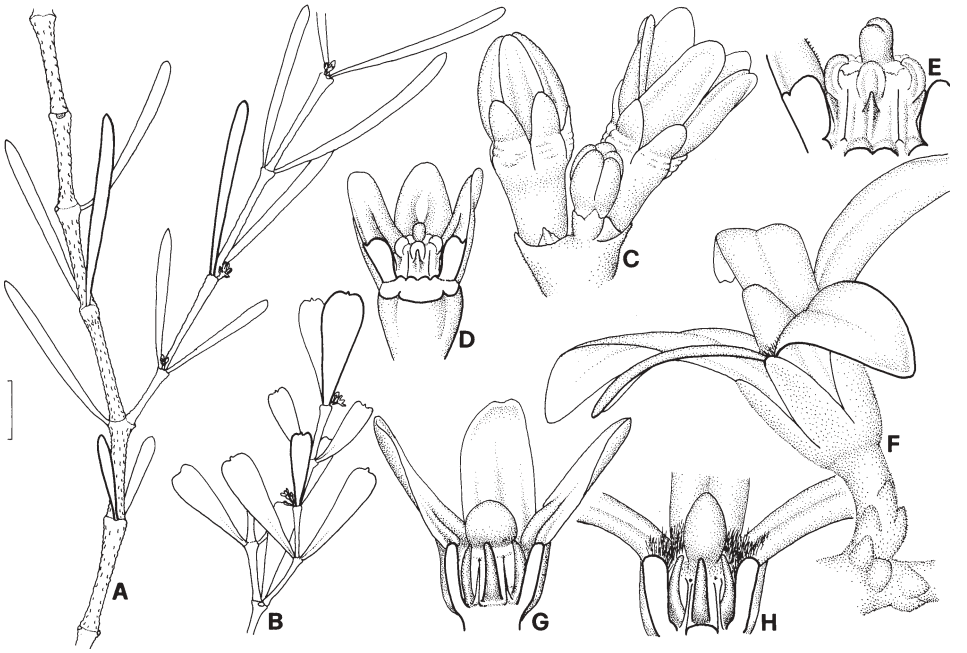

FIG. 6. *Secamone cuneifolia*: A, B, part of plant; C, inflorescence; D, side view of dissected flower; E, side view of gynostegium. *Secamone socotrana*: F, inflorescence; G, H, side view of dissected flower. The scale bar represents 15mm for A, B, 1mm for C, D, F–H and 0.5mm for E. A, C–E drawn from *Miller et al.* 14289; B from *Miller & Talib* 19135; F, H from *Miller* 14290; G from *Miller* 14221.

lobes ascending, slightly laterally flattened, c.0.15mm long, much shorter than anthers. *Style-head* sometimes not protruding but up to 0.5mm above anthers, obtuse and slightly bifid at apex.

Ecology. *Croton* L. shrubland with *Buxus hildebrandtii* Baill., steep slopes to limestone plateau, 100–700m.

Additional specimens examined. SOCOTRA. Qatariah, 480m, 10 ii 2000, *Miller & Talib* 19135 (E); Wadi Ayheft, 10km west of Hadiboh, 100m, 25 i 1990, *Miller et al.* 10016 (E).

Secamone cuneifolia differs from *S. socotrana* in many respects. The leaves usually have a distinctive wedge-like shape. While this is very striking in some collections, it varies considerably and in *Miller et al.* 10016 they are particularly narrow and only slightly wedge-shaped. The stems are also mostly rather more thick and rigid than is usual in *Secamone*. The corolla is extremely small and the pedicels and sepals are almost glabrous, lacking the dense indumentum of *S. socotrana*. In *S. cuneifolia* the corona lobes are also extremely short and cover only the bases of the anthers, whereas in *S. socotrana* they rise from the base of the column to just below the projecting style-head. The style-head is also very small, and although it does project

for a short distance above the anthers in many collections, it does not do so in *Miller et al.* 10016.

No African or Madagascan species is known in which the leaves are shaped as in *S. cuneifolia* (Goyder, 1992; Klackenburg, 1992). The other peculiarity is the extremely short staminal corona lobes. In several Madagascan species the staminal corona is short – it is even absent in *S. astephana* Choux (Klackenburg, 1992) – but in other respects these species are very different from *S. cuneifolia*. Among the African taxa *S. attenuifolia* Goyder has very short staminal corona lobes, but they are inserted right at the base of the column rather than at the bases of the anthers, and the flower is much larger and more nearly rotate (Goyder, 1992).

2. Secamone socotrana Balf.f., Proc. Roy. Soc. Edinburgh 12: 79 (1884). **Fig. 6F–H.** Type: Socotra, ii/iii 1880, *Balfour* 179 (K).

Shrub or climber to 1–2m; stems, leaves, young shoots and inflorescences finely adpressed-pubescent. *Leaves* coriaceous, with petioles 3–5mm, usually crowded on short side-branches; lamina 12–25 × 7–20mm, broadly obovate, apex rounded or retuse, often apiculate, margins often slightly recurved. *Peduncle* 1–2mm long; *bracts* to 0.5mm long, often hidden by dense indumentum; *pedicels* 1–2mm long; *sepals* 1–1.5mm long and 0.5mm wide at base, deltate to ovate, acute to obtuse. *Corolla* 3–6 × 4–10mm, cream to yellow, conical in bud; *tube* 1–2mm long, 1–1.5mm across at mouth, cupular; *lobes* 2–5 × 1–1.5mm, deltate to ovate or oblong, acute or obtuse; *corolline corona* of 5 pairs of fleshy ridges most prominent near bases of lobes, pubescent to glabrous. *Staminal corona lobes* erect, subulate, c.1mm long, exceeding anthers. *Style-head* exserted for c.0.7–1.5mm above anthers, spherical to ellipsoid, not bifid at apex.

Ecology. Steep slopes to plateau, shrubland, often on limestone.

Specimens examined. SOCOTRA. J. Ma'alih, 800m, 21 iii 1996, *Miller* 14221 (E); Dixsam, 700m, 4 iv 1996, *Miller* 14290 (E).

The two collections of *S. socotrana* illustrated here (Fig. 6) do not fit several aspects of the descriptions in either Balfour (1888) or Goyder (1992). *Miller* 14221 has no hairs at all on the corolline corona, whereas according to the key in Goyder (1992) this corona is always pubescent. The corolla in *Miller* 14290 is a little over 10mm in diameter, with lobes 4–5mm long, considerably larger than previously recorded. It is also interesting that the style-heads are differently shaped in the two collections, although both of them project above the anthers for about the same distance.

THE GENUS *CEROPEGIA* L. IN SOCOTRA

Ceropegia L. (*Asclepiadoideae–Ceropegieae*) consists of about 200 species found from the southern tip of Africa around the perimeter of the Indian Ocean to Australia. There are particular concentrations of species in S Africa, E Africa and

peninsular India. In the Arabian Peninsula 10 species are recorded, but these have a very limited range (Bruyns, 1989). Previous accounts of the flora of Socotra have not included any species of *Ceropegia*. However, with the wealth of other asclepiads now known to occur on the island, it is hardly surprising that *Ceropegia* is now added to the list.

It was mentioned in Bruyns (1989) that a plant somewhat like *C. racemosa* N.E.Br. had been observed on Socotra. The material on which this observation was based was fragmentary, so it was not possible to name it. More recent collections by A.G. Miller and others have brought to light two species of *Ceropegia*. One is clearly identifiable as *C. affinis* Vatke, a widespread NE African species. The other is a succulent-stemmed species but the material is again fragmentary and it can only tentatively be assigned to *C. tihamana* Chaudhary & Lavranos.

Ceropegia affinis Vatke, Linnaea 40: 218 (1876). **Fig. 7.**
Type: Ethiopia, Chilguana, 1853, *Schimper* 301 (G, K (lecto.), P, S).

Slender, non-succulent, twining perennial with often deciduous aerial stems arising from short, thicker, knobbly underground stem bearing a cluster of thickened white fusiform roots; *stems* to 1–2m, 1–2mm thick, glabrous; *leaves* 12–45 × 2–6mm, flat, narrowing towards base into short petiole 2–4mm long; blades linear-elliptic, acute, glabrous except for a few minute hairs along midrib beneath and along margins.

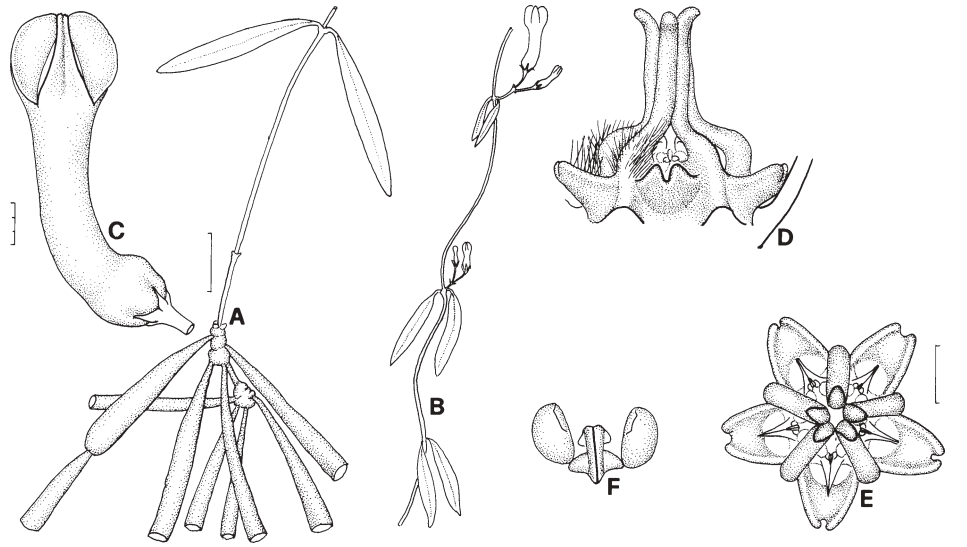

FIG. 7. *Ceropegia affinis*. A, base of plant showing rootstock; B, upper part of plant with flowers; C, side view of flower; D, side view of gynostegium; E, face view of gynostegium; F, pollinarium. The scale bars represent 15mm for A, B (at A), 3mm for C (at C), 1mm for D, E (at E) and 0.25mm for F (at E). A, B drawn from *Miller et al.* 12595; C–E, F from *Miller et al.* 16088.

Inflorescences glabrous, with 1–12 or more flowers opening in gradual succession; *peduncle* 2–10 × < 1mm, ascending to spreading, with few linear bracts < 1mm long around apex; *pedicels* 5–10 × < 1mm, ascending; *sepals* c.2mm long, c.0.5mm wide at base, lanceolate, acuminate. *Corolla* c.20mm long, 7mm across at widest, slightly inflated at base of slender tube, lobes remaining fused at tips above mouth of tube; outside white to pale green with longitudinal maroon to pink veins, glabrous and smooth; inside with fine hairs c.1mm long down whole length of tube but not in basal inflation, with similar hairs along midribs and around bases of lobes; *tube* c.15mm long, c.3mm across in middle widening to 4.5mm around mouth and 4.5mm across in basal inflation; *lobes* 6–7mm long, 2.5mm wide at most, tightly folded along midrib, obtuse. *Corona* c.3.5 × 4mm, fused near base into sides of corolla tube; *outer lobes* to 1mm, cupular and spreading to 1mm, notched in centre into two small round-tipped and deltoid lobules, with many straight hairs along margins and on inside; *inner lobes* c.2.5 × < 0.5mm, adpressed to backs of anthers and rising together in column over centre of gynostegium, with slightly diverging rounded tips and straight hairs dorsally around base.

Ecology. Open to dense, sheltered *Dracaena* Vand. woodland on granite or limestone, 500–700m.

Specimens examined. SOCOTRA. Dixsam Plateau, 550–950m, *Miller et al.* 12595 (E); Dixsam Plateau, 970m, 24 ix 1998, *Miller et al.* 16020 (E); Western Haggier, 650m, 28 ix 1998, *Miller et al.* 16088 (E).

As *Ceropegia affinis* is recorded from Eritrea, Ethiopia, Kenya, Somalia and Uganda (Huber, 1957), these new records extend the distribution slightly to the east. This species is not known on the Arabian Peninsula (Bruyns, 1989).

The material from Socotra has smaller flowers than that from Ethiopia and in addition they have a much less prominently widened mouth to the corolla tube. However, the basal inflation is similarly modest in proportion to the rest of the tube. It is the corona, and most particularly the outer lobes, which are characteristic of this species. These form a spreading, cupular bay between the inner lobes and each bay has a small notch near its apex.

Vegetatively this species is similar to *C. carnosa* E.Mey. (including *C. racemosa* N.E.Br.), which has an almost pan-African tropical and subtropical distribution and is also widespread in Madagascar (Huber, 1957). It is only in some of the smaller details of the flower that they differ. In *C. carnosa* the corolla tube has hairs in the upper half and around the mouth of the basal inflation only whereas in *C. affinis* hairs are present all along the inside of the tube.

In both species the gynostegium is somewhat fused to the sides of the corolla tube around its base and there is no basal stipe. In *C. carnosa* the outer corona lobes form spreading lobules which adhere to the dorsal bases of the inner lobes, and between these (i.e. opposite the guide-rails) there is a deeply excavated area, which is entirely lacking in *C. affinis*. The guide-rails spread horizontally somewhat less into this area in *C. carnosa* than they do in *C. affinis*, where they reach about the middle of the

bay formed by the outer lobes. In this respect *C. affinis* is more similar to members of the *C. haygarthii* Schltr.–*C. distincta* N.E.Br. complex where the guide-rails also spread strongly horizontally towards the edge of the outer corona.

In many, but not all, collections of *C. carnosa* the pollinarium has a markedly short corpuscle which is slit only a short way up. In *C. affinis* the corpuscle is long and narrow and divided almost to its apex; it also has fairly large lateral wings. The pollinia are similar in size and shape in both species.

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