THE ASCLEPIADACEAE, APOCYNACEAE, LOGANIACEAE, AND BUDDLEIACEAE IN HASSAN DISTRICT, MYSORE STATE, INDIA

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ABSTRACT

THE ASCLEPIADACEAE, APOCYNACEAE, LOGANIACEAE, AND BUDDLEIACEAE IN HASSAN DISTRICT, MYSORE STATE, INDIA

By

Warren Douglas Stevens

A floristic treatment for the Asclepiadaceae, Apocynaceae, Loganiaceae, and Buddleiaceae in Hassan District, Mysore State, India is presented. The treatment includes keys, brief nomenclatural citations and synonymys, descriptions, distributions, and specimen citations. The Asclepiadaceae is represented by 35 species in 19 genera, the Apocynaceae by 16 species in 13 genera, the Loganiaceae by 3 species in 3 genera, and the Buddleiaceae by 1 species.

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I am especially indebted to the principal investigators of the project, Drs. D. H. Nicolson and C. J. Saldanha, for providing the financial support for the travel and fieldwork and to all the project personnel for their kind and generous help during my stay in India.

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INTRODUCTION[1]

This floristic treatment of the Asclepiadaceae, Apocynaceae, Loganiaceae, and Buddleiaceae was prepared as part of my participation in the project "A Flora of Hassan District, Mysore State, India." This project is financed by the Smithsonian Foreign Currency Program using P.L. 480 funds. The principal investigators are Dr. D. H. Nicolson (Curator, Department of Botany, Smithsonian Institution) and Dr. C. J. Saldanha (Vice Principal, St. Joseph's College). The project was formulated by the principal investigators in 1968 and funding began in December of that year, the anticipated duration of the project being four years. The first two years were devoted to intensive field study in the district. The third year, now in progress, is concerned primarily with the preparation of the floristic treatment and with additional fieldwork as needed. During the fourth year it is hoped that the manuscript will be finished and the flora published.

The completed flora will have keys, descriptions, brief nomenclatural citations, distributions, phenologies, habitat, local uses, and a plate illustrating each family. It is

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[1]The information for the introduction and the description of the district was derived largely from a series of grant proposals, renewal proposals, and status reports submitted by Drs. Nicolson and Saldanha to the Smithsonian Foreign Currency Program.

anticipated that the flora will involve between 2,000 and 3,000 species of vascular plants.

The long-range goals, toward which this project is expected to be the first step, are the preparation of a flora of Mysore State and establishment of a taxonomic center at St. Joseph's College, Bangalore.

I was chosen as a collaborator in the project to provide a graduate training component and because of my special interest in the taxonomy and biology of the Asclepiadaceae. I spent about 13 weeks during the summer of 1969 participating in the project. Of this time, about ten weeks were spent working in Hassan District and the laboratory at St. Joseph's College. Herbarium study at the Calcutta Botanic Garden occupied one week and two weeks were devoted to herbarium and library study at the Royal Botanic Gardens, Kew, England.

The specimens cited include all those collected in Hassan District through March, 1970. The Stevens collection numbers refer generally to the collections of the project personnel, many of which were made during my participation in the project. The descriptions are based primarily on the cited specimens, but where the material was inadequate additional information was gathered from specimens in the herbaria at Calcutta Botanic Garden and the Royal Botanic Gardens, Kew, and, as a last resort, from the literature. A complete set of my own collections and a nearly complete set of the Saldanha collections cited are deposited in the Beal-Darlington

Herbarium, Michigan State University. A nearly complete set of the specimens are kept at the project headquarters at St. Joseph's College and a representative set will be deposited at the U. S. National Herbarium. Duplicate sets will be distributed to other herbaria.

DESCRIPTION OF THE DISTRICT

Mysore State, in more or less its present circumscription, was a princedom during the period of British rule and was therefore little studied by the British botanists who made such a great contribution to the understanding of the Indian flora. The state was nominally included within the ranges of both Hooker's Flora of British India (1872-1897) and Gamble's Flora of the Presidency of Madras (1915-1936), but was in fact little collected and seldom referred to in these works. The state has an area of about 75,000 sq. mi. and a population of about 20 million. Hassan District (Figure 1) is located in the western part of Mysore State and occupies 2,638 sq. mi. This District was chosen for the project because it is relatively near the project headquarters in Bangalore and because the major vegetation types of Mysore State are present and reasonably well preserved (even though less than ten percent of the District remains forested).

The climate of southern India is dominated by the seasonal monsoon cycle. In Hassan District the rainy season is primarily during the months of June, July, and August when the winds consistently blow toward the northeast. Hassan District straddles the north-south oriented Western Ghats and is thus subject to a considerable rain shadow effect. The western side of the Ghats receives the highest rainfall, 100-300 inches/year, and is covered by a tall evergreen

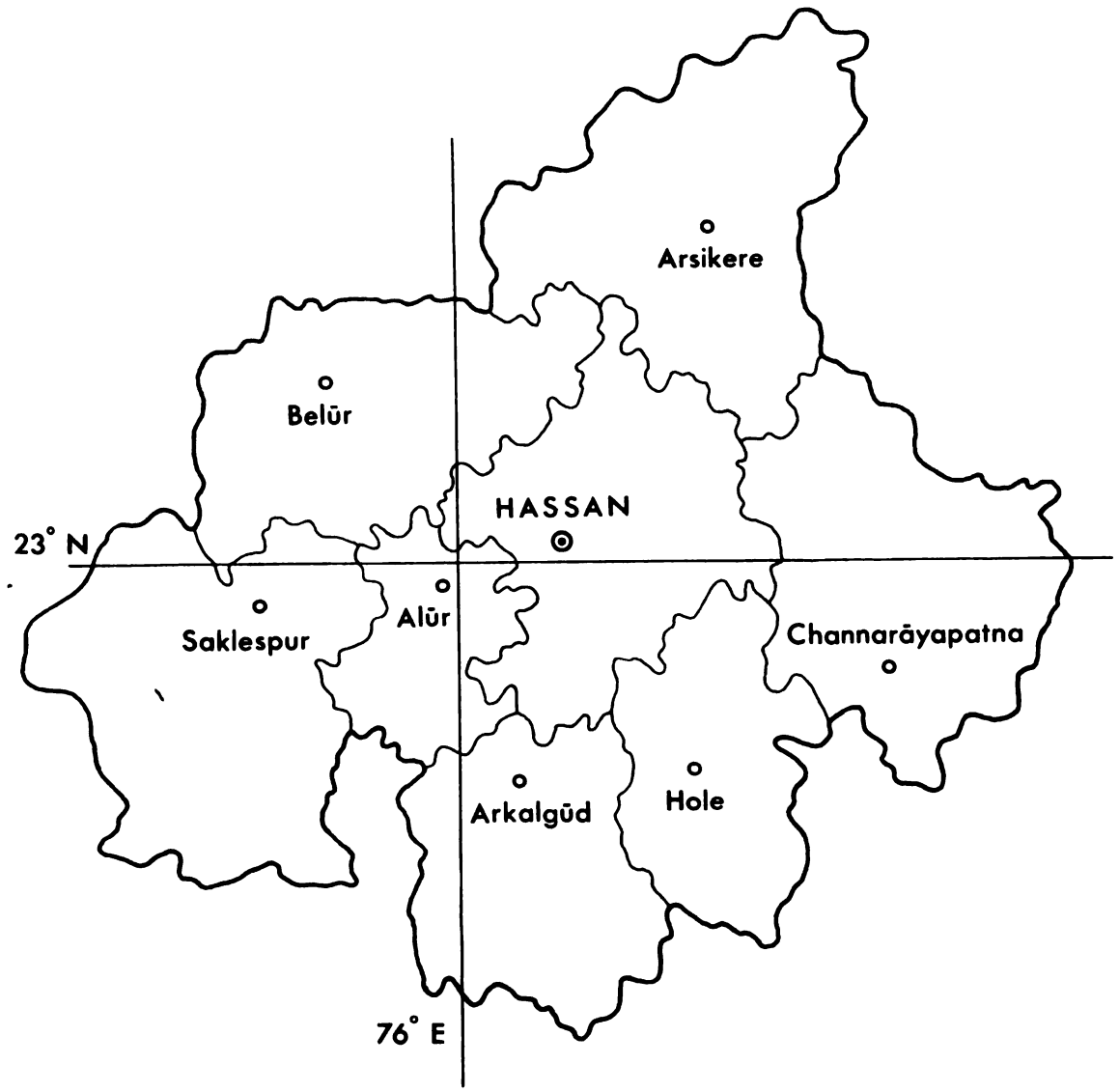


Figure 1. Map of Hassan District and its political subdivisions

forest. The eastern slopes and peaks of the Ghats, which are 4000-6000 feet, mostly receive 60-150 inches/year and support a mixed evergreen-deciduous forest. The plains east of the Ghats receive less than 30 inches/year and have the deciduous scrub or thorn forest typical of the Deccan Plateau. The season which is completely without precipitation lasts six months or longer and is obviously an important factor in determining the vegetation type.

FLORISTIC TREATMENT

LOGANIACEAE

Woody vines, small trees, or epiphytic shrubs. Leaves opposite, simple, entire, with a stipular ridge between the petioles. Flowers bisexual, 4- or 5-merous, actinomorphic, gamosepalous and gamopetalous, in terminal or lateral cymes. Corolla lobes valvate or imbricate to the right in bud. Stamens inserted in the corolla tube. Ovary single, superior, bilocular (sometimes incompletely). Fruit a few to many seeded fleshy berry, sometimes with a crustose rind (Strychnos). Seeds naked.

1. Flowers 4-merous, yellow.....2. Gardneria
1. Flowers 5-merous, white or cream colored
   2. Corolla tube 40-50 mm long; plants without tendrils.....1. Fagraea
   2. Corolla tube 2-2.5 mm long; plants with tendrils.....3. Strychnos

1. Fagraea Thunberg

Generally epiphytic when young, later becoming a small tree. Leaves obovate to elliptic, mostly 10-15 cm long, glabrous or slightly pubescent below, pinnately reticulate

veined with lateral veins few and obscure, base acute, apex obtuse or rounded. Flowers 5-merous, in terminal corymbose cymes. Calyx 10-15 mm long, glabrous, lobes rounded. Corolla funnelform, cream colored, glabrous; tube 40-50 mm long; lobes about 20 mm long, rounded, imbricate to the right. Anthers free, exserted, longer than the filaments. Stigma capitate. Berry ellipsoid to globose, 3-5 cm wide, many seeded, whitish when mature, with a translucent parchment-like rind which separates on drying. Seeds small, ovate.

Fagraea ceilanica Thunberg, Kongl. Vetensk. Acad. Nya Handl. 3: 132. 1782; Backer & Bakhuizen, Fl. Java 2: 211. 1965; F. obovata Wallich in Roxburgh, Fl. Ind. ed. 1, 2: 33. 1824; Wight, Ic. Pl. Ind. Or. 4: tt. 1316-1317. 1848.

India and Ceylon to Malasia; in Hassan occasional in wet forest; Saldanha 10619, 12459, 13358, 13586, 14036, 14055.

This plant may be bat pollinated; the flowers have the characteristic features, and the edges of the corolla lobes are often damaged with what appear to be claw marks.

2. Gardneria Wallich

Woody climbing shrub. Leaves ovate to narrowly elliptic, 7-15 cm long, glabrous, pinnately reticulate veined, base acute to obtuse, apex short-acuminate. Flowers 4-merous, in

lateral cymes. Calyx about 1.5 mm long, glabrous except the lobes short-cilate on the margins, lobes rounded. Corolla rotate, yellow; tube short; lobes 4-6 mm long, thick, deltoid, densely pubescent within, valvate. Anthers subsessile, connate below and free above, exserted. Stigma bifid. Berry globose, 1-2 cm wide, 2-seeded, red when mature. Seeds bowl-shaped.

Gardneria ovata Wallich in Roxburgh, Fl. Ind. ed. 1, 1: 400. 1820; Backer & Bakhuizen, Fl. Java 2: 210. 1965; Wight, Ic. Pl. Ind. Or. 4: t. 1313. 1848.

India to Malasia; in Hassan occasional in most forest communities; Saldanha 11683, 12559, 12927, 12990, 13022, 13184, 13491, 14175, Stevens 711.

3. Strychnos Linnaeus

Ref.: A. W. Hill. 1917. The genus Strychnos in India and the East. Bull. Misc. Inform. pp. 121-210.

Woody climbing shrub with simple clavate tendrils. Leaves ovate to ovate-lanceolate, sometimes oblique, 5-15 cm long, glabrous, with 3 major veins and lateral connecting veins, base acute, apex acute to slightly acuminate. Flowers 5-merous, in lateral corymbose cymes. Calyx about 1.5 mm

long, puberulent on the outside and pilose within near the base, lobes rounded, with ciliate margins. Corolla campanulate, white, puberulent on the outside; tube 2-2.5 mm long, glabrous within; lobes 2-2.5 mm long, thick, lanceolate, long pilose within near the base, valvate. Anthers shorter than the filament, free, bearded at the base. Stigma capitate. Berry globose, 1-2 cm wide, 1- or sometimes 2-seeded, with a thick crustose rind. Seeds discoid.

Strychnos dalzellii C. B. Clarke in J. Hooker, Fl. Brit. Ind. 4: 87. 1883; Hill, l.c. 176.

Apparently restricted to the central and southern Western Ghats; in Hassan occasional in wet forest; Saldanha 11258, 11397, 12045, 12108, 12450, 13024, 13132.

Fruits on our specimens are mostly 1-seeded while most descriptions mention several seeds per fruit.

APOCYNACEAE

Trees, shrubs, erect herbs, or scandent or twining vines. Sap milky or occasionally watery (Ichnocarpus). Leaves opposite, whorled, or alternate, simple, entire, pinnately reticulate veined, exstipulate or with stipular glands or frills. Flowers bisexual, 5-merous, actinomorphic, gamosepalous and gamopetalous, in terminal or lateral cymes or corymbs. Calyx

often with basal glands within. Corolla lobes imbricate in bud. Stamens inserted in the corolla tube; anthers sometimes sagittate with sterile tails, free or connivent and adnate to the stigma. Stigma single, often enlarged and elaborated, style single, mostly thin. Ovaries 2 and unilocular or 1 and bilocular (except unilocular in Allamanda), superior or sometimes partly submerged in a disc. Fruits mostly follicles, sometimes drupes, berries, or capsules. Seeds comose at one or both ends, winged, arillate, or naked.

1. Leaves whorled or alternate; corolla with or without faucal scales
   2. Leaves alternate; corolla lobes imbricate to the left
      3. Leaves more than 20 cm long; corolla without faucal scales.....12. Plumeria
      3. Leaves less than 20 cm long; corolla lobes with faucal scales.....13. Thevetia
   2. Leaves whorled; corolla lobes imbricate to the right or left
      4. Anthers sagitate, with sterile tails and a long terminal pilose appendage; leaves linear-lanceolate.....10. Nerium
      4. Anthers ovate or sagittate, but without sterile tails or such an appendage; leaves wider
         5. Large tree; corolla greenish-white...3. Alstonia

5. Scandent woody shrub or vine; corolla yellow.....2. Allamanda

1. Leaves opposite; corolla without faucal scales

6. Plants with long sharp spines; fruit a fleshy berry.....5. Carissa

6. Plants without spines; fruits follicular

7. Plants erect; ovaries 2

8. Plants herbaceous; ovaries pubescent.....6. Catharanthus

8. Plants woody; ovaries glabrous

9. Corolla tube pubescent, stamens inserted near the base; seeds comose.....8. Holarrhena

9. Corolla tube glabrous, stamens inserted near the top; seeds arillate.....7. Ervatamia

7. Plants scandent or twining; ovaries 1 or 2

10. Corolla tube more than 5 cm long; leaves more than 15 cm long.....4. Beaumontia

10. Corolla tube less than 1 cm long; leaves less than 15 cm long

11. Filaments spirally twisted together around the style; ovary 1.....11. Parsonia

11. Filaments obsolete; ovaries 2

12. Corolla yellow-brown, tube about 6 mm

long, fluted.....1. Aganosma

12. Corolla white or tinted rose, tube 3-4 mm long, narrow at the base and apex and inflated in between.....9. Ichnocarpus

1. Aganosma G. Don

Scandent or sometimes twining woody shrub. Leaves opposite, elliptic to ovate or obovate, 5-15 cm long, glabrous to sparsely pubescent, base rounded to acute, apex acute and slightly acuminate to rounded or emarginate. Cymes terminal, corymbose. Calyx mostly with small subulate glands at the sinuses. Corolla fluted-tubular from a narrow base, yellowish-brown; tube about 6 mm long, pubescent on the outside and with rows of bristles above the anthers on the inside; lobes ovate to lanceolate, 7-12 mm long, imbricate to the right. Stamens inserted in the base of the widened part of the tube; filaments obsolete; anthers sagittate with sterile bases, connivent and adnate to the stigma. Stigma conical, glabrous; ovaries separate, pubescent; disc of 5 more or less connate scales enclosing the ovaries. Fruit of paired falcate follicles, 10-15 cm long, widely divergent; seeds comose.

Aganosma cymosa (Roxburgh) G. Don, Gen. Hist. 4: 77. 1837-1838; Gamble, Fl. Madras 2: 819. 1923; Wight, Ic. Pl. Ind. Or. 4: tt. 1304, 1306. 1848. Echites cymosa

Roxburgh, Fl. Ind. ed. 2, 2: 16. 1832; Wight, l.c. t. 395. 1840.

India and Ceylon, especially the Western Ghats; in Hassan occasional in dry rocky hills; Saldanha 13804, 13935, 13989, Stevens 494.

Our specimens differ in some respects from previous descriptions, but this is apparently a rather variable species over its range.

2. Allamanda Linnaeus

Scandent woody shrub or vine. Leaves whorled, 3-5 per node, ovate to oblanceolate, 6-15 cm long, glabrous or sparsely pubescent below, base acute to attenuate, apex acuminate to caudate. Cymes lateral or terminal, corymbose. Calyx eglandular. Corolla funnelform from a narrow base, bright yellow; tube 45-65 mm long, pilose within at the level of the anthers, otherwise glabrous, with a transparent fimbriate scale over each anther; lobes obliquely obovate, 25-35 mm long, imbricate to the left. Stamens inserted at the base of the widened part of the tube; filaments obsolete; anthers shallowly sagittate but fertile to the base, free. Stigma bifid, with a basal collar, glabrous; ovary single, unilocular, glabrous; disc a fleshy annulus. Fruit a globose echinate capsule, 4-6 cm wide; seeds marginally winged.

Allamanda cathartica Linnaeus, Mant. 2: 214. 1771; Gamble, Fl. Madras 2: 821. 1923.

Native to tropical America but now widely cultivated in the tropics; in Hassan occasionally found in gardens; Saldanha 13464.

Said to be cathartic in proper doses.

3. Alstonia R. Brown nom. cons.

Ref.: J. Monachino. 1949. A revision of the genus Alstonia. Pacific Sci. 3: 133-182.

Large tree. Leaves whorled, 4-7 per node, oblong-elliptic to oblanceolate, 7-25 cm long, glabrous, base acute to slightly obtuse, apex rounded to emarginate. Cymes terminal and lateral, paniculate. Calyx eglandular. Corolla salverform, greenish-white; tube 6-9 mm long, pubescent, pilose at the mouth; lobes cuneate-oblong, 2-5 mm long, imbricate to the right or left. Stamens inserted near the top of the tube; filaments short; anthers ovate with an acute apex, somewhat connivent but not adnate to the stigma. Stigma slightly enlarged, bifid, glabrous; ovaries separate, pubescent; disc absent. Fruit of thin paired follicles, 20-50 cm long, parallel or slightly divergent; seeds comose at both ends.

Alstonia scholaris (Linnaeus) R. Brown, Mem. Wern. Nat. Hist. Soc. 1: 76. 1811; Monachino, l.c. 146; Wight, Ic. Pl. Ind. Or. 2: t. 422. 1840-1843. Echites scholaris Linnaeus, Mant. 53. 1767.

India to southern China and southward through Malasia to eastern Australia and Melanesia, cultivated as an ornamental in the American tropics; in Hassan locally common trees of the wet forest; Saldanha 13084, 16002.

The sap is apparently quite poisonous and the tree is feared by the inhabitants of some areas. In other areas, however, the bark is collected and used for medicinal purposes.

4. Beaumontia Wallich

Scandent woody vine. Leaves opposite, oblong-ovate, 15-30 cm long, at first rusty-tomentose, later nearly glabrous, base acute, apex abruptly acuminate. Cymes terminal. Calyx with numerous basal glands within. Corolla funnelform, white; tube 60-70 mm long, pubescent outside, glabrous within; lobes oblique, short-acuminate, 30-40 mm long, imbricate to the right. Stamens inserted below the middle of the tube; filaments about 35 mm long, thickened immediately below the anther; anthers sagittate with sterile incurved bases, connivent and adnate to the stigma. Stigma fusiform, glabrous; ovary single, bilobed and bilocular, pubescent; disc of 5 rounded ciliate

scales. Fruit of paired follicles (appearing to be 1 until separation at maturity), 20-25 cm long; seeds comose.

Beaumontia jerdoniana Wight, Ic. Pl. Ind. Or. 4: tt. 1314-1315. 1848; Gamble, Fl. Madras 2: 817. 1923.

Apparently restricted to the central Western Ghats; in Hassan collected only once, in wet forest of Shiradi Ghat; Saldanha 16005.

This plant somewhat larger in most dimensions than indicated for the species in previous descriptions.

5. Carissa Linnaeus nom. cons.

The fruits of these species, as well as some others in the genus, have a pleasant flavor and are eaten either fresh or in jams. Carissa carandas is widely cultivated for its fruits and may be found in the district.

Erect or scandent spinous woody shrub. Leaves opposite, glabrous. Cymes terminal. Calyx eglandular. Corolla salverform, white; tube pubescent within; lobes lanceolate, imbricate to the right. Stamens inserted near the top of the tube; filaments short; anthers oblong, apiculate, free. Stigma fusiform, apically bifid, pubescent; ovary single, bilocular, glabrous; disc absent. Fruit a fleshy berry; seeds naked.

1. Leaves mostly less than 3 cm long; berry ellipsoid, 2-seeded.....C. paucinerva
1. Leaves mostly more than 3 cm long; berry spherical or slightly ellipsoid, 4-seeded
   2. Spines distinctly recurved.....C. inermis
   2. Spines straight or slightly curved.....C. congesta

Carissa congesta Wight, Ic. Pl. Ind. Or. 4: t. 1289. 1848; Santapau, Fl. Kandala ed. 2, 129. 1960.

Erect or sometimes scandent woody shrub. Spines straight or slightly curved. Leaves broadly ovate, 3-7 cm long, base cuneate to slightly rounded, apex bluntly acute, mucronate. Corolla tube 10-15 mm long; lobes 5-7 mm long. Berry spherical or slightly ellipsoid, to 3 cm wide, 4-seeded.

Western Ghats and perhaps elsewhere in peninsular India; apparently not common in Hassan; Stevens 588.

Carissa inermis Vahl, Symb. Bot. 3: 43. 1794; Gamble, Fl. Madras 2: 805. 1923.

Scandent woody shrub. Spines recurved. Leaves ovate to elliptic-lanceolate, 5-9 cm long, base rounded or sometimes obtuse or acute, apex acute to slightly acuminate, occasionally emarginate. Corolla tube 10-20 mm long; lobes 5-10 mm long. Berry spherical or slightly ellipsoid, to 3 cm wide,

4-seeded.

Hills of peninsular India, especially the Western Ghats; common in the wetter parts of the district, especially in second growth; Saldanha 10777, 10914, 11693, 12928, 13583, 13769, 14576, 14619, Stevens 724.

Carissa paucinerva A. Candolle in A. P. Candolle, Prodr. 8: 333. 1844. Gamble, Fl. Madras 2: 806. 1923; Wight, Ic. Pl. Ind. Or. 4: t. 1290. 1848.

Erect woody shrub. Spines straight. Leaves elliptic-ovate to elliptic-lanceolate, 1.5 to 3.5 cm long, base acute, apex acute, mucronate. Corolla sometimes tinted rose; tube 10 mm long; lobes about 4 mm long. Berry ellipsoid, 2-seeded.

Peninsular India; in Hassan common in dry scrub and lower deciduous forest; Saldanha 9003, 9743, 11586, 12768, 12984, 13114, 14363, Stevens 758.

6. Catharanthus G. Don

The problem of the names Lochnera and Catharanthus has been a perplexing one. Discussions are presented by M. Pichon (Mem. Mus. Natl. Hist. Nat. 27: 237. 1948), G. H. M. Lawrence (Baileya 7: 113-119. 1959), and especially J. D. Dwyer (Lloydia 27: 282-285. 1964). Although there are several facets to the problem, the deciding factor is whether

Lochnera Reichenbach (Conspectus p. 134. 1828) was validly published or, more specifically, whether reference to a previously described species provides sufficient description (indirect) for a new monotypic genus. I interpret Article 41 of the International Code of Botanical Nomenclature as meaning that this description is insufficient for valid publication. Catharanthus G. Don is the name used when Lochnera Reichenbach is rejected, but its priority over Lochnera Endlicher is not an absolute certainty because the date of publication of the former is not accurately known.

Erect annual or perennial herbs, sometimes slightly woody below. Leaves opposite. Cymes lateral. Calyx eglandular. Corolla salverform; lobes cuspidate, imbricate to the left. Stamens inserted near the top of the tube; filaments short; anthers oblong with slightly sagittate but fertile bases, free. Stigma cylindric with a pendent basal collar, pubescent; ovaries separate, pubescent; disc of 2 erect glands. Fruit of paired follicles; seeds with muricate ribs, otherwise naked.

1. Corolla tube less than 10 mm long; follicles glabrous, more than 30 mm long.....C. pusillus
1. Corolla tube more than 20 mm long; follicles pubescent, less than 30 mm long.....C. roseus

Catharanthus pusillus (J. Murray) G. Don, Gen. Hist. 4: 95.

1837-1838. Vinca pusilla J. Murray, Novi Comment. Soc. Regiae Sci. Gott. 3: 66. 1773; Lochnera pusilla K. Schumann in Engler & Prantl, Pflanzenfam. 4 (2): 145. 1895.

Erect annual herb. Leaves lanceolate, 4-7 cm long, glabrous, base attenuate, apex acuminate. Cymes 1-2 flowered. Corolla white; tube 6-9 mm long, the mouth pilose within, otherwise glabrous; lobes obovate, about 2 mm long. Follicles thin, glabrous, 35-50 mm long.

India and Ceylon, probably native but now predominantly an agricultural weed; in Hassan common in dry cultivated fields; Saldanha 11971.

Catharanthus roseus (Linnaeus) G. Don, Gen. Hist. 4: 95. 1837-1838; Backer & Bakhuizen Fl. Java 2: 227. 1963. Vinca rosea Linnaeus, Syst. Nat. ed. 10, 944. 1759; Lochnera rosea Reichenbach ex Endlicher, Gen. Pl. 583. 1838.

Erect herb, sometimes becoming slightly woody below. Leaves elliptic to obovate, 3-8 cm long, pubescent, base acute, apex obtuse or rounded, cuspidate. Cymes 1-4 flowered. Corolla mostly rose but sometimes with other colors or color combinations; tube 25-30 mm long, pubescent outside, pilose within except at the level of the anthers; lobes broadly

ovate, 15-25 mm long. Follicles thickened, pubescent, 20-30 mm long.

Probably native to Madagascar but now cultivated and naturalized throughout the tropics; in Hassan common in gardens and occasionally found wild; Saldanha 12313.

7. Ervatamia Stapf

Large shrub or small tree. Leaves opposite, elliptic to lanceolate, 10-20 cm long, glabrous, base acute, apex acuminate. Cymes terminal or lateral, corymbose. Calyx with subulate basal glands within. Corolla salverform, white; tube 15-30 mm long, glabrous; lobes obtuse, crispate or frilled, about 10 mm long, imbricate to the right. Stamens inserted near the top of the tube; filaments obsolete; anthers linear-oblong with short bilobed bases, free. Stigma slightly enlarged, bifid, glabrous; ovaries separate, glabrous; disc absent. Fruit of paired boat-shaped follicles, 2.5-3.5 cm long, bright yellow-orange at maturity; seeds with a bright red aril.

Ervatamia heyneana (Wallich) T. Cooke, Fl. Bombay 2: 134. Gamble, Fl. Madras 2: 813. 1923. Tabernaemontana heyneana Wallich, Edward's Bot. Reg. 15: t. 1273. p.p. 1829.

Apparently restricted to the Western Ghats; in Hassan a very common and distinctive second growth species of the Ghats; Saldanha 10120, 10721, 10979, 11254, 11563, 11750, 12037, 12273, 12433, 12901, 13134, 13278, 13854, 14176, Stevens 610.

The seeds of this species are well adapted for distribution by birds and this is perhaps a factor in its success as a second growth species. Probably pollinated by night-flying moths.

8. Holarrhena R. Brown

Shrub or small tree. Leaves opposite or occasionally approximate, broadly ovate to elliptic, 10-25 cm long, pubescent or glabrous, base rounded to obtuse, apex acuminate. Cymes terminal or lateral, corymbose. Calyx with small basal glands within. Corolla salverform, white; tube about 10 mm long, pubescent; lobes oblong, mostly 12-14 mm long, imbricate to the left. Stamens inserted near the base of the tube; filaments short; anthers linear-oblong, free. Stigma not thickened, conical, glabrous; ovaries separate, glabrous; disc absent. Fruit of paired follicles, 20-40 cm long, somewhat divergent; seeds comose.

Holarrhena antidysenterica (Heyne ex Roth) A. Candolle in A. P. Candolle, Prodr. 8: 413. 1844; Gamble, Fl. Madras,

2: 811. 1923. Echites antidysenterica Heyne ex Roth, Nov. Pl. Sp. 138. 1821; Wight, Ic. Pl. Ind. Or. 4: tt. 1297-1298. 1848; Chonemorpha antidysenterica (Heyne ex Roth) G. Don, Gen. Hist. 4: 76. 1837-1838; Wight, l.c. 2: t. 439. 1840-1843.

Throughout India and eastward to the Malay Peninsula; in Hassan locally common in deciduous forest; Saldanha 11758, 13069, 13273, 14090.

The plant is rich in alkaloids. A preparation of the bark is a well known and effective treatment for dysentery. The plant is generally listed under the invalid name H. antidysenterica Wallich, which lacked a description and was based on an unpublished name, Echites antidysenterica Roxburgh.

9. Ichnocarpus R. Brown nom. cons.

Woody twining vine. Leaves opposite, lanceolate to ovate, 4-8 cm long, glabrous to sparsely pubescent below, base acute, apex acute to acuminate. Cymes terminal or lateral. Calyx eglandular. Corolla tubular, white or tinted rose; tube narrow at the base and apex and inflated in the middle, 3-4 mm long, mouth and margins of lobes pubescent; lobes broad with a long thin acumination, mostly 6-7 mm long, imbricate to the right with the acumination reflexed. Stamens

inserted near the middle of the tube; filaments obsolete; anthers sagittate with sterile bases, connivent around and adnate to the stigma. Stigma ovoid, glabrous; ovaries separate, pubescent; disc 5-lobed. Fruit of thin paired follicles, 5-15 cm long, somewhat divergent; seeds comose.

Ichnocarpus frutescens (Linnaeus) Dryander in W. T. Aiton, Hort. Kew, ed. 2, 2: 69. 1811; Gamble, Fl. Madras 2: 820. 1923; Wight, Ic. Pl. Ind. Or. 2: t. 430. 1840-1843.
Apocynum frutescens Linnaeus, Sp. Pl. 213. 1753.

India and Ceylon eastward to the Malay Peninsula and south to Australia; in Hassan common in dry scrub; Saldanha 9061, 9733, 11238, 11956, 12151, 12753, 13238, 13936.

10. Nerium Linnaeus

Erect woody shrub. Leaves whorled, 3 per node, linear-lanceolate, 10-20 cm long, sparsely pubescent when young, later glabrous, base and apex acute. Cymes terminal, corymbose. Calyx with subulate basal glands within. Corolla funnelform, red, white, or occasionally yellow; tube 14-16 mm long, with rows of bristles below the filaments within, with deeply laciniate scales at the mouth; lobes obliquely rounded, about 15 mm long, imbricate to the right. Stamens inserted at the base of the widened part of the tube; filaments short;

anthers connivent and somewhat adnate to the stigma, sagittate with sterile bases which hook inward at the tips, the tips of the connectives greatly extended, long pilose. Stigma slightly enlarged and collared, pubescent; ovaries separate, glabrous; disc absent. Fruit of paired follicles, 15-25 cm long, nearly parallel; seeds comose.

Nerium indicum Miller, Gard. Dict. ed. 8, 1768; Santapau, Fl. Khandala ed. 2, 133. 1960; N. odorum Solander in W. Aiton, Hort. Kew. ed. k, 1: 297. 1789.

Probably a native of the western Himalaya but now widely planted in the Asian tropics and as far north as Japan; in Hassan often planted in gardens; Saldanha 12026, 12864.

Like the similar European species, N. oleander, this plant is well known for its poisonous properties.

11. Parsonia R. Brown nom. cons.

Woody twining vine. Leaves opposite, elliptic, 8-15 cm long, glabrous, base rounded to slightly cordate, apex acuminate. Cymes terminal or lateral, corymbose to paniculate. Calyx with deltoid basal glands within. Corolla campanulate, white; tube about 5 mm long, puberulent on the outside and with a ring of bristles within; lobes linear-lanceolate, erect, about 5 mm long, imbricate to the right. Stamens inserted

near the base of the tube; filaments tightly spiralled together around the style; anthers sagittate with sterile bases, connivent around and adnate to the stigma. Stigma columnar, collared, glabrous; ovary single, bilobed, bilocular, glabrous; disc of 5 free scales. Fruit of paired follicles (appearing to be single until separation at maturity), 12-17 cm long; seeds comose.

Parsonia spiralis Wallich ex G. Don, Gen. Hist. 4: 80. 1837-1838; Gamble, Fl. Madras 2: 814. 1923; Wight, Ic. Pl. Ind. Or. 4: t. 1303. 1848.

Tropical Asia and Malasia; in Hassan uncommon in evergreen forest; Saldanha 14431, 15786.

12. Plumeria Linnaeus

Ref.: R. E. Woodson. 1938. Plumeria, in Studies in the Apocynaceae VII. Ann. Missouri Bot. Gard. 25: 202-224.

Large shrub or small tree, stems thick and fleshy above, woody below. Leaves alternate, oblong-lanceolate to obovate, mostly 20-40 cm long, glabrous to sparsely pubescent below, base acute, apex acute to acuminate. Corymbs terminal. Calyx eglandular. Corolla salverform, white, yellow, rose, or combinations of these colors; tube 10-25 mm long, pubescent

within; lobes broadly ovate, 25-60 mm long, imbricate to the left. Stamens inserted near the base of the tube; filaments obsolete; anthers oblong-ovate, free. Stigma bilobed, glabrous; ovaries separate, glabrous; disc absent or poorly developed. Fruit of paired linear-lanceolate follicles, 9-30 cm long, widely divergent; seeds with a basal wing.

Plumeria rubra Linnaeus, Sp. Pl. 209. 1753; Woodson, l.c. 207; P. acuminata Dryander in W. T. Aiton, Hort. Kew. ed. 2, 2: 70. 1789; P. acutifolia Poiret, Encycl. Meth. suppl. 2, 667. 1812.

Native to tropical America but now cultivated throughout the tropics; in Hassan occasionally found in gardens; Saldanha 12311.

The milky sap is used in small doses as a purgative and in larger doses is poisonous.

13. Thevetia Linnaeus nom. cons.

Large shrub or small tree. Leaves alternate, linear-lanceolate, 10-15 cm long, glabrous, base and apex acute. Cymes terminal or lateral. Calyx with numerous small glands within at the base. Corolla companulate from a narrow base, bright yellow; tube about 30 mm long, glabrous outside, pubescent within below the anthers, with a deltoid scale

immediately above each anther and a protuberance below each, the scales pilose and the protuberances densely flanked by retrorse bristles; lobes obliquely obovate, 20-40 mm long, imbricate to the left. Stamens inserted at the base of the widened part of the tube; filaments obsolete; anthers ovate with a sterile beak, appressed to the top of the stigma but free. Stigma conical with a frilled margin, the apex slightly bifid; ovary single, bilocular, glabrous; disc a fleshy annulus. Fruit drupaceous, globose, 1-4 seeded, 40-60 mm wide; seeds naked.

Thevetia peruviana (Persoon) K. Schumann in Engler & Prantl, Pflanzenfam. 4 (2): 159. 1895; Santapau, Fl. Khandala ed. 2, 134. 1960. Cerbera peruviana Persoon, Syn Pl. 1: 267. 1805; T. neriifolia Adr. Jussieu ex Steudel, Nom. Bot. 180. 1821.

A native of tropical America but now widely planted in the tropics as an ornamental; in Hassan commonly planted and apparently persisting without care; Saldanha 8738, 14077, Stevens 579.

All parts of the plant, especially the seeds, are poisonous.

ASCLEPIADACEAE

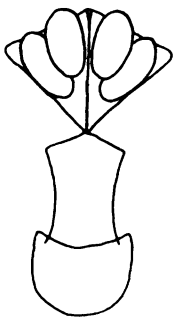
Ref.: H. Santapau & N. A. Irani. 1962. The Asclepiadaceae and Periplocaceae of Bombay. Bot. Mem. Univ. Bombay No. 4.

Erect, twining, or straggling herbs or woody shrubs, sometimes succulent, often with milky sap. Leaves opposite, simple, sometimes absent, exstipulate, entire, pinnately reticulate veined, often with glandular projections at the base of the blade on the adaxial surface. Flowers bisexual, 5-merous, actinomorphic, gamosepalous and gamopetalous, in terminal or lateral umbels or umbellate, corymbose, or paniculate cymes, when lateral often interpetiolar. Corolla lobes valvate or imbricate in bud. Stamens either connivent by the anthers (Periplocoideae) or completely connate and adnate to the style apex forming a gynostegium (Asclepiadoideae). Sometimes with a coralline corona elaborated from the corolla tube and typically with a staminal, or true, corona elaborated from the filaments or connectives. Pollen of the Periplocoideae in tetrads and falling onto spathulate pollen carriers which are equipped with an adhesive disc and which are formed on the surface of the style apex between the anthers. Pollen of the Asclepiadoideae in 1 or 2 waxy masses (pollinia) per anther locule, the pollinia of adjacent locules of adjacent anthers connected by arms to more or less horny corpuscula.

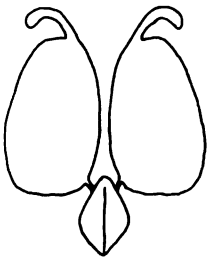
Gynoecium of 2 superior unilocular carpels united only by the enlarged style apex. Fruit of paired or single (by abortion of 1) follicles. Seeds flattened, comose. Figure 2.

1. Plants erect
   2. Leaves reduced and caducous; stems angular and succulent.....17. Caralluma
   2. Leaves well developed; stems terete, not succulent
      3. Plants less than 50 cm tall; sap watery
         4. Leaves ovate; roots fascicled; corolla rotate.....16. Tylophora
         4. Leaves lanceolate to linear; rootstock tuberous; corolla tubular.....18. Ceropegia
      3. Plants more than 50 cm tall; sap milky
         5. Large woody shrub, mostly 1-3 m tall; leaves ovate to obovate, sessile.....8. Calotropis
         5. Smaller herb, mostly less than 1 m tall; leaves lanceolate, petiolate.....7. Asclepias

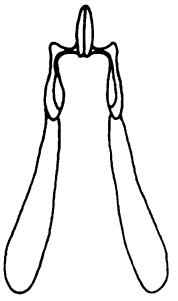
1. Plants twining, procumbent, or straggling
   6. Leaves absent or reduced and caducous
      7. Stems twining; corolla tubular..18. Ceropegia
      7. Stems straggling; corolla rotate.....12. Sarcostemma
   6. Leaves well developed
      8. Corolla more than 20 mm long, tubular.....18. Ceropegia



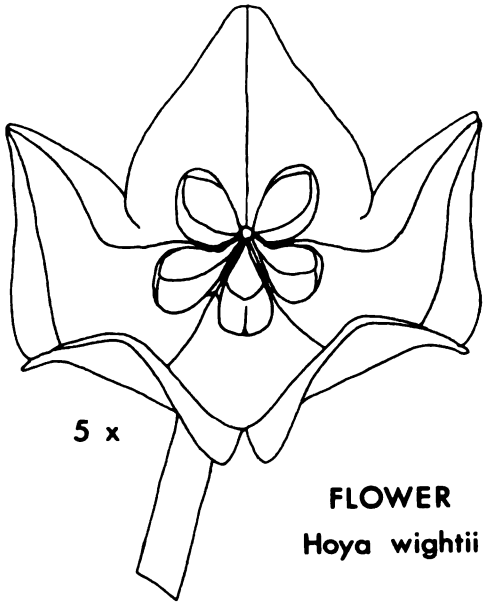
POLLEN CARRIER
Hemidesmus indicus



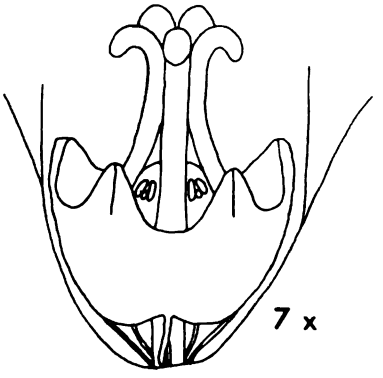
POLLINIUM
Leptadenia reticulata



POLLINIUM
Holostemma annulare



FLOWER
Hoya wightii



CORONA
Ceropegia hirsuta

Figure 2. Representative floral morphology of the Asclepiadaceae

8. Corolla less than 20 mm long, rotate
  9. Corolla entirely glabrous
    10. Corona cupular, enclosing the gynostegium; often with small rounded stipule-like axillary leaves.....9. Cynanchum
    10. Corona, if present, not cupular; without such axillary leaves
      11. Corona of 5 lobes
        12. Leaf bases acute; style apex exserted from the gynostegium
          13. Leaves lanceolate, glabrous; style apex capitate.....5. Secamone
          13. Leaves elliptic to obovate, rusty-tomentose; style apex fusiform....6. Toxocarpus
        12. Leaf bases rounded to slightly cordate; style apex not exserted...16. Tylophora
      11. Corona unlobed or absent
          14. Corona of a prominent fleshy annulus at the base of the gynostegium; anthers completely connate.....10. Holostemma
          14. Corona absent; filaments free
            15. Corolla 4-5 mm long, lobes valvate.....3. Hemidesmus
            15. Corolla 10-14 mm long, lobes strongly imbricate.....1. Cryptolepis
  9. Corolla pubescent, at least within or on the margins

16. Stamens connate only by the anthers; corolla densely white-villous within.....2. Decalepis

16. Stamens more completely connate

17. Corolla with fleshy lobes within at the sinuses

18. Petals valvate, margins revolute at anthesis.....19. Leptadenia

18. Petals imbricate, margins not revolute at anthesis.....14. Gymnema

17. Corolla without such lobes

19. Corona of 2 series of lobes, the outer membranous; leaf bases deeply cordate; stems hispid.....11. Pergularia

19. Corona of a single series of lobes

20. Flowers solitary or in umbels; plants primarily epiphytic with thick, waxy, glabrous leaves.....15. Hoya

20. Flowers in cymes (sometimes umbellate cymes) plants not epiphytic

21. Petals densely white-villous within; pollinia 4 per anther.....4. Genianthus

21. Petals not white-villous within; pollinia 2 per anther

22. Corolla lobes valvate; corona lobes large, fleshy.....13. Dregea

22. Corolla lobes imbricate; corona lobes small, tuberculate.....16. Tylophora

Periplocoideae

Stamens free except the anthers connivent over the style apex, without horny lateral wings. Pollen granular, but sometimes adhering into masses, falling onto and carried by spathulate pollen carriers. Without glandular projections at the bases of the leaf blades.

1. Cryptolepis R. Brown

Stems twining, becoming woody below, with copious milky sap. Leaves elliptic, glabrous, 8-16 cm long, base acute, apex apiculate to caudate. Cymes lateral, paniculate. Corolla campanulate, lobes strongly imbricate to the right, 10-14 mm long, glabrous, pale greenish-yellow, a coralline corona of a blunt fleshy lobe from each sinus. Staminal corona absent. Filaments free, broad, anthers sagittate, connivent over the style apex. Pollen carriers narrow, pollen granular.

Cryptolepis buchananii Roemer & Schultes in Linnaeus, Syst. Veg. ed. 15, 4: 409. 1819; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 91. 1962; Wight, Ic. Pl. Ind. Or. 2: t. 494. 1840-1943.

Peninsular India and Ceylon; in the district occasional

in moderately wet disturbed areas; Saldanha 9506, 13503, 14521.

2. Decalepis Wight & Arnott

Stems twining, sometimes only weakly, woody, sap milky. Leaves obovate to orbicular, glabrous, 5-10 cm long, base acute to obtuse, apex obtuse to emarginate. Cymes lateral to subterminal, paniculate. Corolla rotate, lobes imbricate to the right, 4-5 mm long, densely white-villous within, light brown outside. Corona of 2 series of lobes, the outer series of 5 broad bifid scales basally adnate to the back of the filaments, the inner series of 5 truncate lobes forming an open ring around the ovaries. Filaments free, anthers connivent around the style apex. Pollen carriers broad and bluntly shovel-shaped, pollen granular.

Decalepis hamiltonii Wight & Arnott in Wight, Contrib. 64. 1834; Gamble, Fl. Madras 2: 828. 1923; Wight, Ic. Pl. Ind. Or. 4: t. 1285. 1848.

Apparently a rare plant of the southern Deccan southward; in the district found only in rocky places in Nagpuri hills; Saldanha 13840, 13964, 13971, 14128.

3. Hemidesmus R. Brown

Stems twining or trailing, sap milky. Leaves variable, mostly elliptic to linear, glabrous, mostly 5-10 cm long, base acute, obtuse, or slightly cordate, apex mostly apiculate. Cymes lateral, subsessile. Corolla rotate, lobes valvate, 4-5 mm long, glabrous, yellow to nearly brown, coralline corona of 5 fleshy lobes from below the sinuses. Staminal corona absent. Filaments free, anthers connivent by their tips over the style apex. Pollen carriers obconical, doubled, pollen granular but usually adhering into masses (4 per anther).

Hemidesmus indicus (Linnaeus) R. Brown ex Schultes in Linnaeus, Syst. Veg. ed. 15, 6: 126. 1820; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 96. 1962; Wight, Ic. Pl. Ind. Or. 2: t. 594. 1840-1843. Periploca indica Linnaeus, Sp. Pl. 211. 1753.

Peninsular India and Ceylon; common in all but the wettest parts of the district; Saldanha 9084, 11496, 13998, 14096, 14117, 14522, Stevens 490, 600, 703, 760, 761.

Asclepiadoideae

Stamens completely connate and adnate with the style apex, with horny lateral wings. Pollen in 1 or 2 waxy masses

per anther locule and connected by translators to horny corpuscula. Leaves mostly with glandular projections at the base of the blade.

Secamoneae

Sap milky (?). Corolla lobes valvate or imbricate to the right or left. Pollinia 2 per anther locule, subsessile from light colored, slightly horny corpuscula, without pellucid margins.

4. Genianthus J. Hooker

Stems twining, becoming somewhat woody below. Leaves broadly elliptic, glabrous, 6-10 cm long, base acute, apex acuminate. Cymes lateral, paniculate. Corolla campanulate, lobes valvate or slightly imbricate to the left at the apex, about 2 mm long, densely white-villous within. Corona of 5 adnate scales with terminal adnate projections reaching nearly to the top of the gynostegium and short free cusps on the backs. Gynostegium nonstipitate, style apex dome-shaped, not exserted. Pollinia sessile or light colored, slightly horny corpuscula, 4 per anther, waxy, without pellucid margins.

Genianthus laurifolius (Roxburgh) J. Hooker, Fl. Brit. Ind. 4: 16. 1883; Santapau & Irani, Bot. Mem. Univ. Bombay

No. 4, 46. 1962. Asclepias laurifolia Roxburgh, Fl. Ind. ed. 2, 2: 49. 1832; Toxocarpus laurifolius (Roxburgh) Wight, Contrib. 61. 1834; Wight, Ic. Pl. Ind. Or. 2: t. 598. 1840-1843.

West-central peninsular and northeastern India; in Hassan collected one time on Shiradi Ghat; Saldanha 11469.

It has been mentioned in the literature (e.g. Gamble, Fl. Madras 2: 831) that dimorphic flowers occur on this plant. Santapau and Irani failed to find this on the plants they examined and neither did I observe it. Immature buds tend to open on drying and this is perhaps the source of the original observation.

See note for Secamone.

5. Secamone R. Brown

The present generic limits within the tribe Secamoneae are unsatisfactory. Speculations on a solution to the problem have ranged from redividing the group into four or more taxa using some new criteria to considering the tribe as a single genus. I would expect the latter choice to be the more reasonable but the resolution will depend on careful monographic treatment of the whole tribe over its entire range.

Twining woody shrub with milky sap. Leaves lanceolate, often slightly oblique, 4-7 cm long, glabrous, base and apex

acute. Cymes lateral, somewhat paniculate. Corolla rotate, lobes imbricate to the left, 3 mm long, glabrous, a coralline corona of protuberences inside the tube below the sinuses. Staminal corona of 5 laterally compressed adnate lobes, not much more conspicuous than the anther wings. Gynostegium nonstipitate, style apex exserted, capitate. Pollinia sessile on light colored, slightly horny corpuscula, 4 per anther, waxy, without pellucid margins.

Secamone emetica (Retzius) R. Brown ex Schultes in Linnaeus, Syst. Veg. ed. 15, 6: 124. 1820; Gamble, Fl. Madras 2: 829. 1923. Periploca emetica Retzius, Obs. 2: 14. 1781.

Deccan Plateau; in Hassan common in dry scrub; Saldanha 9732, 10683, 13553, 13912, 13927, Stevens 774.

The roots are purported to be a powerful emetic, hence the specific epithet. Pollinated by small dipterans.

6. Toxocarpus Wight & Arnott

Stems twining, becoming somewhat woody below. Leaves elliptic to obovate, sparsely to densely rusty-tomentose, 6-10 cm long, base acute with revolute margins, apex acuminate. Cymes lateral, paniculate. Corolla campanulate, lobes imbricate to the left, 6-7 mm long, glabrous. Corona of 5 adnate lobes, each with an erect dorsal subulate process.

Gynostegium nonstipitate, style apex long-exserted, fusiform. Pollinia sessile on light colored, slightly horny corpuscula, 4 per anther, waxy, without pellucid margins.

Toxocarpus kleinii Wight & Arnott in Wight, Contrib. 61. 1834; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 84. 1962; Wight, Ic. Pl. Ind. Or. 3: t. 886. 1844-1845.

Peninsular India, especially western, and Ceylon; in Hassan apparently rare, collected only once; Saldanha 13131.

Asclepiadeae

Sap milky. Corolla lobes imbricate to the right. Pollinia 1 per anther locule, pendent from dark horny corpuscula, without pellucid margins.

7. Asclepias Linnaeus

Ref.: R. E. Woodson. 1954. The North American species of Asclepias. Ann. Missouri Bot. Gard. 41: 1-211.

Plants erect, herbaceous or somewhat woody below, with milky sap. Leaves lanceolate, glabrous except when young, 5-15 cm long, base acute, apex acute to acuminate. Cymes umbellate, lateral. Corolla reflex-rotate, lobes imbricate

to the right, 5-10 mm long, glabrous, bright orange. Corona of 5 stipitate, tubular lobes (hoods) attached to the top of the gynostegium stipe, an acicular structure (horn) which arches over the gynostegium arises from within each of the hoods. Gynostegium long-stipitate. Pollinia pendent from dark horny corpuscula, 2 per anther, waxy, without a pellucid margin.

Asclepias curassavica Linnaeus, Sp. Pl. 215. 1753; Woodson, l.c. 59.

A native of tropical America, this weedy species has spread throughout the humid tropics; in Hassan common along the roadsides in the Ghats; Saldanha 8986, 9941, 10961, 12193, 13328, 12439, Stevens 520.

8. Calotropis R. Brown

Woody shrubs with copious milky sap. Leaves elliptic-ovate to obovate, densely arachnoid-pubescent when young, later glabrous, 10-20 cm long, base clasping-cordate, apex obtuse or slightly acuminate. Cymes subumbellate, lateral. Corolla rotate, lobes slightly imbricate to the right, 15-20 mm long, glabrous, purple to white. Corona of 5 keel-shaped lobes adnate to the gynostegium, each with a recurved vesicle at the base and a pair of auricles at the apex. Gynostegium

elongate but not strictly stipitate. Pollinia pendent from dark horny corpuscula, 2 per anther, waxy, without pellucid margins.

Calotropis gigantea (Linnaeus) Dryander in W. T. Aiton, Hort. Kew. ed. 2, 2: 78. 1811; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 17. 1962. Asclepias gigantea Linnaeus, Sp. Pl. 214. 1753.

A common weed throughout much of tropical Asia; in Hassan common in disturbed areas around habitation; Saldanha 9543, 9578, 12075, 12387A, 13383.

Parts of this plant are put to many local uses. The stems are a source of bast fiber, the seed comas are used for stuffing, and the highly toxic sap is used for a variety of medicinal purposes. The species has a number of rather specific insect predators and would be an excellent subject for the study of evolutionary and population biology. It is pollinated, probably exclusively, by carpenter bees (Xylocopa).

9. Cynanchum Linnaeus

Twining herbs with small rounded axillary leaves. Cymes lateral, often subumbellate. Corolla rotate, lobes imbricate to the right, glabrous. Corona attached to the base of the gynostegium, white, cupular. Gynostegium short-stipitate.

Pollinia pendent from dark horny corpuscula, 2 per anther, waxy, without pellucid margins.

A nearly cosmopolitan genus of perhaps 150 species, nomenclaturally and taxonomically difficult and very much in need of study.

1. Leaves sagittate with rounded lobes, cordate base with a broad sinus; major corona lobes acute, contorted.....C. tunicatum
1. Leaves linear-oblong, cordate base with a narrow sinus; major corona lobes obtuse and bifid, erect.....C. callialata

Cynanchum callialata Hamilton ex Wight, Contrib. 56. 1834; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 39. 1962; Wight, Ic. Pl. Ind. Or. 4: t. 1279. 1848.

Leaves linear-oblong, sparsely pubescent on margin and petiole, otherwise glabrous, whitish beneath, to 8 cm long, base cordate with a narrow sinus, apex short-acuminate, margins slightly undulate. Peduncles sparsely pubescent, pedicels puberulent. Sepals glabrous. Corolla lobes 5 mm long, light greenish-brown. Corona somewhat plicate, with 5 erect, obtuse, bifid lobes alternating with 1-several small lobes or teeth. Follicles winged.

Burma to southern India; in Hassan collected only along

Shiradi Ghat Road near the district border; Saldanha 15870.

Cynanchum tunicatum (Retzius) Alston in Trimen, Handb. Fl. Ceylon 6 (Suppl.): 194. 1931; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 40. 1962. Periploca tunicata Retzius, Obs. 2: 15. 1781; C. pauciflorum R. Brown, Mem. Wern. Nat. Hist. Soc. 1: 45. 1810; Wight, Ic. Pl. Ind. Or. 2: t. 354. 1840.

Leaves sagittate with rounded lobes, sparsely pubescent, somewhat lighter green below, to 8 cm long, base cordate with a broad sinus, apex acute to short-acuminate, margins undulate. Inflorescence glabrous or sparsely pubescent. Sepals ciliate on margins. Petals about 4 mm long, greenish-brown. Corona plicate, with 5 long, acute, contorted lobes alternating with 5 shorter lobes. Follicles without wings.

Southern Western Ghats and Ceylon; in Hassan collected only along Shiradi Ghat Road near the district border; Saldanha 15318.

10. Holostemma R. Brown

Stems twining, with abundant milky latex. Leaves ovate, glabrous or sparsely pubescent, to 15 cm long, base cordate with a broad sinus, apex short acuminate. Cymes lateral. Corolla rotate, petals imbricate to the right, 7-15 mm long,

glabrous, deep red-purple in the center above, whitish on the upper margins and below. Corona a fleshy unlobed ring at the base of the gynostegium. Gynostegium nonstipitate, elongate. Pollinia pendent from dark horny corpuscula, 2 per anther, waxy, without pellucid margins.

Holostemma annulare (Roxburgh) K. Schumann in Engler & Prantl, Pflanzenfam. 4 (2): 250. 1895; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 53. 1962. Asclepias annularis Roxburgh, Hort. Beng. 20. 1814; H. rheedei Wallich, Pl. As. Rar. 2: 51. 1831; Wight, Ic. Pl. Ind. Or. 2: t. 597. 1840-1843.

Eastern Burma through India and Ceylon; in Hassan collected only in Nagpuri Hills; Saldanha 13833, 13955.

The fleshy flower buds are said to be eaten as vegetables.

11. Pergularia Linnaeus

Stems twining or procumbent, sap milky. Leaves ovate, sparsely hispid below, 5-15 cm long, base deeply cordate, apex acuminate. Cymes corymbose to racemose, lateral. Corolla campanulate, petals slightly imbricate to the right, 10-14 mm long, with a wide pubescent margin above, otherwise glabrous, greenish-white. Corona with 2 series of lobes, the outer series of 5 membranous truncate flaps, the inner of

5 fleshy lobes, each provided with 2 spurs, one directed outward and downward and the other upward with the tip hooking over the gynostegium. Gynostegium elongate. Pollinia pendent from dark horny corpuscula, 2 per anther, waxy, with pellucid margins.

Pergularia daemia (Forsskal) Chiovenda, Result. Sc. Miss. Sefan.-Paoli Somal. Ital. 1: 115. 1916; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 39. 1962. Asclepias daemia Forsskal, Fl. Aeg.-Arab. 51. 1775; Pergularia extensa (Jacquin) N. E. Brown in Thistleton-Dyer, Fl. Cap. 4: 758. 1908; Doemia extensa (Jacquin) R. Brown ex Schultes in Linnaeus, Syst. Veg. ed. 15, 113. 1820.

Widespread in tropical Africa, northward to Afghanistan and eastward to India and Ceylon; in Hassan 1 plant collected in a cultivated field on west edge of Nagpuri hills; Saldanha 13976.

12. Sarcostemma R. Brown emend. Holm

Pendulous or scandent leafless herbs, somewhat succulent, with copious milky sap. Cymes umbellate, terminal. Corolla campanulate, lobes slightly imbricate to the right, glabrous, pale yellowish-white. Corona of 2 series of lobes, the outer short, cupular. Gynostegium sessile. Pollinia pendent from

dark horny corpuscula, 2 per anther, waxy, without pellucid margins.

These plants are thought to have been a major ingredient in the ancient Indian alcoholic beverage "soma." The fragrant flowers are produced in abundance and attract a variety of insect pollinators.

1. Style apex elongate-conical, exceeding the inner corona lobes; outer corona lobes 10.....S. intermedium
1. Style apex short-conical, not exceeding the inner corona lobes; outer corona lobes 5.....S. acidum

Sarcostemma acidum (Roxburgh) Voigt, Hort. Sub. Calc. 542. 1845; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 76. 1962. Asclepias acida Roxburgh, Fl. Ind. ed. 2, 2: 31. 1832; S. brevistigma Wight & Arnott in Wight, Contrib. 59. 1834; Wight, Ic. Pl. Ind. Or. 2: t. 595. 1840-1843.

Petals 4-6 mm long, margins revolute. Outer corona 5 lobed, inner corona of 5 fleshy erect lobes with the apexes strongly inflexed. Style apex short-conical, entire, not exserted.

Arid rocky areas of peninsular India; in Hassan found

only on a rocky peak in Nagpuri hills; Saldanha 14137.

Sarcostemma intermedium Decaisne in A. P. Candolle, Prodr. 8: 538. 1844; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 11. 1962; Wight, Ic. Pl. Ind. Or. 4: t. 1281. 1848.

Corolla lobes 5-8 mm long, margins revolute. Outer corona 10 lobed, inner corona of 5 fleshy erect lobes with the apexes slightly inflexed. Style apex elongate-conical, shallowly cleft, exerted.

Arid rocky areas of peninsular India; in Hassan locally abundant in dry scrub, often climbing on Euphorbia antiquorum; Saldanha 13543, 13841, 13982, 14235.

Marsdenieae

Sap milky or watery. Corolla lobes valvate or imbricate to the right. Pollinia 1 per anther locule, horizontal or occasionally ascending or descending from dark horny corpuscula, without pellucid margins.

13. Dregea E. Meyer nom. cons.

It is doubtful that this genus is distinct from Marsdenia, but until the group is critically monographed it seems wise to maintain the current usage.

Woody twiners, sap watery except milky in the follicles. Leaves ovate, sparsely pubescent on the veins, 10-15 cm long, base rounded to cordate, apex acuminate. Cymes umbellate, lateral. Corolla rotate, petals imbricate to the right, 5-7 mm long, margins ciliolate, pale green. Corona of 5 fleshy truncate lobes with cusps at the inner angles resting against the stigma head. Gynostegium short, nonstipitate. Pollinia erect from dark horny corpuscula, 2 per anther, waxy, without pellucid margins.

Dregea volubilis (Linnaeus f.) Bentham ex J. Hooker, Fl. Brit. Ind. 4: 46. 1883; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 42. 1962. Asclepias volubilis Linnaeus f., Suppl. 170. 1781; Marsdenia volubilis (Linnaeus f.) Cooke, Fl. Bombay 2: 166. 1904; Wight, Ic. Pl. Ind. Or. 2: t. 586. 1840-1843.

India and Ceylon eastward to the Malay Peninsula and Java; in Hassan occasional in both wet and dry areas; Saldanha 12896, 13021, 13908, Stevens 514.

14. Gymnema R. Brown

Woody twining shrubs with watery sap. Leaves ovate to oblong, sparsely to densely pubescent, 4-6 cm long, base rounded to cordate, apex short acuminate. Cymes corymbose,

lateral. Corolla campanulate, lobes valvate or slightly imbricate to the right, 2-4 mm long, coralline corona of a fleshy projection from each sinus which is incumbent upon the exserted style apex, each projection with a decurrent base flanked by 2 rows of short stiff hairs, corolla pale yellow with ciliolate margins. Gynostegium elongate, without a corona. Pollinia erect from dark horny corpuscula, 2 per anther, waxy, without pellucid margins.

Gymnema sylvestre (Retzius) R. Brown ex Schultes in Linnaeus, Syst. Veg. ed. 15, 6: 57. 1820; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 47. 1962; Wight, Ic. Pl. Ind. Or. 2: t. 349. 1840. Periploca sylvestris Retzius, Obs. 2: 15. 1781.

Widespread in tropical Africa, Asia and Melanesia; in Hassan common in all but the wettest areas; Saldanha 10687, 10836, 11706, 12153, 12389, 13395, 13779, 13801, 13930, 13934, 14054, Stevens 403, 436, 455.

Chewing the leaves of this plant makes one temporarily unable to taste sugar and consequently it has been fancied by some as a treatment for diabetes.

15. Hoya R. Brown

Stems climbing or pendent, usually epiphytic, weakly twining, rooting at the nodes. Sap milky. Flowers lateral, solitary or in umbels. Corolla rotate, petals valvate. Corona of 5 fleshy truncate lobes, with the outer margins stellately spreading, the upper surfaces concave, and the inner margins with cusps incumbent upon the gynostegium. Gynostegium short, nonstipitate. Pollinia erect from dark horny corpuscula, 2 per anther, waxy, without pellucid margins.

1. Leaves linear-oblanceolate, apex retuse; flowers solitary.....*H. retusa*
1. Leaves elliptic, apex not retuse; flowers in umbels
   2. Leaf apexes acuminate, margins revolute and not undulate, lateral veins at nearly right angles to the midrib.....*H. wightii*
   2. Leaf apexes not or only very slightly acuminate, margins undulate and not revolute, lateral veins oblique.....*H. ovalifolia*

Hoya ovalifolia Wight & Arnott *in* Wight, Contrib. 37. 1834; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 57. 1962; Wight, Ic. Pl. Ind. Or. 3: t. 847. 1844-1845.

Leaves elliptic, glabrous, 5-7 cm long, base acute to

slightly obtuse, apex acute to obtuse or very slightly acuminate, margins undulate and not revolute, lateral veins oblique (about 45°). Flowers in umbels. Petals 5-6 mm long, puberulent within, cream colored.

Southwestern peninsular India and Ceylon; in Hassan uncommon in wet forests; Saldanha 12622, Stevens 501.

Hoya retusa Dalzell, Hooker's J. Bot. Kew Gard. Misc. 4: 294. 1852; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 55. 1962.

Leaves linear-oblanceolate, glabrous, 3-4.5 cm long base acute, apex retuse, margins neither revolute nor undulate, lateral veins obscure. Flowers solitary. Petals 6-8 mm long, margins pubescent within, white.

Apparently restricted to forests of the central Western Ghats; in Hassan collected only near Kempuhole Bridge; Saldanha 11629, 14794.

Hoya wightii J. Hooker, Fl. Brit. Ind, 4: 59. 1883; Gamble, Fl. Madras 2: 849. 1923; Hoya pendula Wight & Arnott in Wight, Contrib. 36. 1834. (excl. syn.).

Leaves elliptic, glabrous, 5-10 cm long, base acute to attenuate, apex acuminate, margins revolute and not undulate, lateral veins at nearly right angles to the midrib (75-90°).

Flowers in umbels. Corolla lobes 7-9 mm long, puberulent within, cream colored.

Western peninsular India from about Bombay southward; in Hassan common in wet forests; Saldanha 12453, 12809, 13580, 13862, 14042, Stevens 422.

16. Tylophora R. Brown

Stems twining, erect, or procumbent, herbaceous or slightly woody at the base, sap watery or milky. Cymes umbellate to paniculate, lateral or terminal. Corolla rotate, lobes imbricate to the right. Corona 5-lobed. Gynostegium stipitate to nonstipitate. Pollinia horizontal to ascending, from somewhat darkened horny corpuscula, 2 per anther, waxy, without pellucid margins.

1. Stems erect; leaves 1-4 cm long.....T. fasciculata
1. Stems procumbent or twining; leaves 4-10 cm long
   2. Stems strictly procumbent; leaves rotund..T. rotundifolia
   2. Stems twining or sometimes trailing; leaves not rotund
      3. Pedicels pilose; petals pilose within; sap watery.....T. indica
      3. Pedicels glabrous; corolla glabrous; sap milky
         4. Leaves pilose; corolla 2-3 mm long; peduncles less than 3 mm long (to first flower).....T. dalzellii

4. Leaves glabrous; petals 4-5 mm long; peduncles about 20 mm long.....T. pauciflora

Tylophora dalzellii J. Hooker, Fl. Brit. Ind. 4: 43. 1883; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 87. 1962.

Stems twining, sap milky. Leaves elliptic to lanceolate, pilose, 5-8 cm long, base rounded to slightly cordate, apex acute to acuminate. Cymes lateral, umbellate to paniculate, blooming over a long period, the axis becoming branched and apparently thickened from the crowded persistent bracts and pedicel scars, peducles 1-3 mm long (to first flower), pilose, pedicels 1-2 cm long, glabrous. Sepals subulate, reflexed at the tips, sparsely pilose to glabrous. Petals 2-3 mm long, glabrous, reddish-purple. Corona lobes flattened, cuneate, adnate to the gynostegium. Gynostegium stipitate.

Western peninsular India; in Hassan occasional in wet areas; Saldanha 13785, 13886, 13896.

Tylophora fasciculata Hamilton ex Wight, Contrib. 50. 1834; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 85. 1962; Wight, Ic. Pl. Ind. Or. 3: t. 848. 1844-1845.

Stems erect, sap watery. Leaves ovate, pubescent on margins and veins, 1-4 cm long, base rounded to slightly

cordate, apex acute to short-acuminate. Cymes lateral, umbellate to paniculate, peduncles 2-5 mm long, pubescent, pedicels 5-10 mm long, pubescent. Sepals deltoid, revolute at anthesis, sparsely pilose. Corolla lobes 2.5-3 mm long, pilose within, purplish-brown. Corona lobes rounded, laterally concave, with a short cusp appressed to the gynostegium. Gynostegium stipitate.

Upper Gangetic Plain to southern peninsular India and Ceylon; in Hassan locally abundant on dry grassy hills; Saldanha 13838, 13879, 13952.

Tylophora indica (N. Burman) Merrill, Philipp. J. Sci. 19: 373. 1921; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 88. 1962. Cynanchum indicum N. Burman, Fl. Ind. 70. 1768; T. asthmatica (Roxburgh) Wight & Arnott in Wight, Contrib. 51. 1834; Wight, Ic. Pl. Ind. Or. 4: t. 1247. 1848.

Stems twining or sometimes trailing, sap watery. Leaves elliptic to ovate, pilose to occasionally glabrous, 5-10 cm long, base rounded to cordate, apex acute to acuminate or apiculate. Cymes lateral, umbellate to paniculate, peduncles 1-3 cm long, pilose, pedicels about 2 cm long, pilose. Sepals subulate, spreading, pilose. Petals 4-6 mm long, pilose within, reddish-purple in center, yellowish on margins. Corona lobes intricate, with a wide adnate base and a narrow

free apex arching against the gynostegium. Gynostegium slightly stipitate.

India and Ceylon eastward to the Malay Peninsula and Borneo; in Hassan the most common asclepiad, especially in the dry areas; Saldanha 8771, 10602, 10637, 10673, 13099, 13213, 13445, 13755, 13827, Stevens 489, 577.

The leaves of this plant contain significant amounts of two alkaloids and are reported to be effective in treating some types of asthma.

Tylophora pauciflora Wight & Arnott in Wight, Contrib. 49. 1834; Gamble, Fl. Madras 2: 843. 1923; Wight, Ic. Pl. Ind. Or. 4: t. 1247. 1848.

Stems twining, sap milky (?). Leaves linear-ovate, glabrous, 5-10 cm long, base rounded to slightly cordate, apex acute to acuminate. Cymes lateral, peduncles about 2 cm long, glabrous, pedicels 5-10 mm long, glabrous. Sepals deltoid, spreading, glabrous. Petals 4-5 mm long, glabrous, pale purplish-brown. Corona lobes globose, with small apical cusps. Gynostegium nonstipitate.

Southwestern peninsular India; common on the east side of Shiradi Ghat; Saldanha 15812, 15995.

Tylophora rotundifolia Hamilton ex Wight, Contrib. 50. 1834; Santapau & Irani, Bot. Mem. Univ. Bombay No. 4, 86. 1962.

Stems procumbent, sap watery. Leaves rotund to broadly ovate, pilose on margins and veins below, 4-8 cm long, base rounded to slightly cordate, apex rounded to obtuse, occasionally mucronate or emarginate. Cymes terminal or lateral, umbellate to paniculate, peduncles 1-5 cm long, pilose, pedicels 2-5 cm long, pilose. Sepals deltoid, spreading, pilose. Corolla lobes 3.5-4.5 mm long, glabrous or puberulent within, pale greenish-purple. Corona lobes fleshy, rounded, with short apical cusps appressed to the gynostegium. Gynostegium slightly stipitate.

Peninsular India; in Hassan locally common, especially near Byra; Saldanha 13439, 14540, 14650, Stevens 444, 601.

Ceropegieae

Sap watery. Corolla lobes valvate. Pollinia 1 per anther locule, erect from dark horny corpuscula, with a pellucid margin or apex.

17. Caralluma R. Brown

Ref.: F. H. Gravely & P. V. Mayuranathan. 1931. The Indian species of the genus Caralluma (Fam. Asclepiadaceae). Bull. Madras Gov. Mus. 4: 1-28, tt. 1-4.

Succulent herbs with erect quadrangular stems and clear

viscous sap. Leaves much reduced, caducous. Flowers in terminal or lateral umbels or borne singly in the leaf axils. Corolla rotate to campanulate, petals with valvate aestivation. Corona of one series of deeply trifid lobes, the central division of each lobe strap-shaped and inflexed over the gynostegium. Gynostegium short, nonstipitate. Pollinia erect from dark horny corpuscula, 2 per anther, waxy, with pellucid margins.

These species are pollinated by small, probably scatophagous, dipterans and perhaps also by small beetles.

1. Inflorescence a many flowered terminal umbel; corolla lobes connate for more than half their length.....C. umbellata
1. Flowers borne singly in the leaf axils; corolla lobes free for most of their length
   2. Corolla lobes folded back along the midrib, pilose or glabrous, with some yellow markings.....C. adscendens
   2. Corolla lobes not folded, at anthesis with a few large spindle-shaped hairs on the margin (easily lost), otherwise glabrous, without yellow markings.....C. stalagmifera

Caralluma adscendens (Roxburgh) J. Hooker, Fl. Brit. Ind. 4: 76. 1838; Gravely & Mayuranathan, l.c. 8. Stapelia

adscendens Roxburgh, Pl. Corom. 1: 28. 1795; C. fimbriata Wallich, Pl. As. Rar. 1: 7. 1839; C. attenuata Wight, lc. Pl. Ind. Or. 4: t. 1268. 1848.

Stems mostly 20-100 cm tall. Flowers mostly single in the upper leaf axils, pedicels less than 1 cm long. Calyx glabrous. Corolla campanulate, lobes free for most of their length, linear-deltoid, the distal 2/3 folded back along the midrib, apiculate, pubescence variable, densely pilose to glabrous, color variable, deep purple-brown and yellow in various patterns. Lateral divisions of adjacent corona lobes meeting and arching apart as long thin horns.

Arid areas of peninsular India, Ceylon, and Burma; in Hassan common in dry scrub areas; Saldanha 11324, 11931, 13535, 13821, 14406, 14500, 14501, Stevens 401, 488, 578.

A variable species that may actually involve several entities. Gravely & Mayuranathan recognized 6 varieties of this species, 2 or 3 of which are represented in the district. The difficulty of determination, however, makes their inclusion unwarranted. This species and the next are eaten uncooked in some areas.

Caralluma stalagmifera Fischer, Bull. Misc. Inform. p. 430. 1925; Gravely & Mayuranathan, l.c. 16.

Stems less than 40 cm tall. Flowers single in upper

leaf axils, pedicles less than 1 cm long. Calyx glabrous. Corolla rotate to campanulate, lobes free for most of their length, deltoid, not folded, apiculate, fresh flowers with a few very large reddish-purple spindle-shaped hairs hanging pendently along the distal margins, these easily detached, color deep purple-brown except for a thin white ring at the base. Lateral divisions of adjacent corona lobes meeting and arching upwards as long thin horns.

Arid peninsular India; in Hassan occasional in open scrub areas; Saldanha 14502, Stevens 398, 576.

Caralluma umbellata Haworth, Syn. Pl. Succ. 47. 1812; Gravely & Mayuranathan, l.c. 23; Wight, Ic. Pl. Ind. Or. 2: t. 495. 1840-1843; C. lasiantha (Wight) N. E. Brown, Gard. Chron. 12: 369. 1892; Wight, l.c. 4: t. 1286, 1848; C. campanulata (Wight) N. E. Brown, l.c. 369; Wight, l.c. t. 1287.

Stems mostly 20-30 cm tall, thick. Inflorescence a many-flowered terminal umbel, pedicels mostly 1-2 cm long. Sepals mostly somewhat pubescent distally. Corolla rotate to campanulate, size variable but lobes broad and connate for more than half their length, not folded or apiculate, pubescence variable, long pilose to glabrous, color variable, with deep purple-brown markings over a yellow background. Lateral divisions of corona lobes erect, deltoid.

Arid areas of India and Ceylon; in Hassan relatively common in dry rocky areas; Saldanha 9501, 12874, 13536, Stevens 475.

Often forming large circular patches among the rocks. A variable species throughout its range but represented in the district only by the most typical forms.

18. Ceropegia Linnaeus

Ref.: H. Huber. 1957. Revision der gattung Ceropegia. Mem. Soc. Brot. 12: 1-203.

Twining or erect herbs with watery sap. Cymes subumbellate, lateral. Corolla tubular, petals valvate. Corona of 2 series of lobes, the outer sometimes deeply bifid, the inner entire. Gynostegium stipitate or sessile. Pollinia erect from dark horny corpuscula, 2 per anther, waxy, with pellucid margins.

This genus has evolved a trap mechanism for pollination by small dipterans. The mouth of the tubular corolla is typically equiped with long, often colored, hairs which move with the slightest breeze, and these combined with the corolla color (purples, whites, and yellows) serve to attract the dipterans to the flowers. The neck of the corolla has retrorse hairs or is quite smooth, preventing the insects from easily escaping the flower after entering. The insects

are trapped in the inflated base of the corolla, which is often lighted by translucent areas on the sides (probably keeping the insects active), and pollinia become attached to them to be transferred to other flowers upon escape. Escape is facilitated during the last stage of anthesis by the corolla turning downward and the hairs in the neck becoming flaccid.

The fleshy underground parts of most of these species are eaten by animals, apparently wild boars in the district, and this probably accounts for the scarcity of these attractive plants. A number of other species in this genus may eventually be found in the district.

1. Leaves poorly developed or absent; stems fleshy.....C. juncea
1. Leaves well developed; stems not fleshy
   2. Stems erect; leaves all linear or narrowly lanceolate
      3. Stems and leaves glabrous; corolla lobes pilose for most of their length.....C. spiralis
      3. Stems and upper surface of leaves minutely puberulent, especially when young; corolla lobes pilose only at the base, glabrous above.....C. fimbriifera
   2. Stems twining; linear leaves, if present, on upper stem only

4. Plants densely pilose, especially on the stems and peduncles; inner corona lobes hooked..C. hirsuta

4. Plants sparsely pubescent or glabrous; inner corona lobes not hooked

5. Corolla lobes elongate, forming a narrow beak; gynostegium distinctly stipitate..C. candelabrum

5. Corolla lobes broadly rounded, not forming a beak; gynostegium sessile.....C. elegans

Ceropegia candelabrum Linnaeus, Sp. Pl. 211. 1753; Huber, l.c. 58; C. tuberosa Roxburgh, Pl. Corom. 1: 12, t. 9. 1795.

Rhizome tuberous, stem twining. Leaves ovate to lanceolate, sparsely hispid, 3-7 cm long, base acute to slightly cordate, apex acuminate to mucronate. Cymes mostly 5-15 flowered. Corolla 2-4 cm long, whitish-green, purple-striate, mouth slightly dilated, lobes narrow, densely purple-pilose. Outer corona lobes broadly rounded, pilose, about equaling the gynostegium, inner lobes spathulate, about 3 times the length of the outer. Gynostegium stipitate.

Central and southern peninsular India and Ceylon; in Hassan occasional in dry scrub; Saldanha 14103, Stevens 773.

Ceropegia elegans Wallich, Bot. Mag. 57: t. 3015. 1830; Huber, l.c. 72; Wight, Ic. Pl. Ind. Or. 4: t. 1265. 1848; C. mysorensis Wight, l.c. 3: t. 846. 1844-1845; C. walkerae

Wight, l.c. 4: t. 1266. 1848.

Rhizome not tuberous, stem twining. Leaves elliptic, glabrous or slightly puberulent, 3-12 cm long, base rounded, apex slightly acuminate. Cymes mostly 2-4 flowered. Corolla 2-4 cm long, dark purple, mouth widely dilated, lobes broad and folded back upon themselves, long purple-ciliate on the margins. Outer corona lobes deeply bifid, pilose on the outer margins, extending above the gynostegium, inner lobes linear, less than 2 times the length of the outer. Gynostegium sessile.

Mountains of southern peninsular India and Ceylon; in Hassan collected only near Mankanhalli; Saldanha 15620, Stevens 415.

Ceropegia fimbriifera Beddome, Madras Lit. Soc. J. ser. 2, 6: 53. 1861; Huber, l.c. 127.

Rhizome tuberous, stem erect. Leaves linear to narrowly lanceolate, puberulent above, 5-15 cm long, base and apex acute. Cymes 1-4 flowered. Corolla 3-4.5 cm long, greenish-white outside and purple-striate inside, mouth slightly dilated, lobes linear, densely long purple-pilose within at the base, glabrous above. Outer corona lobes bifid, ciliate, inner lobes linear. Gynostegium sessile.

Mountains of southern peninsular India; in Hassan one

plant collected at Vanagur; Saldanha 15532.

Ceropegia hirsuta Wight & Arnott in Wight, Contrib. 30. 1834; Huber, l.c. 63.

Rhizome tuberous, stem twining. Leaves variable, mostly ovate-elliptic with a rounded base, pilose, apex acute to obtuse. Cymes few-flowered. Corolla 3-5 cm long, light green and variously splotched and striped with purple, upper 1/3 of lobes light yellow, mouth dilated, lobes broad and folded back upon themselves, ciliate on the margins and mid-rib. Outer corona lobes deltoid with cleft apex, long pilose, extending above the gynostegium, inner lobes linear and hooked at the tips, 3 times the length of the outer. Gynostegium short-stipitate.

Southern Gangetic Plain southward to Mysore; in Hassan locally common in moderately dry scrub; Saldanha 9237, 14686, 14687.

Ceropegia juncea Roxburgh, Pl. Corom. 1: 12, t. 10. 1795; Huber, l.c. 85; Wight, Ic. Pl. Ind. Or. 4: t. 1260. 1848.

Rhizome not thickened, stem twining. Leaves reduced or usually absent. Cymes 2-5 flowered. Corolla 3-6 cm long, light whitish-green with purple spots, mouth dilated, lobes

narrow and folded back upon themselves, the lower 2/3 of the midrib pilose, the upper 1/3 with long, purple, clavate hairs. Outer corona lobes deltoid with cleft apex, pilose, extending slightly above the gynostegium, inner lobes narrowly linear and hooked at the tips, about 5 times the length of the outer. Gynostegium sessile.

Semiarid peninsular India; in Hassan occasional in scrub; Saldanha 11993, 13211, 13531, 13752.

Ceropegia spiralis Wight, Ic. Pl. Ind. Or. 4: t. 1267. 1848; Huber, l.c. 127.

Rhizome tuberous, stem erect. Leaves narrowly linear, glabrous, 10-20 cm long, base and apex acute. Cymes mostly single flowered. Corolla 4-6 cm long, greenish-purple below and purple above, mouth slightly dilated, lobes linear to ovate, purple-pilose within nearly to the apex. Outer corona lobes entire to slightly bifid, glabrous, inner lobes linear. Gynostegium sessile.

Mountains of southern peninsular India; in Hassan one plant collected in Nagpuri hills; Saldanha 17893.

19. Leptadenia R. Brown

Ref.: A. A. Bullock. 1955. Leptadenia, in Notes on African Asclepiadaceae. VI. Kew Bull. 10: 287-292.

Stems twining, becoming woody below. Sap watery. Leaves ovate to lanceolate, puberulent above and below, 4-12 cm long, base rounded to slightly cordate, apex acute to acuminate. Cymes umbellate, lateral. Corolla rotate to campanulate, lobes valvate, about 3 mm long, densely pubescent, pale greenish-white, margins revolute at anthesis, coralline corona of a fleshy bilobed protuberance at each sinus. Staminal corona of an inconspicuous undulating ring on the lower part of the stipitate gynostegium. Pollinia erect from dark, horny corpuscula, waxy, with pellucid curved appendages at the tips.

Leptadenia reticulata (Retzius) Wight & Arnott in Wight, Contrib. 47. 1834; Bullock, l.c. 291; Wight, Ic. Pl. Ind. Or. 2; t. 350. 1840. Cynanchum reticulatum Retzius, Obs. Bot. 2; 15. 1781.

Upper Gangetic Plain to peninsular India and Ceylon, eastward to Burma, also Madagascar, Mauritius, and the Coromo Islands; in Hassan collected only at Belavathalli State Forest; Saldanha 13216, 13978.

Pollinated by small dipterans.

BUDDLEIACEAE

Woody shrubs. Leaves opposite, simple, with a stipular line between the petioles, entire or serrulate. Flowers bisexual, 4-merous, actinomorphic, gamosepalous and gamopetalous, in terminal cymes. Stamens inserted in the corolla tube. Ovary superior, bilocular. Fruit a many seeded septicidal capsule.

Buddleia Linnaeus

Leaves lanceolate to linear-lanceolate, glabrous above and densely white tomentose below. Cymes thrysoid, densely white tomentose. Calyx 2-3 mm long, pubescent outside, lobes subulate. Corolla urceolate to tubular. Anthers subsessile. Stigma exserted, capitate.

Buddleia asiatica Loureiro, Fl. Cochinch. 72. 1790; Backer & Bakhuizen, Fl. Java 2: 212. 1965; Wight, Ic. Pl. Ind. Or. 3: t. 894. 1844-1845.

Throughout tropical Asia and Malasia; in Hassan occasional in second growth; Saldanha 10597, 11249, 12852.