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EPIDERMAL AND VENATION STUDIES IN APOCYNACEAE—V

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ABSTRACT

Epidermal characters and venation pattern of the leaves of ten species of Apocynaceae, *viz.*, *Aganosma marginata* G. Don, *Alstonia neriifolia* Don, *Alyxia fascicularis* Benth., *Anodendron paniculatum* A. DC., *Ecdysanthera brachiata* DC., *Melodinus khasianus* Hook. f., *M. monogynus* Roxb., *Microechites elliptica* Hook. f., *Rhazya stricta* Dcne. and *Tabernaemontana heyneana* Wall. have been described.

INTRODUCTION

The significance of epidermal characters and venation pattern as helpful tools in taxonomic and phylogenetic studies and also their utility in identifying crude drugs have already been discussed in the previous papers of the series [Chandra *et al.* (1969), Kapoor *et al.* (1969), Sharma *et al.* (1970) and Chandra *et al.* (1972)]. The present paper deals with ten species of the family Apocynaceae, *viz.*, *Aganosma marginata* G. Don, *Alstonia neriifolia* Don, *Alyxia fascicularis* Benth., *Anodendron paniculatum* A. DC. [*A. manubriatum* (Wall.) Merr.], *Ecdysanthera brachiata* DC. [*E. micrantha* DC.= *Parabarium micranthus* (A. DC.) Pierre ex Spire], *Melodinus khasianus* Hook. f., *M. monogynus* Roxb., *Microechites elliptica* Hook. f., *Rhazya stricta* Dcne. and *Tabernaemontana heyneana* Wall.

MATERIAL AND METHODS

Leaves were collected from the herbarium specimens, which have been cited against each specimen in parentheses. These were soaked in water for about twenty four hours. The same method was then followed as described earlier (Chandra *et al.* 1969).

OBSERVATIONS

Whereas the important data with regard to the epidermal features and venation of each species are presented in a nut shell in the Table I, the details are described below.

Aganosma marginata G. Don (Andamans, *Parkinson* 1916-CAL).

Macro-characters: Leaves opposite, simple, petiolate ; petioles up to 7 mm long, glabrous or shortly pubescent ; lamina linear-oblong, oblong, elliptic-oblong or oblong lanceolate, acute or bluntly acuminate or caudate, base acute or rounded, 5-10 cm × 2-4 cm, entire or nearly so, rather coriaceous, hard, adaxial surface glossy, glabrous, abaxial more or less pale, puberulus or scabrous along the prominent nerves or glabrescent, dark brown when dry, midrib impressed on adaxial surface, slightly channelled, nerves very strong on abaxial surface, lateral nerves 9-12 pairs, with shorter and slender intermediate ones, ultimately joined by a prominent, looped intramarginal nerve away from the margin of the blade.

Micro-characters: Epidermal cells mostly pentagonal, giantly striated, abaxial slightly sinuous-walled or walls slightly curved, the striations radiating from the stomata, adaxial straight-walled or walls slightly curved. Stomata confined to abaxial surface only, 26.64-29.97-34.9 × 13.32-14.98-18.32 μ, cyclocytic, rubiaceous and ranunculaceous, twin stomata present, shrivelled stomata observed (Fig. 1), stomatal index 18.3-18.6-18.8. Vein islets 23-24-25 per sq. mm. Vein end-

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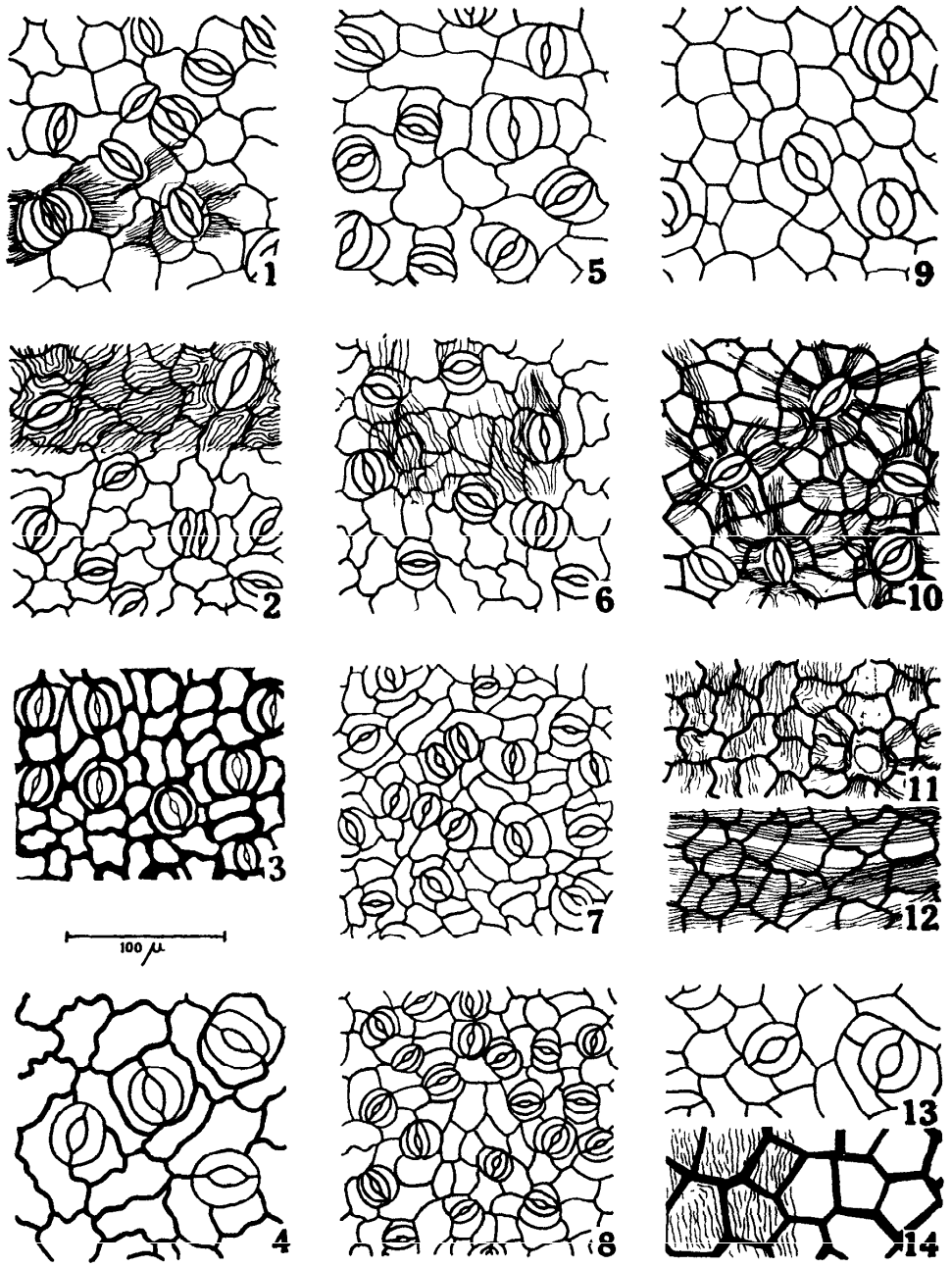
ings 5-6-7 per sq. mm. Palisade ratio 12-13-14.

Alstonia neriifolia Don (Parlakimedi, *Burkill* 17986-BSIS).

Macro-characters: Leaves opposite or 3-4 in a whorl, simple, shortly petiolate; lamina lanceolate or narrowly lanceolate, finely acuminate, base narrowed into the short petiole, 10-20 cm × 1-4 cm, entire, margin some-



Figs. 1-10. Foliar epidermis (abaxial surface) of: 1. *Aganosma marginata* G. Don (striations partly shown); 2. *Alstonia neriifolia* Don (striations partly shown); 3. *Alyxia fascicularis* Benth.; 4. *Anodendron paniculatum* DC.; 5. *Ecdysanthera brachiata* DC.; 6. *Melodinus khasianus* Hook. f. (striations partly shown); 7. *M. monogynus* Roxb.; 8. *Micrechites elliptica* Hook. f.; 9. *Rhazya stricta* Dcne. and 10. *Tabernaemontana heyneana* Wall. (striations shown in most part). Figs. 11-12. Foliar epidermis (adaxial surface) of: 11. *Alstonia neriifolia* Don; 12. *Melodinus khasianus* Hook. f.; 13. *Rhazya stricta* Dcne. and 14. *Tabernaemontana heyneana* Wall. (striations partly shown).

what incurved, densely pubescent on abaxial surface so as velvety to touch, pubescent on adaxial surface mainly on the midrib, when dried chestnut brown on adaxial surface and golden brown on abaxial surface, midrib slightly impressed on adaxial surface, raised on abaxial surface, lateral nerves many, slender, nearly straight and parallel, ultimately joining an intra-marginal vein near the margin; with usually long (sometimes 6 mm long), subulate interpetiolar glands.

Micro-characters: Epidermal cells polygonal, profusely striated on both the surfaces, striations irregular (Fig. 2) or radiating from a trichome base (Fig. 11), abaxial sinuous-walled or walls slightly sinuous, adaxial slightly sinuous-walled or walls slightly curved, slightly thick-walled. Stomata confined to abaxial surface, 16.65-23.31-26.64 × 11.66-14.98-16.65 μ, rubiaceous, actinocytic, rarely ranunculaceous, giant stomata present, twin stomata also present (Fig. 2), stomatal index 15.3-15.8-16.4. Trichomes uniseriate, unicellular, non-glandular (Fig. 26A). Vein islets 22-25-27 per sq. mm. Vein endings 6-7-8 per sq. mm. Palisade ratio 5.

Alyxia fascicularis Benth. [Assam, *G. King s.n.* acc. no. 289182, 1893 (CAL); Khasia Hills, *Burkill* 1911-CAL].

Macro-characters: Leaves opposite or ternate, simple, petiolate; petioles 2.5-10 mm long, glabrous; lamina, elliptic-oblong, oblong-lanceolate or elliptic-lanceolate, acuminate or obtusely caudate, base narrowed into the petiole, 2.5-10 cm × 1-3.5 cm, entire, coriaceous, glabrous on both the surfaces, shining on adaxial surface, green or pale brown when dry, adaxial surface with channelled midrib and numerous parallel very slender raised nerves, on abaxial surface midrib raised while other veins very faint or almost inconspicuous.

Micro-characters: Epidermal cells pentagonal, thick-walled, sinuous-walled or with walls curved or slightly sinuous. Stomata confined to abaxial surface, 21.65-26.64-28.31 × 14.98-16.65-18.32 μ, rubiaceous (Fig. 3), stomatal index 13.3-15-16.2. Multicellular peltate glands present on adaxial surface (Fig. 25). Vein islets 22-25-26 per sq. mm. Vein endings 11-12-13 per sq. mm. Palisade ratio 6.

Anodendron paniculatum A. DC. [*A. manubriatum* (Wall.) Merr.] (Singbhum, *Haines* 1903-CAL).

Macro-characters: Leaves opposite, simple, petiolate; petioles stout, 0.6-1.6 cm long; lamina of leaves towards the base elliptic or oblong, leaves towards the apex narrow-oblong, obtusely or acuminately cuspidate, base usually rounded, towards the base 14-20 cm × 10-22.5 cm, towards the apex, 10-22.5 cm × 3.7-6 cm, entire, thinly coriaceous, glabrous on both the surfaces, shining on adaxial surface, secondary nerves 12 to 15 pairs, distant, paralled, arched or nearly straight impressed on adaxial surface, slightly raised on abaxial surface.

Micro-characters: Epidermal cells mostly penta- or hexa-gonal, slightly thick-walled, abaxial sinuous-walled (Fig. 4), adaxial straight-walled or walls slightly curved or slightly sinuous; rosette crystals of calcium oxalate present. Stomata confined to abaxial surface only, 29.97-33.30-36.63 × 19.98-24.98-28.31 μ, with a gaping 4-6 μ, wide aperture, rubiaceous, cruciferous, ranunculaceous, stomatal index 13.3-13.9-14.5. Vein islets 13-14-15 per sq. mm. Vein endings 5-7-8 per sq. mm. Palisade ratio 11-12-13.

Ecdysanthera brachiata DC. [*E. micrantha* DC. = *Parabarium micranthus* (A. DC.) Pierre ex Spire] (Sikkim, *King's* coll. no. 2313, 1975-CAL).

Macro-characters: Leaves opposite, simple, petiolate; petioles 5-20 mm long, twisted, glabrous; lamina ovate-lanceolate, ovate-oblong or oblong-lanceolate, acuminate or caudate-acuminate, base acute, cuneate or obtuse, 5-18 cm × 2.5-6 cm, entire, thinly coriaceous, usually glabrous on both the surfaces or hairy in the angles of midrib and main lateral nerves, midrib impressed on adaxial

surface, raised on abaxial surface, lateral nerves 3-5 pairs, slender, very oblique, arcuate, nervation distinct.

Micro-characters: Epidermal cells tetra- or penta-gonal, abaxial with walls slightly sinuous or curved, adaxial straight-walled or walls slightly curved. Stomata confined to abaxial surface only, 16.65-19.98-23.31 × 9.99-11.66 μ, rubiaceous (Fig. 5), stomatal index 25.8-26.8-30.2. Trichomes uniseriate, 2- to 3-celled, nonglandular, with hooked or straight apex (Figs. 26 B & C). Vein islets 10-11-12 per sq. mm. Vein endings 5-6-7 per sq. mm. Palisade ratio 4-5-6.

Melodinus khasianus Hook. f. (Assam, *G. King* 1895-BSIS).

Macro-characters: Leaves opposite, simple, petiolate; petioles 1-10 mm long, glabrous; lamina linear-lanceolate or oblong-lanceolate, acute at both the ends, 3.5-13 cm × 1.2-3.7 cm, margins entire, recurved, more membranous than *M. monogynus* Roxb., glabrous on both the surfaces, midrib impressed on adaxial surface, raised on abaxial surface, lateral nerves about 19-22 pairs, slender, with many intermediate nerves, reticulations forming a beautiful net work on abaxial surface.

Micro-characters: Epidermal cells mostly pentagonal, striated, abaxial sinuous-walled (Fig. 6), striations irregular, of short lengths or longer, adaxial slightly thick-walled, walls slightly sinuous or curved, striations long and continuous (Fig. 12). Stomata confined to abaxial surface only, 19.98-23.31-24.98 × 13.32-16.65-18.32 μ rubiaceous, ranunculaceous, stomatal index 14.8-15.8-16.8. Vein islets 3 per sq. mm. Vein endings 2-3-4 per sq. mm. Palisade ratio 6-7-8.

M. monogynus Roxb. (Khasia Hills, *Anon.* acc. no. 288760-CAL).

Macro-characters: Leaves opposite, simple, petiolate; petioles 5-10 mm long, glabrous; lamina oblong-lanceolate or elliptic-oblong, acute, acuminate or obtuse, base acute or rounded, 5-15 cm × 1.2-6.2 cm, margins entire, obscurely recurved, thinly coriaceous, glabrous on both the surfaces, shining above, pale brown when dry, midrib and lateral nerves raised beneath, lateral nerves 15-20 pairs, not close, very slender, arching, intermediate nerves numerous, often forked, reticulations forming a beautiful net work on abaxial surface.

Micro-characters: Epidermal cells mostly pentagonal, abaxial slightly sinuous-walled or walls curved (Fig. 7), adaxial straight-walled or walls curved. Stomata confined to abaxial surface only, 16.65-21.65-23.31 × 14.98-16.65-19.98 μ, rubiaceous, cyclocytic, ranunculaceous, stomatal index 12.1-13.1-14.3. Vein islets 27-29-31 per sq. mm. Vein endings 17-18-20 per sq. mm. Palisade ratio 5-6-7.

Micrechites elliptica Hook. f. (Darjeeling, *Gamble* 1881-BSIS).

Macro-characters: Leaves opposite, simple, petiolate; petioles 7-12 mm long, glabrous; lamina elliptic-lanceolate or elliptic-oblong or oblong-lanceolate, obtusely or acutely acuminate, base acute or rounded, 6-15 cm × 2.5-5 cm, margin incurved, entire, thinly coriaceous, glabrous on both the surfaces, reddish in colour, midrib and main lateral nerves raised on abaxial surface, main lateral nerves 10-12 pairs, distant, nearly straight, very slender, slightly oblique, looping near the margin.

Micro-characters: Epidermal cells tetra- or pentagonal, abaxial with walls curved or slightly sinuous, adaxial slightly thick-walled, walls straight or slightly curved. Stomata confined to abaxial surface, 16.65-18.32-19.98 × 9.99-11.66-14.98 μ rubiaceous (Fig. 8), stomatal index 20.4-20.6-21.0. Vein islets 22-24-26 per sq. mm. Vein endings 5 per sq. mm. Palisade ratio 7-8-9.

Rhazya stricta Dcne. (Jhelum, Punjab, *Anon.* 24166-CAL).

Macro-characters: Leaves alternate, simple, sessile; lamina elliptic-lanceolate or linear-lanceolate or oblong-lanceolate, acute, base

tapering, 7-12 cm × 1-2 cm, entire, thick-coriaceous, glabrous on both the surfaces, yellowish brown when dry, nerves in fresh leaves (except the midrib) obscure, main lateral nerves 8-10 pairs, nearly straight or slightly arched.

Micro-characters: Epidermal cells polygonal, straight-walled or walls slightly curved. Stomata present on both the surfaces. nearly orbicular or broadly ellipsoid with wide gaping aperture (Figs. 9 & 13), on abaxial surface 26.64-29.97-39.96 × 23.31-29.97-33.30 μ, aperture 10-13.32 μ wide, cyclocytic, ranunculaceous, actinocytic and rarely cruciferous, stomatal index 10.7-11.5-12.6, on adaxial surface 26.64-33.30-39.96 × 23.31-29.97-33.30 μ, aperture 10-16.65 μ, wide, more commonly actinocytic and cyclocytic though ranunculaceous and cruciferous ones also present, twin stomata present, stomatal index 6-7-8. Vein islets 14-16-17 per sq. mm. Vein endings 15-17-18 per sq. mm. Palisade ratio 6.

Tabernaemontana heyneana Wall. (24-Parganas, West Bengal, *S. K. Dass* 1908-CAL).

Macro-characters: Leaves opposite, simple, petiolate; petioles 8-18 mm long, base dilated; lamina linear-oblong, linear-lanceolate, elliptic-oblong, elliptic-lanceolate, oblong or oblong-lanceolate, shortly and obtusely acuminate, base acute, 7-20 cm × 2.5-7.5 cm, entire, thinly coriaceous, glabrous on both the surfaces, dark brown and shining on adaxial surface when dry, paler on abaxial surface, midrib and nerves prominent on abaxial surface, main lateral nerves 12-16 pairs, arched, not close.

Micro-characters: Epidermal cells tetra- or hexa-gonal, profusely striated, straight-walled or walls slightly curved, abaxial with striations radiating from all sides of stomata frequently in regular bands (Fig. 10), slightly thick-walled, upper thick-walled, striations of short lengths (Fig. 14); rosette crystals of calcium oxalate present. Stomata confined to abaxial surface, 19.98-23.31-29.97 × 9.99-14.98-18.32 μ rubiaceous, actinocytic, stomatal index 8.3-9.3-10.0. Vein islets 14-15-16 per sq. mm. Vein endings 7-9-10 per sq. mm. Palisade ratio 14.

DISCUSSION

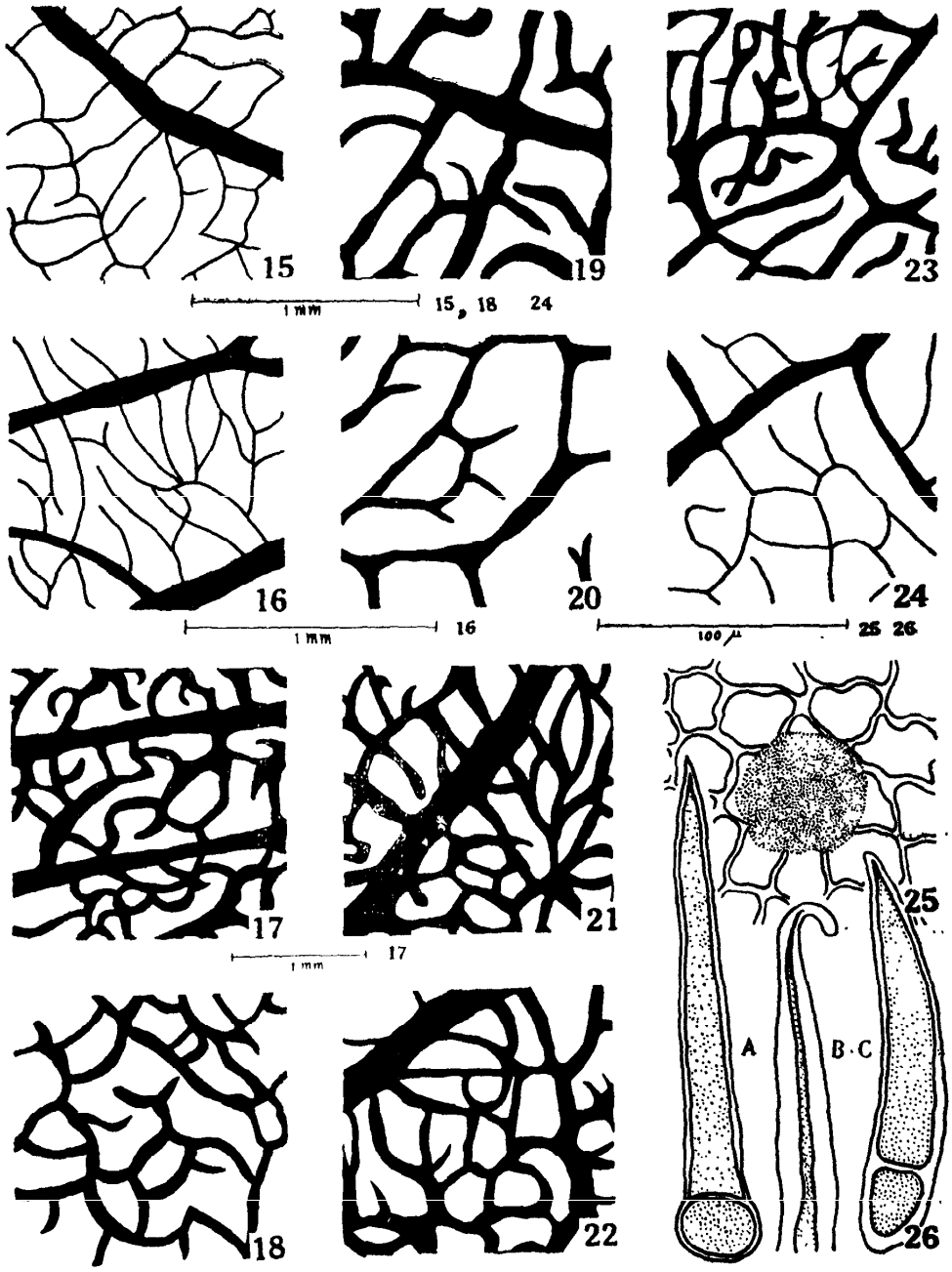
In the species investigated here, the epidermal cells, where straight-walled or with curved walls, are usually penta- or hexagonal which has been a common feature of almost all the species studied so far.

On the adaxial surface the epidermal cell walls are straight, curved or slightly curved in *Aganosma marginata* G. Don, *Anodendron paniculatum* DC., *Ecdysanthera brachiata* DC., *Melodinus monogynus* Roxb., *Micrechites elliptica* Hook. f., *Rhazya stricta* Dcne. and *Tabernaemontana heyneana* Wall. In *Anodendron paniculatum* DC. the walls may be slightly sinuous also. The walls are slightly sinuous or curved in *Alstonia neriifolia* Don and *Melodinus khasianus* Hook. f. In *Alyxia fascicularis* Benth. the walls are sinuous or slightly sinuous or even curved. The walls are characteristically thick in *Alyxia fascicularis* Benth. and *Tabernaemontana heyneana* Wall.

On the abaxial surface the epidermal cell walls are nearly straight or slightly curved in *Rhazya stricta* Dcne. and *Tabernaemontana heyneana* Wall. In *Aganoema marginata* G. Don., *Ecdysanthera brachiata* DC., *Melodinus monogynus* Roxb. and *Micrechites elliptica* Hook. f. the epidermal walls are slightly sinuous or curved. In *Alyxia fascicularis* Benth. sinuous, slightly sinuous or even curved walls have been observed. In *Alstonia neriifolia* Don, *Anodendron paniculatum* DC. and *Melodinus khasianus* Hook. f. the walls are sinuous; *A. neriifolia* Don has slightly sinuous walls also. The walls are characteristically thick in *Alyxia fascicularis* Benth. (Fig. 3).

The epidermis is characteristically striated in *Aganosma marginata* G. Don, *Alstonia neriifolia* Don, *Melodinus khasianus* Hook.

f. and *Tabernaemontana heyneana* Wall. In *A. marginata* the epidermis is faintly striated on both the surfaces, the striations on abaxial surface radiating from stomata (Fig. 1). In *Tabernaemontana heyneana* the epidermis is profusely striated, the striations, on abaxial surface, radiating from all sides of stomata frequently in regular bands (Fig. 19). In *Alstonia neriifolia* Don the striations are irregular or radiating from the tri-



Figs. 15-24. Venation pattern: 15. *Aganosma marginata* G. Don; 16. *Alstonia neriifolia* Don; 17. *Alyxia fascicularis* Benth.; 18. *Anodendron paniculatum* DC.; 19. *Ecdysanthera brachiata* DC.; 20. *Melodinus khasianus* Hook. f. 21. *M. monogynus* Roxb.; 22. *Micrechites elliptica* Hook. f.; 23. *Rhazya stricta* Dcne. and 24. *Tabernaemontana heyneana* Wall. Fig. 25. Peltate gland (adaxial surface): *Alyxia fascicularis* Benth. Fig. 26. (A-C). Trichomes: A. *Alstonia neriifolia* Don; B. & C. *Ecdysanthera brachiata* DC.

TABLE-

Sl. No.	Name of species	Stomata			Stomatal Index	
		Type*	Average size in (μ) Abaxial	Adaxial	Abaxial	Adaxial
1.	*Aganosma marginata* G. Don	Cy Ru Ra	29.97 × 14.98	—	18.3-18.6-18.8	—
2.	*Alstonia neriifolia* Don	Ru Ac Ra (rare)	23.31 × 14.98	—	15.3-15.8-16.4	—
3.	*Alyxia fascicularis* Benth.	Ru	26.64 × 16.65	—	13.3-15.0-16.2	—
4.	*Anodendron paniculatum* DC.	Ru Cr Ra	33.30 × 24.98	—	13.3-13.9-14.5	—
5.	*Ecdysanthera brachiata* DC.	Ru	19.98 × 9.99	—	25.8-26.8-30.2	—
6.	*Melodinus khasianus* Hook. f.	Ru	23.31 × 16.65	—	14.8-15.8-16.8	—
7.	*Melodinus monogynus* Roxb.	Ru Cy Ra	21.65 × 16.65	—	12.1-13.1-14.3	—
8.	*Micrechites elliptica* Hook. f.	Ru	18.32 × 11.66	—	20.4-20.6-21.0	—
9.	*Rhazya stricta* Dcne.	Cy Ra Ac Cr (rare)	29.97 × 29.97	33.30 × 29.97	10.7-11.5-12.6	6-7-8
10.	*Tabernaemontana heyneana* Wall.	Ru Ac	23.31 × 14.98	—	8.3-9.3-10.0	—

* Ra=ranunculaceous; Ru=rubiaceous; Cr=cruciferous; Cy=cyclocytic; Ac=actinocytic.

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Epidermal cell wall		Venation		Palisade ratio (average)
Abaxial	Adaxial	Vein islets per sq. mm (average)	Vein endings per sq. mm (average)	
Slightly sinuous or Curved	Stratight or Slightly curved	24	6	13
Sinuous or Slightly sinuous	Slightly sinuous or Curved	25	7	5
Sinuous or Slightly sinuous or Curved	Sinuous or Slightly sinuous or Curved	25	12	6
Sinuous	Straight or Curved or Slightly sinuous	14	7	12
Slightly sinuous or Curved	Straight or Curved	11	6	5
Sinuous	Slightly sinuous or Curved	3	3	7
Slightly sinuous or Curved	Straight or Curved	29	18	6
Slightly sinuous or Curved	Straight or Slightly curved	24	5	8
Straight or Slightly curved	Straight or Slightly curved	16	17	6
Straight or Slightly curved	Straight or Slightly curved	15	9	14

chome base (Figs. 2 & 11). In *Melodinus khasianus* Hook. f., the striations on adaxial surface are characteristically long and continuous (Fig. 12) while on the abaxial surface they are irregular and of short lengths or little longer (Fig. 6).

Rosette crystals of calcium oxalate are present in *Anodendron paniculatum* A. DC. and *Tabernaemontana heyneana* Wall.

The stomata are, as a rule, confined to abaxial surface of the leaves, except in *Rhazya stricta* Dcne., in which they occur on adaxial surface also (Fig. 13); their frequency of occurrence on the adaxial surface is, however, of a lower order (stomatal index being 6-7-8) when compared to that on abaxial surface (stomatal index being 10.7-11.5-12.6).

The stomata are generally rubiaceous but in *Rhazya stricta* Dcne., the rubiaceous type of stomata are not present. In this species they are observed to be actinocytic, cyclocytic (on adaxial surface these two types are more common) ranunculaceous, and rarely cruciferous. In some species in addition to the rubiaceous ones other types have also been observed. For instance ranunculaceous stomata have been observed in *Aganosma marginata* G. Don, *Anodendron paniculatum* DC., *Melodinus monogynus* Roxb. and rarely in *Alstonia neriifolia* Don. Of these, *Aganosma marginata* G. Don and *Melodinus monogynus* Roxb. are also seen to possess cyclocytic ones, and *Alstonia neriifolia* Don and *Tabernaemontana heyneana* Wall. actinocytic ones. Cruciferous type of stomata have been seen, besides *Rhazya stricta* Dcne., in *Anodendron paniculatum* DC. also. The interesting features with regard to *Aganosma marginata* G. Don, *Alstonia neriifolia* Don and *Rhazya stricta* Dcne. Is the presence of twin stomata in all the three species. In the former species shrivelled stomata have been seen. In *Alstonia neriifolia* Don giant stomata have been observed. In *Rhazya stricta* Dcne., the stomatal aperture is noticeably wide; in *Anodendron paniculatum* A. DC. also the stomatal aperture is conspicuously gaping (Fig. 4). However, more material need be examined in order to conclude whether the character of gaping stomatal aperture is of any systematic value.

The width of stomata is least in case of *Ecdysanthera brachiata* DC. (9.99 μ), and maximum in *Rhazya stricta* DC. (29.97 μ), *Aganosma marginata* G. Don, *Alstonia neriifolia* Don and *Tabernaemontana heyneana* Wall. have each 14.9 μ, wide stomata while *Alyxia fascicularis* Benth., Melodinus *khasianus* Hook.f. and *M. monogynus* Roxb. have each 16.65 μ wide ones. In *Anodendron paniculatum* DC. the stomata are quite wide (24.98 μ) and in *Micrechites elliptica* Hook. f. they are quite narrow (11.6 μ). Comparing the length of stomata in various species we find that those of *Anodendron paniculatum* DC. and *Rhazya stricta* Dcne. (adaxial surface ones) are the longest. A glance at the Table I will show that the quantitative values of the measurement of the stomata are of systematic significance. Similarly the figures of stomatal index too are distinctive in some species. *Ecdysanthera brachiata* DC., for example, has a high range of 25.8-26.8-30.2, whereas the *Tabernaemontana heyneana* Wall. has a low range of 8.3-9.3-10.0. In *Rhazya stricta* Dcne. the stomata are relatively longer on the adaxial surface than on the abaxial.

Venation pattern of the various species studied here (Figs. 15-24) can be gainfully employed for identifying them.

The number of vein islets per sq. mm is distinctively high in *Melodinus monogynus* Roxb. (29) and remarkably low in *M. khasianus* Hook.f. (3) a feature which can be used to distinguish these two species.

The species having a high number of vein islets per unit area (above 20) are *Aganosma marginata* G. Don (24), *Alstonia neriifolia* Don (25), *Alyxia fascicularis* Benth. (25) and *Micrechites elliptica* (24). The remaining

species have relatively low number of vein islets per unit area (below 20).

The number of vein endings per sq. mm too is a distinguishing feature between the two *Melodinus* spp. studied here ; *M. monogynus* Roxb. having as high as 18, whereas *M. khasianus* Hook. f. having as low as 3 (It may be recalled that these two species differed in cell walls of their epidermis as well ; in *M. monogynus* Roxb. epidermis is non-striated and abaxial epidermis has slightly sinuous-walled cells ; in *M. khasianus* epidermis is striated and the cells on abaxial surface are sinuous-walled ; the adaxial epidermis is straight-walled or with curved walls in *M. monogynus* and the walls are slightly sinuous or curved in *M. khasianus*).

The palisade ratio figures are remarkably high in *Anodendron paniculatum* DC. (12), *Aganosma marginata* G. Don (13) and *Tabernaemontana heyneana* Wall. (14). The palisade ratio is low in the remaining species.

It will not be out of place to compare the two species of *Aganosma* with regard to the utility of the features of epidermis and venation in distinguishing them from each other. *A. caryophyllata* (Roxb. ex Sims.) G. Don [=*A. dichotoma* (Roth) Sehum.] (Sharma *et al.* 1970) and *A. marginata* G. Don are distinguishable by size of stomata (21.7×19.7 μ ; 29.97×14.98 μ respectively), epidermal cell walls of the abaxial surface (almost straight ; sinuous respectively), number of vein islets and vein endings per sq. mm (8 & 24, and 20 & 6 respectively) and palisade ratio (7.8 and 13 respectively).

The comparison of the three species of *Alstonia, viz., A. macrophylla* Wall. ex DC. (Chandra *et al.*, 1969), *A. neriifolia* Don (presently investigated) and *A. scholaris* R. Br. (Kapoor *et al.* 1969) is interesting. For facilitating a comparison, the interesting details are presented in Table II.

TABLE II

Name of species	Epidermal cell wall		Stomata	Veins		
	Abaxial	Adaxial	Stomatal index	Size (μ)	Islets per sq. mm	Ending per sq. mm
A. macrophylla	Slightly sinuous	Straight	15-18-22	20 × 13.7	26	21
A. neriifolia	Sinuous or Slightly sinuous	Slightly Sinuous or Curved	15.3-15.8-16.4	23.31 × 14.98	25	7
A. scholaris	Straight	Straight	5-7.5-12	21 × 13.4	4	18

It is thus evident that the characters of epidermis and venation are of systematic value in distinguishing the three species of *Alstonia* from one another.

However, this fact is to be borne in mind that all species of a particular genus need to be examined before proclaiming that a particular character has any systematic or diagnostic value.

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