

## 676. AESCHYNANTHUS BUXIFOLIUS

Gesneriaceae

David J. Middleton

**Summary.** *Aeschynanthus buxifolius* is described and illustrated. The pollination biology and cultivation of the genus is discussed.

*Aeschynanthus* Jack is one of the largest genera in the Gesneriaceae with about 160 species from Sri Lanka and India through southern China and Southeast Asia to New Guinea and the Solomon Islands (Weber, 2004). They are mostly epiphytic subshrubs with rather fleshy leaves and brightly coloured flowers. The genus was first described by Jack (1823), with two species, *Aeschynanthus volubilis* Jack and *A. radicans* Jack, both from Sumatra. Two species of *Aeschynanthus* from Nepal had earlier been described by Don (1822) in the genus *Trichosporum*, *T. grandiflorum* D. Don (now *Aeschynanthus parasiticus* (Roxb.) Wall.) and *T. parviflorum* D. Don (now *A. parviflorus* (D. Don) Spreng.) but *Aeschynanthus* has been conserved against this earlier name (Sprague, 1929). New taxa were then slowly described over the years until C. B. Clarke (1883) listed all of the then known species and described many more, 64 in total. Since then exploration and plant collection in South, East and Southeast Asia has brought more and more species to light, right up to the present day (e.g. Mendum, 1999; 2001; 2004 [2003]; Mendum *et al.*, 2006; Middleton, 2007a; 2007b; 2009).

Weber (2004) placed *Aeschynanthus* in what he referred to as the Didymocarpoideae Gesneriaceae along with the majority of the Asian genera of Gesneriaceae. He did not propose a tribal classification within the Didymocarpoideae Gesneriaceae, but the genus has mostly been placed in tribe Trichosporeae (see Burt & Wiehler, 1995) along with *Agalmyla* Blume, *Lysionotus* D. Don and *Loxostigma* C. B. Clarke. Molecular phylogenetic research does not support the close association of these genera (see Möller *et al.*, 2009) but a new workable tribal classification has yet to be formulated.

A formal infrageneric classification system for *Aeschynanthus* was first proposed by Bentham (1876), mainly using characters of the seed appendages, but also incorporating calyx characters. Later classifications (Clarke, 1883; Burt & Woods, 1975; Wang, 1984) were elaborations of the same system, but problems with this framework

have been highlighted through the work of Denduangboripant *et al.* (2001), Mendum *et al.* (2001) and Christie & Mendum (2002). Although the current system, based on seed appendage and calyx characters, is convenient it has not been found to correspond well to the molecular phylogenetic findings. These findings, however, must still be considered rather preliminary and a more comprehensive infrageneric system has still to be developed. In the existing system *Aeschynanthus buxifolius* belongs to *Aeschynanthus* sect. *Microtrichium* C. B. Clarke, a section characterised by very short seed appendages.

All species of *Aeschynanthus* are epiphytic although some may also be lithophytic or creeping on banks or around the bases of trees. The branches may rarely be erect (e.g. *Aeschynanthus buxifolius*), but are more commonly arching and pendulous, completely pendulous, or creeping (but usually not exclusive of some of the other growth forms). When the plant is creeping, adventitious roots often form at the nodes. They are mostly rather easily spotted in tropical forests as many species have large bright red flowers. A smaller number of species have green, yellow, orange or purplish flowers. One species, *Aeschynanthus chiritoides* C. B. Clarke, has white flowers.

Burt & Woods (1975) suggested that the flowers of most species of *Aeschynanthus* have characters associated with bird pollination: arcuate corolla tube, exerted anthers shedding pollen downwards, strong protandry and copious nectar. McClure (1966) noted that the flowers of an unidentified *Aeschynanthus* species in Peninsular Malaysia were visited by three different species of spiderhunter birds (genus *Arachnothera*, family Nectariniidae). Freeman *et al.* (1991) analysed the nectar of various *Aeschynanthus* species from Peninsular Malaysia and found it to have low sucrose levels, which they suggest is typical for flowers associated with sunbirds (also family Nectariniidae). In the greenhouse, little fruit set is observed unless the plants are hand-pollinated. No self-incompatibility is known (Burt & Woods, 1975). With the small seed size and the appendages at either end the seeds are quite clearly adapted for wind dispersal. Mendum *et al.* (2001) suggest that when the appendages are wet they may also help in anchoring the seeds to a suitable substrate.

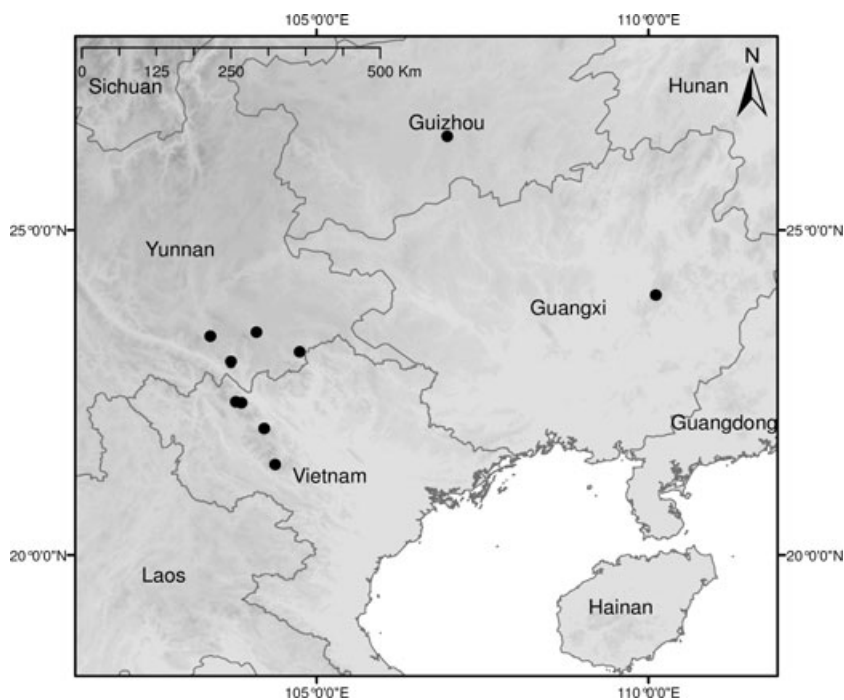
*Aeschynanthus buxifolius* Hemsl. was described in 1903 (Hemsley, 1903) based on collections made by Augustine Henry (1857–1930) and William Hancock (1847–1914). It has so far been collected



Plate 676 *Aeschynanthus buxifolius*

MASUMI YANAMAKA





Map of part of south-east Asia, showing distribution of *Aeschynanthus buxifolius*; drawn by Mark Hughes.

rather infrequently in southern China (Yunnan, Guangxi, Guizhou) and northern Vietnam (Lao Cai, Yen Bai), (see map.). It is most easily distinguished from other species in China and Vietnam by the dense minute papery ridges on the stems, resulting in a flaky wrinkled look. It shares this character with *Aeschynanthus garrettii* Craib from Thailand and *A. tubulosus* J. Anthony from China and Burma but those species generally have larger leaves and lack the stout hairs in the corolla tube. It is also rather unusual in having stems more upright than most species of the genus except for the species in the *Aeschynanthus andersonii* C. B. Clarke group. However, species of that group are generally smaller plants with smaller flowers, have rather soft leaves and have much longer appendages on the seeds.

**CULTIVATION.** *Aeschynanthus* species are relatively easy epiphytes to cultivate and propagate. They generally grow all year round in the greenhouse kept at 18–24°C, but summer is the best time for

growth and to take cuttings. The same techniques can be used for both lowland and highland species. They should be grown in hanging baskets with a free draining and open compost consisting of bark, perlite, vermiculite and charcoal. This allows water to pass through easily but hold onto enough to last the day. Underfeed rather than overfeed to keep the plants compact and more floriferous. Cuttings are best taken from mature or only slightly immature material during the early summer. If too young, they are susceptible to rot before rooting. They should be nodal, around 10 cm long, with all but a few of the leaves removed to minimise water loss. Use a 50/50 bark perlite cutting mix and place in a closed propagation unit, to maintain humidity, and set at 25°C. *Aeschynanthus* species are generally pest free but do occasionally succumb to mealy bug and aphids. Viruses do occur, causing leaf discolouration only.

The plant illustrated here was collected in North Vietnam by Keith Rushforth, whose field notes are as follows:

*Aeschynanthus* KR 7798, VIETNAM: Yen Bai province, Tram Tau to Phu Luong range, from Thai minority guides' house at station 339 (21.27'43.3'N, 104.22'57.8'E, 725 m) via roadhead at station 340 (21.26'19.5'N, 104.23'38.5'E, 730 m), on track up foothills to station 341 (21.25'03.9'E, 1000 m) and then through logged mesic forest including *Liriodendron chinense* and felled *Fokienia* to night stop on deforested ridge, at station 342 (21.24'11.9'N, 104.22'33.6'E, 1700 m) and into the primary but disturbed forest at and above station 343 (21.24'00.7'N, 104.22'35.1'E, 1950 m) to c. 2050 m: epiphyte on fallen tree, flowers red, striking, October 18, 2003.

This plant has proved able to withstand some frost, surviving -6°C., in a sheltered position in 2008/2009, and in a frost-free greenhouse. (Rushforth pers. comm.).

***Aeschynanthus buxifolius*** Hemsl., J. Linn. Soc. Bot. 35: 515 (1903). Type: China, Yunnan, Mengtze, *A. Henry* 11217 (lectotype, designated by Middleton, 2009, E; isolectotypes: E, K, US).

**DESCRIPTION.** *Epiphyte*, rarely lithophytic; *stems* erect, slightly arching when very long, with papery ridges giving stems a wrinkled look, especially when younger. *Leaves* opposite; petiole 1–4 mm long, glabrous; blade slightly fleshy, elliptic or oblong, dark green above, paler beneath, not marbled, 0.6–3 × 0.5–9 cm, 1.2–3.7 times as long as wide, apex acute to rounded, base cuneate to rounded, glabrous above and beneath, not punctate beneath, margins entire,

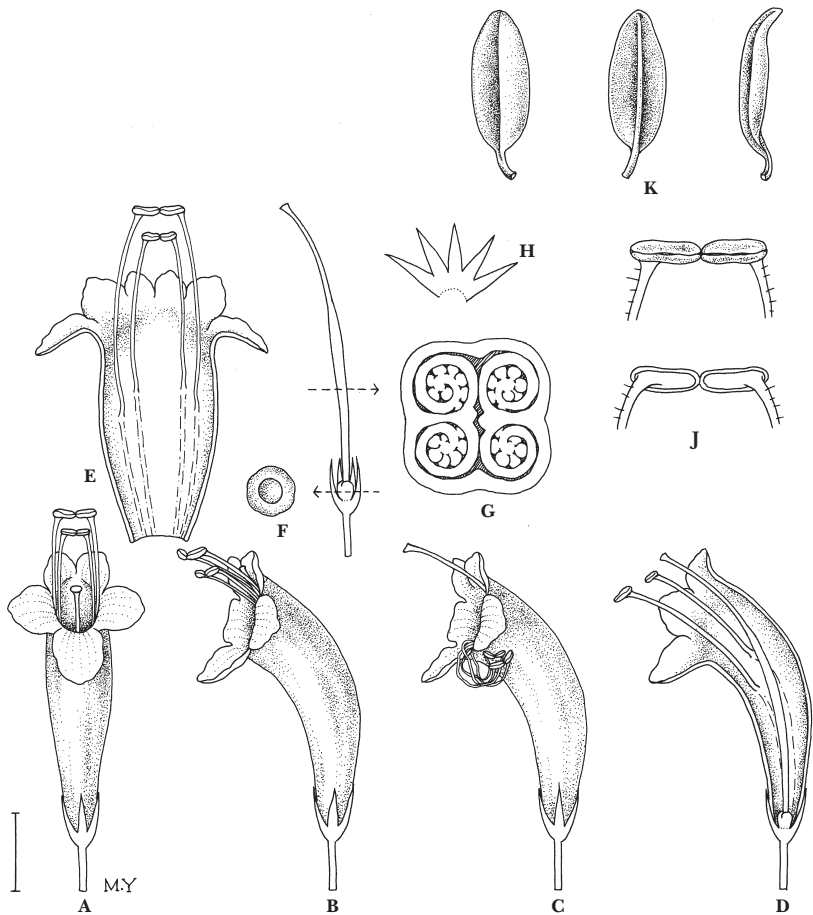


Fig. 1. *Aeschynanthus buxifolius*. A, flower (from below),  $\times 1$ ; B, flower, side view, before dehiscence of anthers,  $\times 1$ ; C, flower, side view, after dehiscence of anthers, with extended style,  $\times 1$ ; D, l.s. flower, side view,  $\times 1$ ; E, corolla, opened out,  $\times 1$ ; F, t.s. disk,  $\times 3$ ; G, t.s. ovary,  $\times 20$ ; H, calyx, opened out  $\times 1\frac{1}{2}$ ; J, stamens, 2 views  $\times 6$ ; K, leaf, 3 views,  $\times 1$ . Drawn by Masumi Yanamaka from KR 7798.

secondary veins obscure, tertiary venation obscure. *Inflorescences* subterminal or axillary; *flowers* solitary, peduncle absent; *bracts* green, minute; *pedicels* 6–14 mm long, green, glabrous. *Calyx* of separate lobes free to base, green faintly flushed red, glabrous, lobes linear or narrowly triangular, erect, 3.7–8  $\times$  0.9–1.8 mm, apex acute or rounded. *Corolla* 24–37 mm long, externally tube bright red to dark red, lobes bright red, internally tube yellow, lobes bright red with cream and dark markings on lower three lobes, base of tube narrow to broad; upper lobes squarish, ovate or oblong, reflexed or not, 3.2–5  $\times$  3.1–4.6 mm, sinus

2.5–3.7 mm deep, apex rounded; lateral lobes deltoid or ovate, reflexed or not, 3.9–6 × 4.2–8 mm, apex rounded; lower lobe oblong or elliptic, reflexed or not, 5–7.5 × 3.6–6.4 mm, apex rounded; glabrous outside except for ciliate lobes, inside with sparse glandular hairs and short stiff upward pointing hairs near base, sessile glands inside tube present. *Stamens* long exserted, fused in two pairs, filaments white at base and red higher, with glandular hairs in upper part, papillose at base, anthers red; anterior filaments inserted at 12–19 mm from corolla base which is 41–51% of corolla length, filaments 26–28 mm long, anthers 2.6–3.2 × 1.1–1.3 mm; posterior filaments inserted at 16–20 mm from corolla base which is 54–61% of corolla length, filaments 20.5–22.5 mm long, anthers 2.1–2.8 × 1.2–1.4 mm; staminode 0.9 mm long. *Pollen* yellow. *Disk* 1.2–1.3 mm high, 5-crenate or a simple annular ring. *Pistil* 24.5–48.5 mm long; stipe 10–18.5 mm long, glabrous or with few sessile glands; *ovary* cream, 8–15 mm long, glabrous or with sessile glands; *style* cream, 6.5–15 mm long, glabrous or with few sessile glands; stigma cream, edged red. *Capsule* 6–7.5 cm long, c. 3 mm wide, with a long narrow section at base. *Seed* grain 0.8–1 × 0.3 mm, papillose; bubble cells absent; apical appendage short and stout, 0.5–0.8 mm long; hilar appendage single and stout, 0.5–1.1 mm long, appendages not papillose.

**DISTRIBUTION.** Southern China (Yunnan, Guangxi, Guizhou), northern Vietnam (Lao Cai, Yen Bai).

**HABITAT AND ECOLOGY.** In forest at 1600–2550 m.

**ACKNOWLEDGEMENTS.** The author would like to thank Steve Scott, for providing the information on *Aeschynanthus* cultivation, Mark Hughes for producing the distribution map, and Keith Rushforth for kindly supplying his field notes.

#### REFERENCES

- Bentham, G. (1876). Gesneriaceae. In: Bentham, G. & Hooker, J.D., *Genera Plantarum*, vol. 2. pp. 990–1025. Reeve & Co., London.
- Burt, B.L. & Wiehler, H. (1995). Classification of the family Gesneriaceae. *Gesneriana* 1: 1–4.
- Burt, B.L. & Woods, P.J.B. (1975). Studies in the Gesneriaceae of the old world xxxix: towards a revision of *Aeschynanthus*. *Notes from the Royal Botanic Garden Edinburgh* 33: 471–489.
- Christie, F. & Mendum, M. (2002). The ontogeny of *Aeschynanthus* seeds: a comparative study using scanning electron microscopy. *Botanical Journal of the Linnean Society* 138: 197–207.
- Clarke, C.B. (1883). Cyrtandreae. In: de Candolle, A.L.L.P. & de Candolle, A.C.P. (eds), *Monographiae Phanerogamarum*, vol. 5. pp. 1–303. G. Masson, Paris.
- Denduanguboripant, J., Mendum, M. & Cronk, Q.C.B. (2001). Evolution in *Aeschynanthus* (Gesneriaceae) inferred from ITS sequences. *Plant Systematics and Evolution* 228: 181–197.
- Don, D. (1822). Descriptions of two new genera of Nepaul plants. *Edinburgh Philosophical Journal* 7: 85–86.



- Freeman, C.E., Worthington, R.D. & Jackson, M.S. (1991). Floral nectar sugar compositions of some South and Southeast Asia species. *Biotropica* 23: 568–574.
- Hemsley, W.B. (1903). Descriptions of new Chinese plants. *Journal of the Linnean Society, Botany* 35: 483–518.
- Jack, W. (1823). On Cyrtandraceae, a new natural order of plants. *Transactions of the Linnean Society* 14: 23–44.
- McClure, H.E. (1966). Flowering, fruiting and animals in the canopy of a tropical rain forest. *Malayan Forester* 29: 182–203.
- Mendum, M. (1999). Three new species of *Aeschynanthus* (Gesneriaceae). *Edinburgh Journal of Botany* 56: 265–272.
- Mendum, M. (2001). Three new Gesneriaceae from Palawan, Philippines. *Edinburgh Journal of Botany* 58: 435–441.
- Mendum, M. (2004 [2003]). The Gesneriaceae of Sulawesi: 3. Three new species of *Aeschynanthus*. *Edinburgh Journal of Botany* 60: 323–330.
- Mendum, M., Lassnig, P., Weber, A. & Christie, F. (2001). Testa and seed appendage morphology in *Aeschynanthus* (Gesneriaceae): phytogeographical patterns and taxonomic implications. *Botanical Journal of the Linnean Society* 135: 195–213.
- Mendum, M., Scott, S.M. & Galloway, L.E.R. (2006). The Gesneriaceae of Sulawesi IV: two new species of *Aeschynanthus*. *Edinburgh Journal of Botany* 63: 67–72.
- Middleton, D.J. (2007a). A new species and a new combination in *Aeschynanthus* (Gesneriaceae) from Laos. *Edinburgh Journal of Botany* 64: 45–50.
- Middleton, D.J. (2007b). A revision of *Aeschynanthus* (Gesneriaceae) in Thailand. *Edinburgh Journal of Botany* 64: 363–429.
- Middleton, D.J. (2009). A revision of *Aeschynanthus* (Gesneriaceae) in Cambodia, Laos and Vietnam. *Edinburgh Journal of Botany* 66: 391–446.
- Möller, M., Pfosser, M., Jang, C.-G., Mayer, V., Clark, A., Hollingsworth, M.L., Barfuss, M.H.J., Wang, Y.-Z., Kiehn, M. & Weber, A. (2009). A preliminary phylogeny of the ‘Didymocarpoid Gesneriaceae’ based on three molecular data sets: incongruence with available tribal classifications. *American Journal of Botany* 96(5): 989–1010.
- Sprague, T. A. (1929). *Nomenclature Proposals by British Botanists*. HMSO, London.
- Wang, W.T. (1984). *Aeschynanthus*. *Bulletin of Botanical Research, Harbin* 4: 26–30.
- Weber, A. (2004). Gesneriaceae. Pp. 63–158 in: Kubitki, K. & Kadereit, J.W. (eds), *The Families and Genera of Vascular Plants, vol. 7. Dicotyledons. Lamiales (except Acanthaceae incl. Avicenniaceae)*. Springer, Berlin and Heidelberg.