

## Studies on the *Gymnantheminae* (Asteraceae: Vernonieae). II: a new genus, *Decaneuropsis*, from China, India, southeast Asia, and Malaysia

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**Abstract.**—The genus *Decaneuropsis* of the Asteraceae, Vernonieae, subtribe *Gymnantheminae*, is named as new, with the transfer of 12 species from southeast Asia and Malaysia. Combinations are provided for the type species, *Vernonia cumingiana*, and 11 other known members of the genus, *V. andamanica*, *V. andersonii*, *V. blanda*, *V. chingiana*, *V. craibiana*, *V. eberhardtii*, *V. garrettiana*, *V. gratiosa*, *V. obovata*, *V. philippinensis*, and *V. vagans*.

The present study continues a critical review of the Eastern Hemisphere Vernonieae, some of which have been placed in the genus *Gymnanthemum* Cass. by Robinson (1999a) and were traditionally placed in the genus *Vernonia* Schreb. (Bentham & Hooker 1873). Recent studies have shown *Vernonia* to be a mostly eastern North American genus (Robinson 1999b). More recently, the Asiatic and Indonesian genera *Monosis* DC (Robinson & Skvarla 2006) and *Strobocalyx* (Blume ex DC.) Spach (Robinson, Keeley, Skvarla, & Chan 2008) have been resurrected, and a related genus (Robinson, Keeley, Skvarla, & Chan 2008) is to be described as new. Here, one of the major remaining gymnanthemine elements in Asia and Malaysia is described as a new genus.

C.B. Clarke, *V. craibiana* Kerr, *V. cumingiana* Benth., *V. garrettiana* Craib, and *V. tavoyana* C.E.C. Fisch. were provided by the Royal Botanic Gardens, Kew. Examination of microscopic characters involved use of Hoyer's Solution (Anderson 1954).

Preparation of pollen for scanning electron microscopy (SEM) consisted of acetolysis (Erdtman 1960) followed by the osmium–thiocarbonylhydrazide repeat procedure (Chissoe et al. 1995) and pulse sputter coating with a gold/palladium (60/40) target (Chissoe & Skvarla 1996). Examination was with JEOL 880 (University of Oklahoma) and Leica 440 (National Museum of Natural History, Smithsonian Institution) SEMs, both equipped with lanthanum hexaboride (LaB6) electron sources.

### Materials and Methods

Specimens examined are primarily from the U.S. National Herbarium in Washington, D.C. Digital scans of some type specimens of *Vernonia andersonii*

### Results

The species placed here in *Decaneuropsis* have the generally woody habit and imbricated, somewhat deciduous, inner involucre bracts characteristic of members of the Vernonieae subtribe *Gymnantheminae* in the Eastern Hemisphere.

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*Decaneuropsis* is distinguished from most Gymnantheminae by its scandent or subs scandent habit. Associated with this habit are elongate thyriform inflorescences with corymbiform or thyriform lateral flowering branches (Fig. 1A). This contrasts with inflorescences of most Gymnantheminae which have an overall corymbiform shape.

The shape of the corolla in *Decaneuropsis* is slender with an elongate basal tube and a narrowly campanulate limb (Fig. 1E, F). This contrasts with other Gymnantheminae, especially *Strobocalyx*, with its basal corolla tube expanding slightly from near the base. At low magnification, the mature achenes show 8–10 strong ribs (Fig. 1I), differing from *Strobocalyx* in which 10 ribs may be present, but more than five ribs are rarely strongly developed. The carpodium of *Decaneuropsis* is as broad as the body of the achene and either cylindrical or abruptly obconical.

Under the compound microscope, the base of the style in *Decaneuropsis* shows no differentiated node (Fig. 1G); instead, it arises from inside the top of the cylindrical nectary. The lack of a basal stylar node is a character shared by *Gymnanthemum* of Africa. It differs greatly from *Strobocalyx* of Asia and Malaysia, however, which has a highly developed basal stylar node. The sweeping hairs of the upper style shaft and branches in *Decaneuropsis* are blunt as in *Strobocalyx* (Fig. 1H), differing from the pointed sweeping hairs of *Gymnanthemum* and *Monosis*.

The pollen of *Decaneuropsis* is tricolporate and echinate with perforated tectum nearly continuous between the colpi (Figs. 2A–F, 3A, B), the form referred to as Type A (Keeley & Jones 1979). In Type A pollen, the spines are arranged around large incipient lacunae, partially lacking perforated tectum, in a form referred to as sublophate (Skvarla et al. 2005). The columellae are single and

stout beneath each spine and the intervening perforated tectum is scarcely mamillate on the inner surface. This form is more like the pollen of *Gymnanthemum*, but differs from the specialized, nearly non-lophate Type A with more evenly distributed spines and subsidiary columellae found in *Strobocalyx*.

*Decaneuropsis* is assumed, for the present, to be rather closely related to *Strobocalyx*, since both occupy the same geographic area and possess similar sweeping hairs on the style, despite differences in pollen. If so, according to the known DNA sequences of *Gymnanthemum* and *Strobocalyx*, the relationship of *Decaneuropsis* to *Gymnanthemum* could be quite remote.

The name *Decaneuropsis* is derived from the generic name *Decaneurum* DC., under which one of the species has been placed in the past (see *D. obovata*). *Decaneurum* has also been used at the sectional level under *Vernonia*, a section in which many of the following species have been placed. The name *Decaneurum* itself is derived from the strongly developed 8–10 ribs of the achenes in its species. Unfortunately, the type species of *Decaneurum* is the same as the type of the African *Gymnanthemum*, and the name is not available for the present group.

*Decaneuropsis* H. Rob. & Skvarla,  
gen. nov.

Plantae lignosae plerumque scandentes vel subs candentes alternifoliae in pilis simplicibus. Inflorescentiae elongatae thyriformes; bractae involucri mediocriter persistentes; thecae antherarum base late caudatae, appendices apicales anguste ovato-oblongae; basi stylorum non nodati, rami stylorum in pilis obtusi. Achaeonia valde 8–10-costata plerumque puberula; carpodia late obturaculiformes vel cylindrica; setae pappi fere omnino elongatae distaliter latiores. Grana pollinis in typis A sublophata in diametro ca. 45  $\mu$ m.

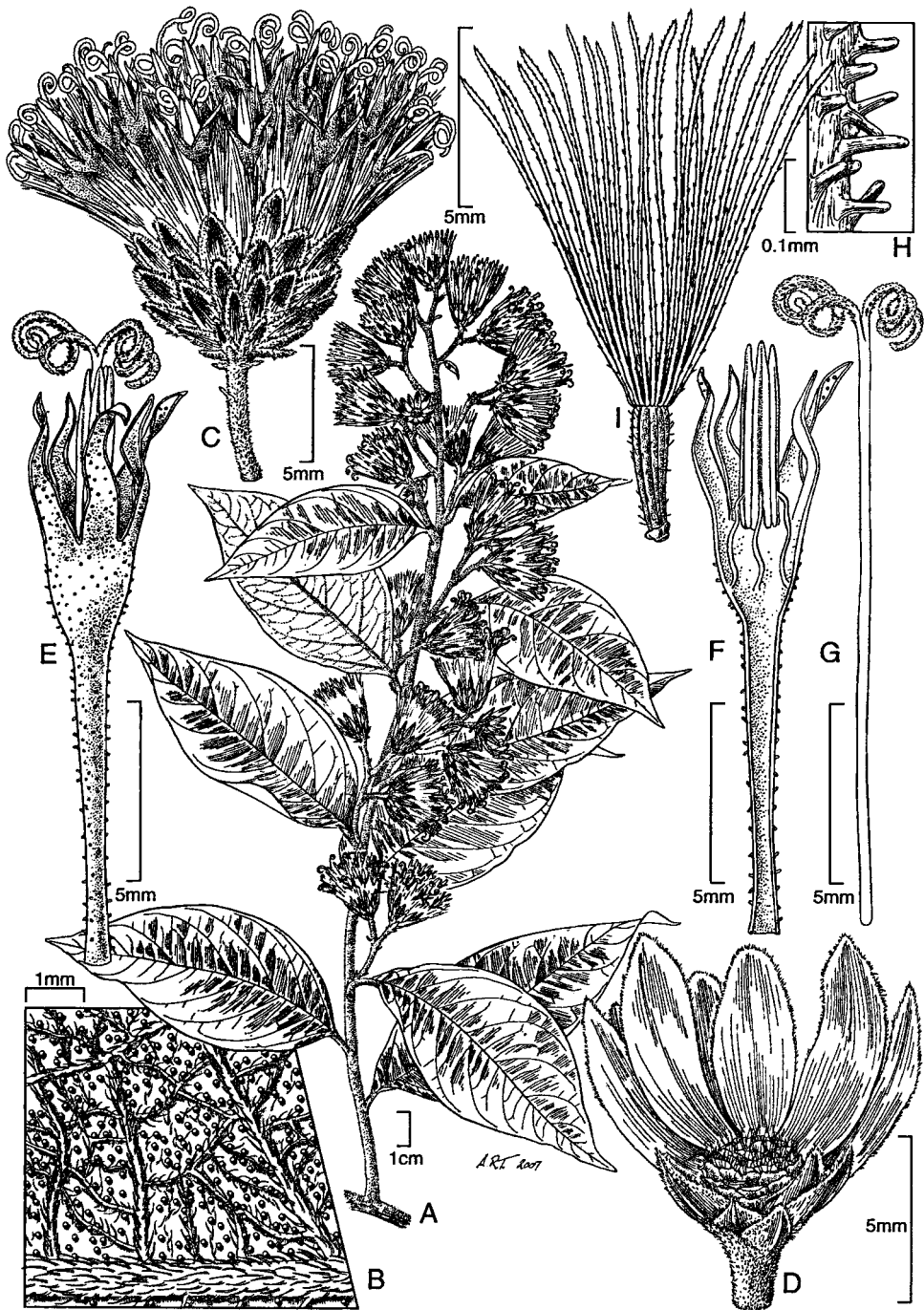


Fig. 1. *Decaneuropsis cumingiana* (Benth.) H. Rob. & Skvarla, a species with prominulous veinlets on the leaf blade and hairs on the receptacle: A. Branch showing narrowly thyriform inflorescence. B. Abaxial surface of leaf showing veinlets, hairs, and glandular dots. C. Enlargement of head. D. Open head showing receptacle with hairs. E. Corolla with included anthers and style showing slender basal tube. F. Corolla opened to show attachments of anther filaments. G. Style showing lack of basal enlargement and coiled style branches. H. Inset showing blunt sweeping hairs of style branch. I. Achene with pappus. Mostly drawn from: Tonkin, *Petelot 2064* (US); receptacle from, Tonkin, *Faurier 4614* (US). Illustration prepared by Alice R. Tangerini.

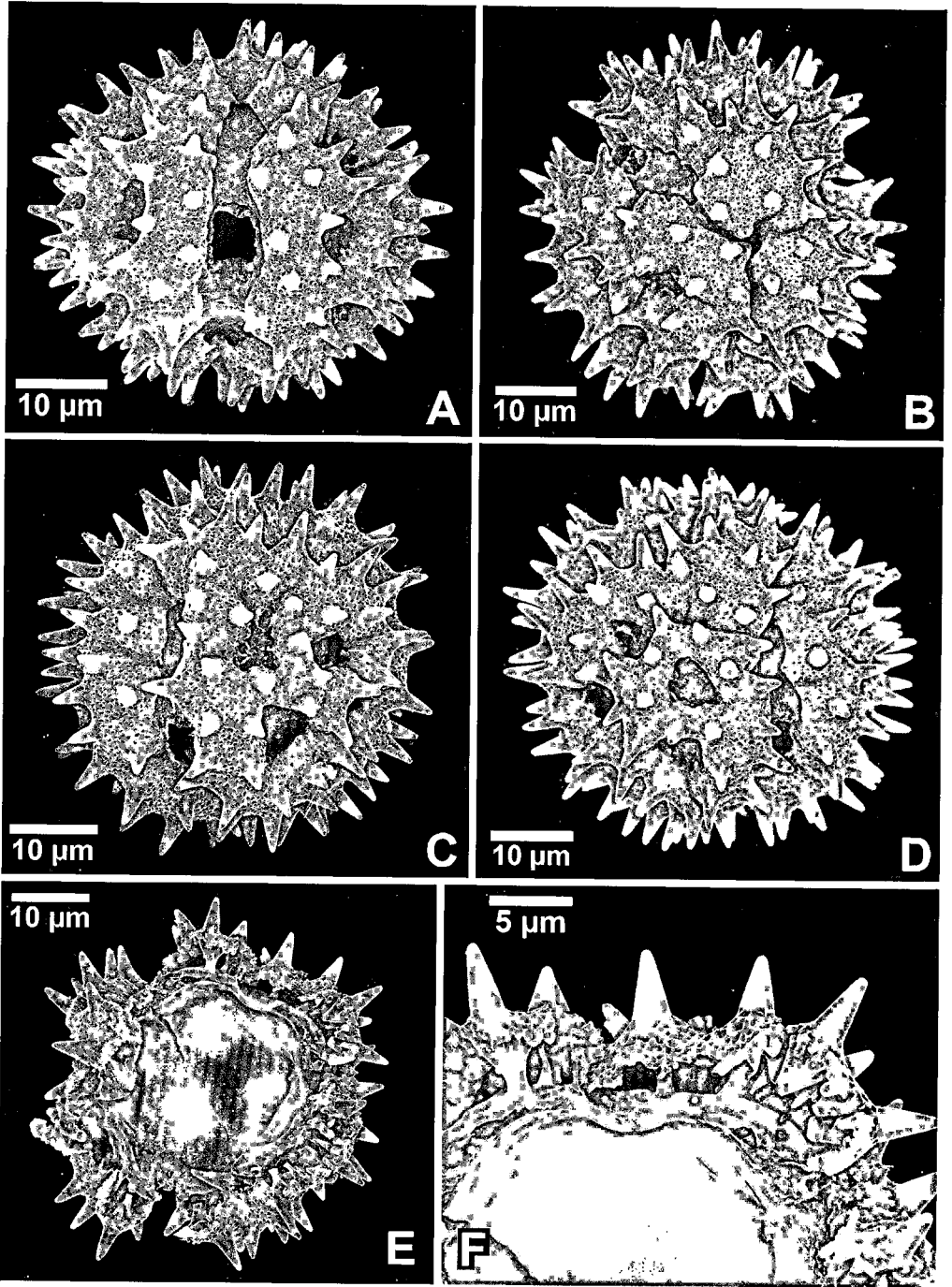


Fig. 2. *Decaneuropsis cumingiana* (Benth.) H. Rob. & Skvarla, Pollen. A-D. Whole grains showing weakly lophate pattern with 2-4 equatorial intercolpar lacunae and lack of perforated tectum in lacunae. A. Colpar view. B. Polar view showing partial syncolpar groove. C, D. Intercolpar views. E, F. Broken grain showing single baculum under each spine. From: China, Hong Kong, Tuan 1917 (US).

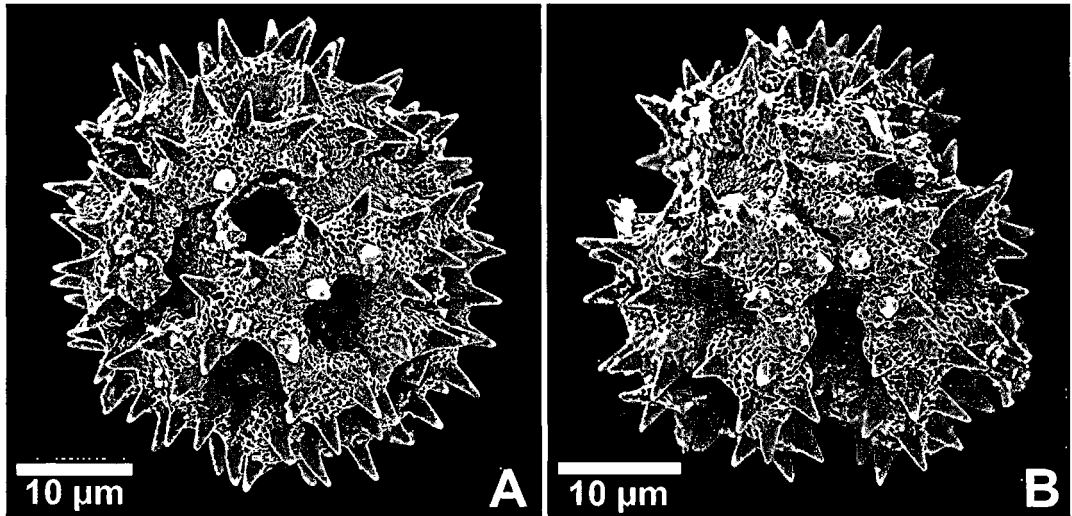


Fig. 3. *Decaneuropsis blanda* (DC.) H. Rob. & Skvarla, a species without prominulous veinlets or hairs on the receptacle. Whole pollen grains. A. Colpar view. B. Polar view. From China, Hainan, *C.I. Lei 311* (US).

Plants woody, scandent or subscandent, with mostly slender stems, with simple, symmetrical to somewhat asymmetrical hairs. Leaves alternate, short-petiolate, blades oblong to obovate (Fig. 1A), usually with glands abaxially, base cuneate to obtuse, margins entire or remotely denticulate, apex short-acuminate, surfaces concolorous, sometimes with veins and veinlets moderately exsculptate, glabrous or with erect or appressed hairs abaxially (Fig. 1B); secondary veins pinnate, regularly arching toward tips. Inflorescences on distal or lateral branches, elongate thyriform, narrowly pyramidal with corymbiform to thyriform lateral branches; heads clustered or solitary on usually relatively short peduncles (Fig. 1A); involucre bracts imbricated in 4–6 series, graduated, broadly obtuse to acute at tip, inner bracts tardily deciduous (Fig. 1C); receptacle sometimes hirsute (Fig. 1D). Florets 3–40+ in a head; corolla white to purple, 8–12 mm long, with long slender basal tube, becoming narrowly campanulate in limb (Fig. 1E, F), with glands on limb, especially on base of throat; anther thecae with broad tails at base; apical appendages narrowly ovate-oblong; gla-

brous; nectary cylindrical; style base without differentiated node (Fig. 1G), upper shaft and branches of style with blunt sweeping hairs (Fig. 1H). Achenes strongly 8–10-ribbed when mature (Fig. 1I), often puberulous with simple hairs or setulae, with small elongate raphids in wall, idioblasts not seen; carpodium broad, obconical to cylindrical; pappus of numerous slender bristles, broadened distally, with relatively few or no shorter bristles interspersed. Pollen grains ca. 45 µm in diameter in fluid, Type A (Figs. 2A–F, 3A, B), tricolporate, sublophate, with distinct micropores in tectum, perforated tectum without projections from inner surface, columellae single and stout under each spine.

*Type species.*—*Vernonia cumingiana* Benth. from Hong Kong.

*Decaneuropsis* consists of the following twelve known species.

*Decaneuropsis andamanica* (Balakr. & Nair) H. Rob. & Skvarla, comb. nov.

*Vernonia andamanica* Balakr. & Nair, Bull. Bot. Surv. India 24:32–33 (1982).

*Remarks.*—*Decaneuropsis andamanica* was originally compared with *Vernonia*

*blanda*, and was distinguished primarily by the more ciliate rather than puberulous involucre bracts and the grayish rather than reddish pappus (Balakrishnan & Nair 1982).

*Distribution*.—Andaman Islands.

***Decaneuropsis andersonii* (C.B. Clarke)**

H. Rob. & Skvarla, comb. nov.

*Vernonia andersonii* C.B. Clarke, Compos. Ind. 27 (1876).

*Vernonia chevalieri* Gagnep., Bull. Mus. Hist. Nat. (Paris). 488 (1919).

*Remarks*.—In the U.S. National Herbarium, numerous specimens have been received over the years under the name *Vernonia andersonii* Clarke. The specimens were almost all from China and Vietnam, and none were correctly named. The wide use of the name *V. andersonii* is difficult to understand because the names *V. blanda* and *V. cumingiana* both had nomenclatural priority. Of the misnamed material, specimens of *Decaneuropsis cumingiana* (Fig. 1B, D) and *D. gratiosa* share the exsculptate venation of the leaves and the hirsute receptacles seen in *D. andersonii*.

One specimen at the U.S. National Herbarium from China is identified as *D. andersonii* in this study: Southern Yunnan, between Chieng Law and Muang Hun, 11–13 Feb 1922, *J.F. Rock* 2355 (US).

*Distribution*.—India (Sikkim, Assam), Burma, Thailand, Vietnam, China (Yunnan).

***Decaneuropsis blanda* (DC.) H. Rob. &**

Skvarla, comb. nov.

Fig. 3A, B

*Vernonia blanda* DC., Prodr. 5:32 (1836).

*Conyza blanda* Wall., Cat. (Bull.) 3033 (1830), nom. nud.

*Vernonia tavoyana* C.E.C. Fisch., Kew Bull. 1927:92 (1927).

*Remarks*.—The species was validated by Candolle in the Prodr. (1836), and the type accepted here is the same cited by Candolle: India Birmannica prope Trogia ad Saluen, legit cl. Wallich. *Conyza blanda* Wallich cat. et herb. n. 3033, comp. 143. birm. n. 1926, in Herbarium Geneva (G-DC, microfiche 768, 5: 32. 143). A specimen at NY labelled as a type of *Vernonia blanda*, is not this species but is perhaps *Strobocalyx arborea* (Buch. Ham.) Sch. Bip.

*Distribution*.—India, Burma, Thailand, Vietnam, China (Hainan).

***Decaneuropsis chingiana* (Hand.-Mazz.)**

H. Rob. & Skvarla, comb. nov.

*Vernonia chingiana* Hand.-Mazz., Sinesia 7: 622 (1936).

*Remarks*.—The species has the largest heads, up to 2 cm in length, of any species in the genus.

*Distribution*.—China.

***Decaneuropsis craibiana* (Kerr) H. Rob. &**

Skvarla, comb. nov.

*Vernonia craibiana* Kerr., Kew Bull. 1935:328 (1935).

*Remarks*.—The species is notable for the narrow leaves with long-acuminate tips.

*Distribution*.—Thailand.

***Decaneuropsis cumingiana* (Benth. in Hook.f) H. Rob. & Skvarla, comb. nov.**

Figs. 1A–I, 2A–F

*Vernonia cumingiana* Benth., Hooker's J. Bot. Kew Gard. Misc. 4:232 (1852).

*Remarks*.—Bentham (1852) cited both Hong Kong and Philippine material for this species and named the species after the collector of the Philippine material. Hooker (1882:241) suggested the Philippine material was typical and the Hong Kong material was the species recognized above as *Decaneuropsis andersonii*. Nev-