



Resurrection of *Angelesia*, a Southeast Asian genus of *Chrysobalanaceae*

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Key words

Licania
pantropical
polyphyletic
taxonomy

Abstract *Licania* subg. *Angelesia* is composed of only three species restricted to Southeast Asia and is currently delimited as one of four subgenera of *Licania*, a species-rich genus of mostly Neotropical taxa. Molecular phylogenetic studies involving *Chrysobalanaceae* have revealed that *Licania* is polyphyletic. Here we propose to re-establish *Licania* subg. *Angelesia* to generic rank based on molecular and morphological evidence and the three species currently placed in *Licania* subg. *Angelesia* (*Licania fusicarpa*, *L. palawanensis* and *L. splendens*) are here re-instated and transferred to *Angelesia*, as appropriate. This new generic delimitation renders *Licania* an exclusively Neotropical genus, and *Angelesia* an endemic Southeast Asian genus.

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INTRODUCTION

Licania comprises a genus of c. 220 species, and is currently divided into four subgenera: subg. *Licania*, subg. *Moquilea*, subg. *Parinariopsis* and subg. *Angelesia*. All four subgenera share the characters of a unilocular ovary inserted at or near the base of the receptacle and an essentially actinomorphic receptacle. However, generic instability concerning the circumscription of *Licania* and its subgenera has persisted to the present time.

The genus *Licania* was described by Aublet (1775: 119) based on *L. incana* Aubl. from French Guiana. In the same work Aublet (1775: 521) also described *Moquilea*, among other genera of *Chrysobalanaceae*.

Angelesia was described by Korthals (1855: 384), who cited *A. splendens* Korth. as the type. Miquel (1855: 357) described *Trichocarya* based on two species Korthals (1855) had previously published, *A. splendens* and *Diemenia racemosa* Korth. (= *Parastemon urophyllus*), creating the illegitimate name *Trichocarya splendens* (Korth.) Miq. That same year Blume (1855) proposed that *A. splendens* be transferred to *Licania*, but in doing so he also created the illegitimate name *Licania angelesia* Blume (1855: 10).

Grisebach (1857: 50) was the first to suggest uniting *Licania* and *Moquilea*, and placed *Moquilea* in synonymy under *Licania*. Hooker (1865: 606) treated *Trichocarya* (with *Angelesia* as a synonym), *Licania* and *Moquilea* as distinct genera. Baillon (1869: 480) accepted only *Licania* and *Trichocarya*, treating *Moquilea* as a synonym of *Licania*. He was also the first to arrange genera of *Chrysobalanaceae* into groups based on the symmetry of the flowers and the position of the ovary (group A central vs group B not central or 'excentrique'). Fritsch (1888: 94) recognized only *Angelesia* and *Licania*, citing *Moquilea* as a synonym of *Licania*. Focke (1891: 57), however, accepted the three genera and subdivided them into two distinct tribes, placing *Moquilea* and *Licania* in *Chrysobalaninae*, and *Angelesia* in *Hirtellinae*.

Following the views of Hallier (1903), who suggested that *Moquilea* and *Angelesia* should be united under *Licania* based on anatomical studies, *Moquilea*, *Angelesia*, and *Afrolicania*, a monospecific genus described by Mildbraed (1921: 483), were placed in the synonymy of *Licania* (Prance 1967, 1972, Letouzey & White 1978a, b, respectively). Subgenus *Parinariopsis* was subsequently described (Prance & White 1988) to accommodate the Neotropical *L. licaniiiflora*.

Thus, in Prance & White's (1988: 93) concept, *Licania* was treated as a pantropical genus, incorporating the American species of *Licania* (subg. *Licania*, subg. *Moquilea*, subg. *Parinariopsis*), the Southeast Asian species (subg. *Angelesia*), and the West African *Afrolicania elaeosperma* (subg. *Afrolicania*). Prance & Sothers (2003: 175) re-established *Afrolicania* as a distinct genus based on morphological characters and also on the molecular studies of Dissanayake (1999).

Here we propose to re-instate *Angelesia* to generic rank and transfer its three species, *Licania splendens* (Korth.) Prance, *L. fusicarpa* (Kosterm.) Prance and *L. palawanensis* Prance, to *Angelesia* based on molecular evidence (Sothers 2010, Bardon et al. 2013). These results are also supported by discrete morphological characters which differentiate *Angelesia* from its previous Neotropical congeners. This revised taxonomy represents a further step towards understanding the complex and currently polyphyletic classification of the American species of *Licania*.

TAXONOMY

Angelesia

Angelesia Korth. (1855) 384.

Trichocarya Miq. (1855) 357, nom. superfl. illegit.

Licania subg. *Angelesia* (Korth.) Prance & F.White (1988) 94. — Type: *Angelesia splendens* Korth.

Coccomelia Ridl. (1920) 183. — Type: *Coccomelia nitida* (Hook.f.) Ridl.

Distribution — A genus of three species distributed throughout Southeast Asia.

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Angelesia fuscarpa* (Kosterm.) Sothers & Prance, *comb. nov.

Hunga fuscarpa Kosterm. Reinwardtia 10 (1985) 123.

Licania fuscarpa (Kosterm.) Prance (1987) 366. — Type: *J. Buderus* NGF-24059 (holo L; iso A, BRI, CANB, K), Papua New Guinea, Milne Bay Distr., Ferguson Island, Selomo.

Distribution & Habitat — Eastern New Guinea. Coastal rain-forests.

Conservation status — This species is also here assessed as near threatened, NT, under the IUCN (2001) criteria. It is only known from one locality and by a few collections.

Selected specimens examined. NEW GUINEA, A.N. Gillison & A. Kairo NGF25630 (A, K, L, SING), Papua New Guinea, Morobe Distr., Waiu Bay.

Angelesia palawanensis* (Prance) Sothers & Prance, *comb. nov.

Licania palawanensis Prance, Brittonia 31 (1979) 94. — Type: *D.R. Mendoza* & *R. Espirita* PNH 91305 (holo BM; iso K, L, PNH), Philippines, Palawan, Queza.

Distribution & Habitat — Philippines; known only from Palawan and Luzon. Forests on rocky seashores, 0–300 m altitude.

Conservation status — This species is assessed here as near threatened, NT, under the IUCN (2001) criteria. It has a restricted geographic distribution.

Selected specimens examined. PHILIPPINES, G.E. Edaño PNH14082 (BR, L, PNH, US), Palawan, Malasgao R., Aborlan; *D. Soejarto* & *B.C. Stone* PPI433 (BRIT), Palawan, Pto. Princesa, Bacungan; *E.J. Reynoso et al.* 295 (BISH), Mt Bloomfield, Gabang; *D.R. Mendoza* PNH91432 (L, PNH, SAN), Quezon; *A.C. Podzorski* SMHI 543 (K, L), 561 (K, L), Mt Beaufort, NW side; *M.D. Sulit* PNH12305 (L, PNH, US), Aborlan, Panacan, Victoria Mts; *C.G. Manuel* PNH18631 (US), Luzon, Pasay City.

***Angelesia splendens* Korth.**

Angelesia splendens Korth. (1855) 384.

Trichocarya splendens (Korth.) Miq. (1855) 358; *Licania angelesia* Blume (1855) 10, nom. superfl. illegit.; *Licania splendens* (Korth.) Prance & Kosterm. in Kosterm. (1965) 184, *comb. inval.*; *Licania splendens* (Korth.) Prance (1972) 172. — Type: *P.W. Korthals s.n.* (holo L), Borneo, Pamatton. *Parinari nitida* Hook.f. (1878) 310, as '*Parinarium nitidum*'; *Ferolia nitida* (Hook.f.) Kuntze (1891) 216; *Coccomelia nitida* (Hook.f.) Ridl. (1920) 183; *Atuna nitida* (Hook.f.) Panigrahi & K.M. Purohit in Purohit & Panigrahi (1991) 346. — Type: *A.C. Maingay* 619 (lecto K, in Prance & Sothers (2003) 98), Peninsular Malaysia.

Coccomelia nitida (Hook.f.) Ridl. var. *latifolia* Ridl. (1922) 671. — Type: *Curtis* 147 (lecto SING, in Prance (2012) 29; K), Peninsular Malaysia, Penang. *Chrysobalanus splendens* (Korth.) Miq. (1855) 358, nom. inval. in synon. *Parinari fragilis* Teijsm. & Binn. (1866) 253, as '*Parinarium fragile*', nom. nud. *Parinari philippinensis* Elmer (1939) 3809, as '*Parinarium philippinense*', nom. nud.

Distribution & Habitat — Thailand and Sumatera, Malay Peninsula to Philippines and Sulawesi. Lowland rainforest and in peat swamp, fresh water swamp forest, on seashores and in rocky places.

Conservation status — *Angelesia splendens* is widely distributed throughout Southeast Asia and is here assessed as least concern, LC, under the IUCN (2001) criteria.

Selected specimens examined. BRUNEI, *H. Fukol* BRU5401 (K), Berakas F.R. — INDONESIA, A.J.G.H. Kostermans 21822 (BO, NY), Java, Ujungkulon Reserve; *Netherlands India Forest Service* bb32331 (A, L), Sumatera, E Coast, Batu Bara, Padang, Bolak. — MALAYSIA, A. Zainudin et al. 5130 (K), Kedah, Gurun, Gunung Jerai; *King's Collector* 8680 (K, P, U, Z), Perak, near Ulu Selangore; *A.D.E. Elmer* 21008 (BISH, BM, BR, F, K, L, NY, P, US, Z), Sabah, Tawao, Elphinstone Prov.; *P. Chai* S31724 (K, L), Sarawak, Segan F.R., Bintulu, 4th Division. — PHILIPPINES, A.D.E. Elmer 12766 (A, F, GH, K, L, NY, P, U, US), Palawan, Puerto Princesa, Mt Fulgar. — SINGAPORE, J.F. Maxwell 81-109 (AAU, L), Upper MacRitchie Reservoir, Island Club. — THAILAND, R. Geesink & T. Santisuk 5318 (AAU, L), Panguga, Kan Bow Koranee; A.F.G. Kerr 17329 (AAU, K), Panjinja, Kaw Zao Zai.

DISCUSSION

The species now placed in *Angelesia* are trees and shrubs distributed throughout Southeast Asia (Prance 1989, Prance & Sothers 2003). The leaves are glabrous, the inflorescences are a panicle of cymules, with eglandular bracts and bracteoles, not enclosing groups of flower buds, the flowers are bisexual, c. 2 mm long, with unequal calyx lobes and with petals always present; the stamens number 7–10, and the filaments are included and slightly fused at the base. The ovary is unilocular and inserted at the base of the receptacle. The fruits are fleshy drupes with a smooth, unridged and glabrous epicarp.

The symmetry of the receptacle, number of locules in the ovary and position of the ovary on the receptacle are characters which have been used to separate genera of *Chrysobalanaceae* and have defined the circumscription of *Licania*. As a result, taxa such as *Angelesia*, *Moquilea* and *Afrolicania* have been associated with *Licania*. However, *Angelesia* can be distinguished from American species of *Licania* (subg. *Licania*, subg. *Moquilea* and subg. *Parinariopsis*) by such characters as the unequal calyx lobes (as in *Kostermanthus* and *Acioa*), the petals always present (vs several *Licania* which are apetalous) and stamens fused at the base, a feature seen only in *Chrysobalanus* and a few species of *Licania* and *Magnistipula*.

Angelesia and the Neotropical species of *Licania* are not closely allied as previously regarded, despite sharing key morphological features. In two molecular analyses (Sothers 2010, Bardon et al. 2013), *Angelesia splendens* (as *Licania splendens*) appears in a separate lineage altogether from American species of *Licania*. Affinities of *Angelesia* appear to lie both with New world genera, such as *Acioa* and *Exellodendron*, as well as the Old world genus *Hunga* (Sothers 2010, Bardon et al. 2013 and unpublished results by Sothers). Future studies should establish and clarify the relationships of *Angelesia* with other genera.

Furthermore, the current circumscription of Neotropical *Licania* must be re-evaluated in light of molecular phylogenetic studies. Evidence of a polyphyletic genus is emerging, with species appearing in 3–4 well-supported clades (Sothers 2010, Bardon et al. 2013, Sothers et al. 2014). The resurrection of *Angelesia* proposed here establishes *Licania* as an exclusively Neotropical genus and *Angelesia* as a species-poor and widely distributed endemic Southeast Asian genus.

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