

63. NEONAUCLEA Merrill, J. Wash. Acad. Sci. 5: 538. 1915.

新乌檀属 xin wu tan shu

Chen Tao (陈涛); Charlotte M. Taylor

Nauclea Korthals, Observ. Naocl. Indic. 17. 1839, not Linnaeus (1762).

Trees or shrubs, unarmed; buds flattened with stipules erect and pressed together [to conical], [sometimes with fusiform swellings housing ants in branches]. Raphides absent. Leaves opposite, sometimes with numerous foveolate domatia; stipules caducous [or rarely persistent], interpetiolar, generally ligulate, entire. Inflorescences terminal, capitate with 1–9 globose heads in fascicles or cymes, many flowered, pedunculate, bracteate; peduncles and axes articulate near middle; bracts enclosing heads involucre and caducous; bracteoles spatulate to conical or sometimes absent. Flowers sessile, bisexual, monomorphic. Calyx limb deeply 5-lobed; lobes prolonged into a slender shaft bearing thickened to rhomboidal apical portion, this often ornamented and/or pubescent differently from shaft and frequently deciduous before shaft. Corolla pale green to white or red, salverform to narrowly funnelform, inside glabrous or glabrescent; lobes 5[or rarely 6], imbricate in bud. Stamens 5, inserted in corolla throat, partially to fully exerted; filaments short; anthers basifixed. Ovary 2-celled, ovules numerous in each cell, pendulous on axile placentas attached in upper third of septum; stigma globose to obovoid, exerted. Fruiting heads globose. Fruit capsular, obconic, septically then loculicidally dehiscent into 4 valves from base to apex, with valves separating from septum, with septum persistent on inflorescence or later deciduous, woody to cartilaginous, with calyx limb deciduous with capsule valves; seeds numerous, small, fusiform, flattened, winged; embryo ellipsoid, somewhat bilaterally compressed.

About 62 species: tropical Asia and Pacific islands, perhaps ten species in continental Asia; four species (one endemic) in China.

This genus was studied in some detail by Ridsdale (Blumea 24: 337–342. 1979; Blumea 34: 177–275. 1989). The unusual, usually quite elaborately developed calyx lobes are distinctive of the genus in general, and their form is distinctive for individual species; care must be taken to look for the caducous apical part of the calyx lobes and to not confuse the persistent tubular calyx limb base with the entire calyx limb. Ridsdale (loc. cit. 1989) developed a very detailed terminology, but did not suggest a function, for the calyx lobe morphology of this genus. He also noted that *Neonauclea* has secondary pollen presentation. Ridsdale (loc. cit. 1989) and Zou (J. Arnold Arbor. 69: 73–76. 1988) noted that some *Neonauclea* species are large trees that produce very good lumber.

- 1a. Leaves sessile or subsessile, with petioles to 5 mm; leaf base obtuse to rounded, truncate, or cordulate.
 - 2a. Leaf blade elliptic-oblong to elliptic or suborbicular, with 6–9 pairs of secondary veins, with domatia in abaxial axils of secondary, tertiary, and often quaternary veins; corolla tube 5–6 mm 2. *N. sessilifolia*
 - 2b. Leaf blade obovate, broadly obovate, broadly elliptic, or elliptic-oblong, with 7–9 pairs of secondary veins, abaxially with domatia only in axils of secondary veins; corolla tube 8–10 mm 3. *N. truncata*
- 1b. Leaves petiolate with petioles 8–40 mm; leaf base acute to cuneate or broadly obtuse, sometimes decurrent.
 - 3a. Petioles 8–20 mm; leaf base acute to cuneate and sometimes decurrent; domatia glabrous; calyx lobes densely pilosulous on middle and lower portion and glabrous at apex, with apical portion fusiform 1. *N. griffithii*
 - 3b. Petioles 15–40 mm; leaf base broadly obtuse to cuneate; domatia tomentulose or glabrous; calyx lobes puberulent throughout except glabrous adaxially in basal portion, with apical portion spatulate to cucullate 4. *N. tsaiiana*

1. *Neonauclea griffithii* (J. D. Hooker) Merrill, J. Wash. Acad. Sci. 5: 540. 1915.

新乌檀 xin wu tan

Adina griffithii J. D. Hooker, Fl. Brit. India 3: 24. 1880; *Cephalanthus navillei* H. Léveillé; *Nauclea griffithii* (J. D. Hooker) Haviland; *Neonauclea navillei* (H. Léveillé) Rehder.

Trees, evergreen, to 20 m tall; trunk often buttressed at base, sometimes with aerial roots; bark greenish gray, fissured and cracked, sometimes warty, with inner bark yellow, pale brown to pink; branchlets quadrangular becoming terete, grayish brown, rugose or striate, white lenticellate, glabrescent. Petiole 8–20 mm, stout, glabrous; leaf blade drying thickly papery to subleathery, obovate to elliptic, 8–22 × 4–15 cm, both surfaces glabrous, base acute to cuneate and frequently decurrent, apex rounded then abruptly cuspidate or acute; secondary veins 5–7 pairs, in abaxial axils with glabrous domatia; stipules obovate to obovate-oblong, 5–10 × 3–8 mm, weakly keeled, glabrous, apex obtuse. Inflorescences puberulent to glabrescent; pedun-

cles 1 or 3, 2–6 cm; flowering heads solitary, 8–12 mm in diam. across calyces, 25–30 mm in diam. across corollas; involucre bracts not seen; bracteoles 0.5–1 mm. Calyx with ovary portion obconic, 1–1.5 mm, glabrous in lower 2/3, pilosulous in upper 1/3; limb partially lobed, with basal tubular portion ca. 1 mm; lobes with shaft clavate, 3.5–4.5 mm, densely pilosulous, with apical portion fusiform, deciduous before corollas open, pilosulous on lower portions, glabrous at apex. Corolla red (*Henry 12676*, MO!), narrowly funnelform to salverform, outside glabrous; tube 7–8 mm, inside glabrous to sparsely pubescent; lobes elliptic-oblong, 2–3 mm, acute. Stigmas subglobose, ca. 1 mm, exerted for 5–6 mm. Fruiting heads ca. 20 mm in diam. Capsules obconic, 5–6 mm, pilosulous at least at apex; seeds not seen.

Dense forests in valleys or on humid slopes; 800–1300 m. Guangxi, Guizhou, Yunnan [Bhutan, N India, Myanmar].

2. *Neonauclea sessilifolia* (Roxburgh) Merrill, J. Wash. Acad. Sci. 5: 542. 1915.

无柄新乌檀 wu bing xin wu tan

Nauclea sessilifolia Roxburgh, Fl. Ind. 2: 124. 1824; *Adina sessilifolia* (Roxburgh) J. D. Hooker ex Brandis; *N. sericea* Wallich ex G. Don.

Trees, leaf persistence unknown, 7–30 m tall; bark dark gray, transversely fissured and cracked, with inner bark brown, sometimes mottled; branches flattened to angled, glabrous. Leaves sessile or subsessile; petiole to 5 mm, stout, glabrous; blade drying papery to thinly leathery, elliptic to elliptic-oblong or suborbicular, 5–30 × 3–15 cm, both surfaces glabrous, base rounded to truncate or cordulate, apex obtuse; secondary veins 6–9 pairs, with small, glabrous to pilosulous, foveolate domatia in abaxial axils of lateral, tertiary, and often quaternary veins; stipules broadly elliptic to obovate, 10–30 × 5–10 mm, glabrous, keeled in lower portion, apex obtuse to broadly rounded. Inflorescences glabrescent; peduncles 1(or 3), 1–3(–8) cm; flowering heads solitary, 20–25 mm in diam. across calyces, 35–45 mm in diam. across corollas; involucre bracts not seen; bracteoles linear, 1–2(–3) mm. Calyx with ovary portion obconic, 1–1.5 mm, glabrous or apically tomentulose; limb partially lobed, with basal tubular portion 0.5–0.8 mm; lobes densely pilosulous, with shaft clavate, 5–7 mm, with apical portion pyramidal, deciduous before corollas open. Corolla color unknown; tube 5–6 mm, inside glabrescent; lobes deltoid to elliptic, 2–3 mm, outside densely strigillose to sericeous, acute. Stigma subglobose, ca. 0.8 mm, exserted for 5–6 mm. Fruiting heads (15–) 25–35 mm in diam. Capsules obconic, 8–10 mm, glabrous except densely pilosulous at apex; seeds ca. 2 mm. Fl. Oct.

Thickets or broad-leaved forests on hills; 500–800 m. Taiwan, Yunnan [Cambodia, India, Laos, Myanmar, Thailand, Vietnam].

This is the first report of this species in Taiwan.

3. *Neonauclea truncata* (Hayata) Yamamoto, J. Soc. Trop. Agric. 7: 149. 1935.

台湾新乌檀 tai wan xin wu tan

Nauclea truncata Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 140. 1911.

Trees, evergreen, large, height not noted; branches flattened to angled, gray, glabrous. Leaves sessile or subsessile; petiole to 2 mm, glabrous; blade drying leathery, obovate, broadly obovate, broadly elliptic, or elliptic-oblong, 13.5–26 × 9.9–19.8 cm, glabrous, base rounded to truncate, obtuse, or cordulate, apex obtuse to acute or shortly acuminate; secondary veins 7–9 pairs, in abaxial axils with pilosulous or foveolate domatia; stipules elliptic-oblong to elliptic, 12–25 × 8–15 mm, glabrous, smooth to weakly keeled, rounded to obtuse. Inflorescences densely strigillose to glabrescent; peduncles 1–3(–5), 2.2–3.5 cm, stout; flowering heads solitary on peduncles, 12–25 mm in diam. across calyces, 34–45 mm in diam. across corollas; bracteoles reportedly sparse, not seen. Calyx with ovary portion 0.8–1.5 mm, glabrous; limb partially lobed, with basal tubular portion 1–1.5 mm, pilosulous at least on apical portion; lobes deciduous before corollas open, with shaft linear, 1.5–2.5 mm, glabrous below and densely pilosulous in upper part, with apical portion obconic to thickly fusiform, 2–2.5 mm, pilosu-

lous to glabrescent. Corolla white, funnellform; tube 8–10 mm, glabrous; lobes ligulate to lanceolate, 2–3 mm, puberulent, obtuse to acute. Stigma subglobose to fusiform, ca. 1 mm, exserted for 8–10 mm. Fruiting heads 30–35 mm in diam. Capsules obconic, 8–10 mm, glabrescent. Fl. Jul.

Forests, on coral rocks. Taiwan [Philippines].

This species was reported from Taiwan by Chun (Fl. Taiwan 4: 313. 1978) and later by Liu et al. (Fl. Taiwan, ed. 2, 4: 304–306. 1998) under the name *Neonauclea reticulata* (Haviland) Merrill, with the name *N. truncata* placed in synonymy there. However, Yamamoto (loc. cit.) had already noted the differences that separate *N. truncata* and *N. reticulata* and concluded that the name *N. reticulata* had been incorrectly applied to the Taiwanese plants. Ridsdale (Blumea 34: 213–217. 1989) later recognized these as two distinct species and reported an extended range for *N. truncata*, in N Philippines.

4. *Neonauclea tsaiana* S. Q. Zou, J. Arnold Arbor. 69: 73. 1988.

滇南新乌檀 dian nan xin wu tan

Trees, to 30–40 m tall and 1 m d.b.h.; trunk cylindrical, with buttresses; bark rough, with inner bark fibrous, yellow or sometimes with pink; branches flattened to angled, densely lenticellate, glabrescent. Petiole 12–40 mm, stout, glabrous; leaf blade drying leathery, elliptic or ovate-elliptic, 12–22 × 6–13 cm, adaxially glabrous and rather shiny, abaxially glabrous and matte, base broadly obtuse to cuneate, apex acute to shortly acuminate; secondary veins 6 or 8 pairs, with tomentulose to glabrous foveolate domatia in abaxial axils; stipules ovate, 12–24 × 8–14 mm, glabrous, weakly keeled in basal portion, apex obtuse. Inflorescences glabrous; peduncles 1–3, 2–4.5 cm; flowering heads 1–7(or 9), solitary on peduncles or 3–7 in branched cymes, 10–18 mm in diam. across calyces, 25–30 mm in diam. across corollas; involucre bracts not seen; bracteoles conical, 0.7–1 mm. Calyx with ovary portion obconic, 1–1.5 mm, glabrous except puberulent at apex; limb partially lobed, with basal tubular portion 0.8–1 mm; lobes deciduous before corollas open, with shaft clavate, 3–4 mm, densely puberulent except adaxially glabrous in basal portion, apical portion rounded to cucullate, densely puberulent. Corolla pale yellow, funnellform, glabrous; tube 5–6.5 mm; lobes elliptic-oblong, ca. 2.5 × 1.2 mm, apex acute. Stigmas subglobose, ca. 1 mm, exserted for 5–6 mm. Fruiting heads 15–20 mm in diam. Capsules clavate, somewhat flattened, 6–7 mm, glabrous in basal portion, puberulent or pilosulous at apex; seeds unknown. Fl. Sep–Oct, fr. May–Jun.

• Tropical rain forests at streamsides or in bottom of valleys; 500–1100 m. Yunnan.

This species was described almost simultaneously with the publication of Ridsdale's revision of the genus (Blumea 34: 177–275. 1989) and was not mentioned by him presumably because he was unaware of it.

Fl. China 19: 255–257. 2011.