BLUMEA 23 (1976) 177—188

A REVISION OF THE TRIBE CEPHALANTHEAE (RUBIACEAE)

C. E. RIDSDALE*)

SUMMARY

The tribe *Cephalantheae* is here reinstated; a full taxonomic treatment of all species is given, including a key to all species. The architecture and systematic relations are discussed.

INTRODUCTION

During the revision of the *Naucleeae sensu* K. Schumann (1891) for Flora Malesiana the characters of all component taxa of the tribe, including the extra-Malesian groups, were re-evaluated. It became evident that the tribe as conceived by K. Schumann is a heterogeneous group. Bemekamp (1966) also concluded that the tribe was heterogeneous. At least three genera, *Cephalanthus*, *Mitragyna*, and *Uncaria*, and possibly also *Anthocephalus*, do not fall within the limits of the *Naucleeae* as conceived in the present work. This paper deals with *Cephalanthus* which is transferred back into a monotypic tribe.

The treatment of the literature is not completely uniform, for the Asiatic taxa full literature references and complete distribution data are given, but for the non-Asiatic taxa only the basic literature is cited and only general distribution given.

SYSTEMATIC RELATIONSHIPS

The genus has had a chequered history and for the last hundred years has generally been considered to occupy an isolated position in the *Naucleeae sensu* K. Schumann. At an earlier time it has also been placed in the *Spermacoceae*, where it certainly does not belong, as noted by Bremekamp (1966). It has been segregated in a separate tribe *Cephalantheae* by Humbold, which originally also included *Morinda*, but some later authors excluded *Morinda*. Bremekamp (1966) has questioned the position of the genus and stated that it should be studied in more detail.

The pendulous solitary ovules suggest a strong relationship with the *Naucleeae* (*Mitragyna* and *Uncaria* excluded) but in this tribe there is no arillus. Haviland records arils for *Nauclea* (*Sarcocephalus*) but I have not been able to confirm this observation. Phytochemically there is a strong affinity with the alkaloids found in *Mitragyna* and *Uncaria* (Phillipson & Hemingway, 1974); this suggests a close relationship with these genera, but in *Mitragyna* and *Uncaria* the ovules are vertically imbricate on a pendulous placenta and there is no arillus. The wood anatomy deviates from the other members of the tribe *Naucleeae* K. Schumann (Koek-Noorman, 1970).

The distribution suggests a relic group, particularly as the single African species seems to occupy an isolated position in the genus, the American and Asiatic taxa being closely related, mutually.

*) B. A. Krukoff botanist of Malesian Botany, Rijksherbarium, Leiden.

The relationships of the tribe are clearly with the *Naucleeae* or the *Cinchoneae*. The problem of relationships is centred around the delimitation of the tribes. The *Naucleeae* have been considered to be a homogeneous tribe by most botanists, Ariy Shaw (1973) even following Wernham in considering the group as a separate family; only Bremekamp (1966) has questioned this concept. A re-examination of the component taxa has shown that the only character they have in common is the aggregation of the flowers into a sphaerical head. This feature occurs spasmodically in many tribes and cannot be considered of great significance. Besides *Cephalanthus*, two other genera must also be excluded from the *Naucleeae*: *Mitragyna* and *Uncaria*. Both genera were considered by Haviland (1897) to occupy a distinctive position in the tribe and were placed into separate subtribes by him. The pendulous placentas bearing numerous vertically imbricate ovules, the nature of the placentas, and the construction and dehiscence of the fruit all indicate that the two genera have greater affinity with the *Cinchoneae* than with the *Naucleeae*. Evidence from phytochemistry in the nature of the indole alkaloids together with the similarities of the growth organization and form indicates a strong relationship between *Cephalanthus* and *Mitragyna* and *Uncaria*. In reappraising the characters of these two genera and the tribe *Cinchoneae* it became apparent that there is a possibility that the *Cinchoneae sensu* K. Schumann are also still a heterogeneous assemblage of taxa. The investigation of this problem is still in the initial stage and at the moment little can be said over the interrelations of the remainder of the *Cinchoneae* and the *Cephalantheae*. However, the exclusion of *Mitragyna* and *Uncaria* from the *Naucleeae* (Ridsdale, 1975) results in *Cephalanthus* having a low level of relationship with the *Naucleeae s.s.*

ARCHITECTURE

In the literature the leaf arrangement is variously given as leaves in pairs or 3—4-verticillate. In branches found mounted in the herbarium the leaves are mostly either in pairs or in a whorl of three or four.

Cephalanthus occidentalis

Observation of a living plant in Wageningen Arboretum showed that there is a dimorphic branching system. The orthotropic axis basically has the leaves arranged in three's (sometimes one member is suppressed or reduced), in the axis of each leaf are differentiated serial buds. The upper serial bud, supra-axillary in origin, gives rise to the plagiotropic system; the lower is a dormant (=proleptic) bud of the orthotropic system. The plagiotropic system is non-horizontal and unbranched with the leaves always in pairs; flowering buds sometimes develop in the axils of these leaves. Flowering is both terminal and lateral on both the orthotropic and plagiotropic systems. The consequence of this is that flowering terminates the growth of the plagiotropic system and flowering on the orthotropic system results in the development of the proleptic buds of that system. The orthotropic system thus repeatedly branches 3 or 4 times after each flowering period.

Cephalanthus natalensis

Here the orthotropic system is also arranged in three's and the plagiotropic system has the leaves arranged in pairs. However, the plagiotropic system is branched, the lateral branches arising in a supra-axillary position from the leaf axils. Below the lateral branch no dormant bud can be detected. Flowering is again both terminal and lateral on both systems.

REFERENCES

AIRY SHAW, H. K. 1973. In J. C. Willis, A dictionary of flowering plants and ferns, ed. 8: 779.
BREMEKAMP, C. E. B. 1966. Remarks on the position, the delimitation and the subdivisions of the Rubiaceae. Acta Bot. Neerl. 15: 1—33.
HAVILAND, G. D. 1897. A revision of the tribe Naucleeae (Rubiaceae). J. Linn. Soc. Bot. 33: 1—94, pl. 1—4.
KOEK-NOORMAN, J. 1970. A contribution to the wood anatomy of Cinchoneae, Coptosapelteae and Naucleeae (Rubiaceae). Acta Bot. Neerl. 19: 154—164.
PHILLIPSON, J. D., & S. R. HEMINGWAY. 1974. Indole and oxindole alkaloids from Cephalanthus occidentalis. Phytochem. 13: 2621.
RIDSDALE, C. E. 1975. A synopsis of the African and Madagascan Rubiaceae — Naucleeae. Blumea 22: 541—553.
SCHUMANN, K. 1891. Rubiaceae. In Engler & Prantl, Die natürlichen Pflanzenfamilien, ed. I, 4, 4: 55—60.

CEPHALANTHEAE

Cephalantheae H. B. K. [Nov. Gen. Sp. 3 (1818) 379, *nom. prov.* (as 'Sectio')] *ex* Kunth, Synop. Pl. Aequinoct. 4 (1824) 37 (as 'Sectio'); Cham. & Schlecht., Linnea 4 (1829) 147 (as 'Sectio'); Lindl., Intr. Nat. Syst. Bot. (1830) 204. — Subtribe *Cephalanthinae* DC., Prodr. 4 (1830) 538 (as '*Cephalantheae*'); Endl., Gen. Pl. (1838) 530; Ench. Bot. (1841) 271 (both as '*Cephalantheae*'); Havil., J. Linn. Soc. Bot. 33 (1897) 21 (as '*Cephalanthidae*').

Erect *shrubs* or *trees*. Growth axes differentiated: orthotropic axis with leaves 3- or 4-verticillate (sometimes one reduced or suppressed); plagiotrpic axis with leaves in pairs. *Stipules* interpetiolar, apex with or without a black gland. *Inflorescences* terminal and axillary on plagiotropic and orthotropic shoots, in compact heads, heads not surrounded by reduced leaves or stipules. Receptacle pubescent, interfloral bracteoles present. *Hypanthium* tubular; calyx short, lobes 4, sometimes with a smaller 5th one. Corolla hypocrateriform to infundibular, lobes spreading, in the bud (sub) imbricate. Stamens inserted in the throat of the corolla, filaments short, anthers dorsifixed, bicuspid at the base. Style filiform, exserted from the corolla; stigma capitate to clavate. Ovary 2-celled, ovules solitary, apically attached to the septum, pendulous, anatropous, funicle with an arillus. *Fruit* a loose head of indehiscent cocci.

Monotypic.

CEPHALANTHUS

Cephalanthus L. [Gen. Pl. ed. 1 (1737) 60, no. 174] Sp. Pl. (1753) ed. 5 (1754) no. 105.— Type species: *C. occidentalis* L.
Acrodryon Spreng., Syst. Veg. 1 (1825) 365, 386. — Lectotype species: (Merrill, 1935) *A. orientale* Spreng.
Axolus Rafin., Sylv. Tell. (1838) 61. — Type species: *A. angustifolius* (Lour.) Rafin.
Eresimus Rafin., Sylv. Tell. (1838) 61. — Type species: *E. stellatus* (Lour.) Rafin.

For description of genus see tribal diagnosis.

Distribution: Pantropical, 6 species: 3 American, 2 Asiatic, 1 African.

KEY TO THE SPECIES

1a. Calyx lobes narrowly triangular, apex long acuminate. *Continental Asia* **1. C. angustifolius**

b. Calyx lobes oblong to elliptic and obtuse, or rarely shortly deltoid. *America, Africa, Asia* 2

2a. Calyx (particularly the lobes) and hypanthium outside glabrous, sometimes with a few long white hairs at the base. *America* 3
b. Calyx (particularly the lobes) and hypanthium sparsely to mediumly pubescent or sericeous 4
3a. Corolla generally over 6 mm, style 6—10 mm, exserted. Leaves generally over 2 cm wide. *N. and C. America*. . . . . **2. C. occidentalis**
b. Corolla up to 6 mm long, style 4—6 mm, exserted. Leaves generally up to 2 cm wide. *S. America*. . . . . **3. C. glabratus**
4a. Calyx and hypanthium densely sericeous. *C. America*. . . . . **4. C. salicifolius**
b. Calyx and hypanthium sparsely to mediumly finely pubescent. *Not in America* . 5
5a. Leaves generally over 5 cm long, Lobes of corolla not densely pubescent on inner side, sinuses usually with a black gland (such glands often present on calyx and stipules). *Asia* . . . . . **5. C. tetrandra**
b. Leaves generally up to 5 cm long. Lobes of corolla densely pubescent on inner side, black glands absent from sinuses of corolla (also from calyces and stipules). *Africa*. **6. C. natalensis**

1. Cephalanthus angustifolius Lour.

C. angustifolius Lour., Fl. Cochinch. (1790) 67; ed. Willd. (1793) 83; Havil., J. Linn. Soc. Bot. 33 (1897) 39; Merr., Comm. Lour. (1935) 363. — *Acrodryon angustifolium* Spreng., Syst. Veg. 1 (1825) 386. — *Axolus angustifolius* Rafin., Sylva Tellur. (1838) 61. — Type: *Loureiro s.n.* (BM).
C. stellatus Lour., o.c. 68; ed. Willd. o.c. 85; Pitard in Lecomte, Fl. Gén. I.-C. 3 (1922) f. 3: 6—13; Craib., Fl. Siam. En. 2 (1932) 8; Ho & Duong, Fl. Vietnam (1960) 506, fig. 187 E. — *Nauclea stellata* Wall. (1832) List no. 6102. — *Eresimus stellatus* Rafin., l.c. — Type: *Loureiro (n.v.)*.
Mimosa stellata Lour., o.c. 651; ed. Willd., o.c. 800. — *Acacia taxifolia* Willd., Sp. Pl. 4 (1805) 1050. — *Mimosa ternata* Pers., Syn. 2 (1806) 261. — Type: *Loureiro (n.v.)*.

Shrub or small tree. *Stipules* rostrate, 3—6 mm. *Leaves* ovate-oblong to ovate-lanceolate, (3—)5—13 × (0.75—)1—5 cm, glabrous; apex acute; base rounded to acute; nerves 4—6(—10) pairs. *Inflorescences* terminal and axillary, usually simple with 1(—3) heads. Flowering axis 2—3 cm, peduncle short, receptacle hairy, interfloral bracteoles linear to clavate. *Flowering head*: diameter across the calyces 8—15 mm, across corollas (15—) 20—25(—30) mm. Calyx tube and hypanthium 2—3 mm, hairy, calyx lobes narrowly triangular to lanceolate, (1—)2—4 mm long, hirsute, often with a black gland between each member. Corolla 5—8 mm, tube outside glabrous, inside pubescent; lobes oblong, 1.5—2 mm, glabrous. Style *c.* 7 mm, exserted. Diameter across *fruiting head* 15—20 mm, fruiting cocci *c.* 4 mm long, seeds 3—4 mm long, brown, capped by a pallid arillus.

Distribution: Laos, N. Vietnam.

Ecology: Riverine vegetation.

2. Cephalanthus occidentalis L.

C. occidentalis L., Sp. Pl. (1753) 95; Gen. Pl. ed. 5 (1754) 42, no. 105. — *C. oppositifolius* Moench, Meth. (1794) 487. — *C. acuminatus* Rafin., New. Fl. N. Am. 3 (1838) 25. — Type: *Herb. Linn. 118: 1, 2* (LINN).
C. occidentalis var. *brachypodus* DC., Prodr. 4 (1830) 539. — Type: *Berlandier 1737* (BM, G-DC).
C. occidentalis var. *macrophylla* Rafin., Med. Fl. 1 (1838) 101. — Type: unknown.
T. occidentalis var. *obtusifolius* Rafin., o.c. 102, — Type: unknown.
C. occidentalis var. *pubescens* Rafin., o.c. 101. — *C. pubescens* Rafin., New Fl. N. Am. 3 (1838) 25. — Type: unknown.
C. obtusifolius Rafin. [Herb. Rafin. (1833) 57, *nom. nud.*] New Fl. N. Am. 3 (1838) 25. — Type: unknown

C. occidentalis var. *californicus* Benth., Pl. Hartw. (1849) 314. — T y p e: *Hartwig 414 (n.v.)*.
C. angustifolius auct. non Lour.: André, Rev. Hort. (1889) 281. — *C. occidentalis* forma *angustifolia* Rehder, Bibl. Cult. Tr. Shr. (1949) 597. — *C. occidentalis* var. *angustifolia* Chittenden, Dict. Gard. 1 (1951) 434.
C. berlandieri Wernh., J. Bot. 55 (1917) 175. — T y p e: *Berlandier 1620* (BM).
C. hansenii Wernh., o.c. 176. — L e c t o t y p e: *Hansen 1163* (BM). S y n t y p e: *Jones s.n.*, Chihuahua, Mexico (BM).

Shrub or small tree up to 15 m high. *Stipules* deltoid to narrowly triangular, usually with marginal glands. *Leaves* broadly ovate to ovate-lanceolate, less frequently elliptic, 6—19 × (1—)2—9 cm, above glabrous to slightly scabrous, below glabrous to pilose; apex acute to long acuminate; base rounded to subcordate, less frequently acute; nerves (5—)8—12 pairs, often with hairy domatia in axils. *Inflorescences* terminal and axillary, simple or branched, with 1—3(—7) heads, flowering axis 3—10 cm, peduncle short, receptacle hairy, interfloral bracteoles spathulate to filiform-clavate. *Flowering* head: diameter across the calyces 6—12 mm, across corollas 15—25(—30) mm. Calyx tube and hypanthium 2—3 mm, glabrous, often with long hairs at the base, calyx lobes shallow, obtuse, up to 0.5 mm, glabrous. Corolla (5—)6—9(—12) mm long, tube outside glabrous, inside sparsely pubescent; lobes oblong, 1—2 mm, glabrous, sinuses with solitary black gland. Style 6—10 mm, exserted. Diameter across *fruiting head* 10—20 mm, fruiting cocci 4—8 mm long, seeds 3—7 mm long, brown, capped by a large white arillus.

D i s t r i b u t i o n: N. America (New Brunswick to Florida, California), Mexico, Cuba.

E c o l o g y: Riversides and swamp vegetation.

3. **Cephalanthus glabratus** (Spreng.) K. Schum.

Buddlea glabrata Spreng., Syst. Veg. 1 (1825) 431. — *Cephalanthus sarandi* Cham. & Schlecht., Linnaea 2 (1827) 610. — *Cephalanthus glabratus* K. Schum. in Mart., Fl. Brasil. 6, 6 (1888) 128, pl. 94. — T y p e: *Sellow*, Rio Negro (L, iso).

Small tree or shrub up to 5 m. *Stipules* deltoid to narrowly triangular, 1—5 mm long. *Leaves* elliptic-lanceolate (2—)4—8(—12) × (0.5—)1—2(—2.5) cm, glabrous; apex acute to acuminate; base rounded; nerves 6—10 pairs. *Inflorescences* terminal and axillary, usually simple with 1(—3) heads. Flowering axis 2—6 cm, peduncle short, receptacle densely hairy, interfloral bracteoles clavate to spathulate. *Flowering head*: diameter across the calyces 5—8 mm, across corollas 10—15 mm. Calyx tube and hypanthium 2—3 mm, glabrous, or with a few long hairs at the base, calyx lobes deltoid to obtuse, shallow to 0.5 mm, glabrous or with a few scattered hairs. Corolla 3—6 mm long, tube outside glabrous, inside sparsely pubescent, lobes oblong, 1—2 mm long, sinuses with a black gland. Style 4—6 mm, exserted. *Fruiting head* 10—15 mm diameter, fruiting cocci 4—5 mm long, seeds *c.* 4 mm long, brown, capped by a small white arillus.

D i s t r i b u t i o n: Brasil, Uruguay, Paraguay, Argentine.

E c o l o g y: Riversides and flooded areas.

4. **Cephalanthus salicifolius** Humb. & Bonpl.

C. salicifolius Humb. & Bonpl., Pl. Aequin. 2 (1809) 63. — *C. occidentalis* var. *salicifolius* A. Gray, Syn. Fl. N. Am. 1, 2 (1884) 29. — T y p e: *Humbold & Bonpland s.n.*, Acapulco, Mexico (*n.v.*).
C. peroblongus Wernh., J. Bot. 55 (1917) 176. — T y p e: *Barclay 1193* (BM).

Shrub or small tree. *Stipules* deltoid to triangular, 2—3 mm long. *Leaves* elliptic-oblong to elliptic-lanceolate, 4—10(—15) × 1—2(—3) cm, above glabrous, below glabrous

to sparsely pilose; apex acute to long acuminate; base acute to subcordate; nerves (5—)8—12 pairs, often with hairy domatia. *Inflorescences* terminal and axillary, usually simple with 1(—3) heads. Flowering axis 2—5 cm, peduncle short, receptacle hairy, interfloral bracteoles spathulate to clavate. *Flowering head*: diameter across the calyces (6—)8—15 mm; across corollas (10—)15—25 mm. Calyx tube and hypanthium 2—3 mm, densely pallidly sericeous, calyx lobes very small, to 0.3 mm, rounded, pubescent. Corolla 5—8 mm, tube outside glabrous, inside sparsely pilose; lobes oblong, 2—4 mm long, sinuses usually with a black gland. Style 3—6 mm, exserted. *Fruiting head* (8—)12—20 mm diameter, fruiting cocci 4—5 mm; seeds *c.* 3 mm long, brown, capped by a large white arillus.

Distribution: Mexico (Sonora to Nuevo and Guerrero), Honduras.

Ecology: Riversides and flooded areas.

5. **Cephalanthus tetrandra** (Roxb.) Ridsd. & Bakh. *f.*, *comb. nov.*

Nauclea tetrandra Roxb. [Hort. Beng. (1814) 14, *nom. nud.*] Fl. Ind. ed. 1, 2 (1824) 125; Fl. Ind. ed. 2, 1 (1832) 516. — *Cephalanthus naucleoides* DC., Prodr. (1830) 539; G. Don, Gen. Hist. 3 (1834) 610, Steud., Nom. Bot. ed. 2, 1 (1840) 326; Kurz, For. Fl. Burm. 2 (1877) 68; Hook. *f.*, Fl. Brit. Ind. 3 (1880) 24; Hance, J. Bot. 11 (1882) 6; Pitard in Lecomte, Fl. Gén. I.-C. 3 (1922) 31, *pro parte*; Craib, Fl. Siam. En. 2 (1932) 8; Li, Woody Fl. Taiwan (1963) 846, f. 341. — Type: *Wallich Cat. 6101A* (K) = *F. de Silva s.n.*, Sylhet.

Cephalanthus occidentalis auct. non L.: Lour., Fl. Cochin. (1790) 67; ed. Willd. (1793) 83 (*nom. altern. in nota C. orientalis* Lour., *non* L.); Hemsley & Forbes, J. Linn. Soc. Bot. 23 (1888) 369; Havil., J. Linn. Soc. Bot. 33 (1897) 38; Hayata, Icon. Pl. Form. 2 (1912) 79; Dunn & Tucher, Kew Bull. Misc. Inf. Add. Ser. 10 (1912) 124; Chung, Mem. Sci. Soc. China 1 (1924) 236; Merr., Lingn. Sci. J. 5 (1927) 173; Comm. Lour. (1935) 364; Handel-Mazzetti, Symb. Sin. 7, 4 (1936) 1019; Kanehira, Form. Trees (1936) 662, f. 616; Kanjilal & Das, Fl. Assam 3 (1939) 369; Masamune, Trans. Nat. Hist. Soc. Form. 30 (1940) 412; How, Sunyatsenia 6 (1946) 235; Steward, Man. Vasc. Pl. L. Yangtze Valley China (1958) 367. — *Acrodyron orientale* Spreng., Syst. Veg. 1 (1825) 386.

C. monas Lour. *ex* Gomes, Mem. Acad. Sci. Lisb. Cl. Sci. Pol. Mor. Bel-Let. n.s. 4 (1868) 26. — Type: *Loureiro s.n.* [*Herb. Lour. 51*] (P).

C. glabrifolius Hayata, Icon. Pl. Form. 9 (1920) 51. — Type: *Nagasawa 532* (*n.v.*).

C. ratoensis Hayata, o.c. 52. — Type: *Kawakami 34* (*n.v.*).

C. montanus auct. non Lour.: Merr., Comm. Lour. (1935) 364.

Shrub to 5 m. *Stipules* broadly ovate, 3—5 mm long, often terminated with a black gland. *Leaves* ovate to ovate-lanceolate, (15—)7—10(—15) × (1.5—)3—5(—8) cm, above glabrous to sparsely pubescent, below glabrous to densely pilose, apex acute; base rounded to subcordate, less frequently acute; nerves 8—12 pairs, often with hairy domatia. *Inflorescences* terminal and axillary, simple or branched, flowering heads 1—3(—10). Flowering axis 2—6 cm, peduncle short, receptacle hairy, interfloral bracteoles clavate to clavate-spathulate. *Flowering head*: diameter across the calyces 8—12 mm, across corollas1 5—25 mm. Calyx tube and hypanthium 2—3 mm, sparsely pubescent, often with long pilose hairs at the base; calyx lobes shallow, obtuse, up to 0.7 mm, finely densely pubescent. Corolla 5—8 mm long, tube outside glabrous, inside pubescent; lobes oblong, 1—2 mm long, sinuses usually with a solitary black gland. Style 4—6 mm, exserted. *Fruiting head* 10—20 mm diameter, fruiting cocci 4—6 mm long, seeds 3—5 mm long, brown, capped by a large pallid arillus.

Distribution: India (United province: Oudh, Assam, Khasia, Tripura), Sikkim, Bangladesh, Burma (upper), Thailand (Eastern: Udawn Ratchathani, N. Eastern: Udon Thani), Laos ,N. & S. Vietnam, China (Hainan, Kwantung, Kwangsi, Hunan, Fukien, Kiangsi, Chekiang), Taiwan.

Ecology: Riverine vegetation, often planted for ground stabilization.

6. Cephalanthus natalensis Oliver

C. natalensis Oliver, Hook. Ic. Pl. Ser. 3, 4, 2 (1881) 22, t. 1331. — Lectotype: *Gerrard 1495* (CR). Syntype: *Atherstone s.n.*, Transvaal (K).

Small tree or shrub. *Stipules* 3—5 mm long, broadly ovate at the base, apex long subulate. *Leaves* ovate to ovate-oblong, 2—5 × 1—2.5 cm, glabrous; apex acute; base rounded to acute; nerves 4—6 pairs. *Inflorescence* terminal and axillary, simple, flowering heads 1(—3). Flowering axis 2—5 cm, peduncle short, receptacle hairy, interfloral bracteoles filiform to clavate. *Flowering head*: diameter across the calyces 5—7 mm, across the corollas 20—25 mm. Calyx tube and hypanthium 2—3 mm, sparsely to mediumly pubescent; calyx lobes elliptic, 0.5—1 mm long, pubescent. Corolla 7—10 mm, tube outside glabrous, inside densely pubescent; lobes oblong, 1 mm, inside densely pubescent, easily visable when reflexed. Style *c.* 7 mm, exserted. *Fruiting head* 10—15 mm diameter, fruiting cocci 2—3 mm, seeds *c.* 2.5 mm long, brown, capped by a small brown arillus.

Distribution: S. Africa (Natal, Transvaal).

Ecology: Small, somewhat scandent shrub of forests.

DUBIOUS SPECIES

1. **Cephalanthus spinosus** Griff., It. Notes. (1848) 94. — Type: *Griffith* 1407 (*n.v.*).

SPECIES EXCLUDED FROM CEPHALANTHUS

1. *Cephalanthus africanus* Riechb. = **Mitragyna inermis** (Willd.) O.K.
2. *C. aralioides* Zoll. & Moritzi, Syst. Verz. (1846) 61 = **Metadina trichotoma** (Z. & M.) Bakh. *f.* var. **aralioides** (Z. & M.) Bakh. *f.*
3. *C. breviflorus* Spruce *ex* K. Schum. in Mart., Fl. Brasil. 6, 6 (1888) 129. — Type: *Spruce* 4175 (*n.v.*) = **Ixora peruvianus** (Spruce) Standley, *fide* Macbride, Field. Mus. Nat. Hist. Bot. 11 (1936) 128.
4. *C. cavaleriei* Léveillé, Fedde Rep. Sp. Nov. 10 (1912) 434, — Type: *Cavalerie* 365 (*n.v.*) = **Uncaria scandens** (Sm.) Hutch., *fide* Rehder J. Arn. Arb. 16 (1935) 319.
5. *C. chinensis* Lamk. = **Anthocephalus chinensis** (Lamk.) A. Rich. *ex* Walp. See Blumea 22 (1975) 551 for discussion.
6. *C. coriacea* K. Schum. in E. & P., Nat. Pfl. Fam. ed. 1, 4, 4 (1891) 58, *nom. nud.* Schumann notes that there are three seeds per locule, this excludes most possibilities, except **Breonardia microcephala** (Del.) Ridsd.
7. *C. esquirolii* Léveillé, Fedde Rep. Nov. Sp. 13 (1914) 176. — Type: *Cavalerie* 2963 (*n.v.*) = **Camptotheca acuminata** Decne. (*Cornaceae*), *fide* Rehder, J. Arn. Arb. 15 (1934) 117; Lauener, Notes Roy. Bot. Gard. Edinb. 32 (1972) 97, 103.
8. *C. hildebrandtii* Vatke, *nom. nud.* = **Breonia sphaerantha** (Baill.) Homolle *ex* Ridsd.
9. *C. montanus* Lour., Fl. Cochin. (1790) 67; ed. Willd. (1793) 84. — *Gilipus montanus* Rafin., Sylva Tellur. (1838) 61. — Type: unknown.

Merrill in his commentary reduced this species to synonymy of *Cephalanthus occidentalis*, basing his decision on the information provided by Gagnepain relating to the identity of a specimen of Loureiro (no. 51) in the Paris herbarium. The identity of this latter species is unquestionably *C. tetrandra* (Roxb.) Ridsd. & Bakh. *f.* as indicated by Gagnepain. However, it is impossible to connect this specimen with the description of Loureiro and the problem cannot be dismissed as faulty observation on behalf of Loureiro. The specimen

is in excellent condition and even with the greatest stretch of the imagination could never be associated with Loureiro's description, calling for a plant with a lateral inflorescence, apetalous dioecious flowers, and alternate leaves. One must bear in mind that Loureiro separated *C. stellatus* and *C. angustifolius* on the character leaves ternate versus opposite. The label on the Paris specimen reads '*Cephalanth. monis*' (or '*monas*') and there under '*Tetrandr. 1-gyn*'. Unlike some of the other collections there is no local name added. Above this label in another handwritting is the name *Cephalanthus montanus* Lour.; clearly this is a later addition to the sheet. Reading through the introduction of Merrill's interpretation it becomes clear that A. L. de Jussieu forwarded a list to B. A. Gomes containing the manuscript name of Loureiro and interpreting this to represent *C. montanus* Lour. The material in question corresponds exactly with Loureiro's description of *Cephalanthus orientalis* and considering the great discrepancy between the existing plant and the description I reject the interpretation that this represents the type of *C. montanus* Lour.; this is clearly a later interpretation of A. N. Desvaux or Jussieu which was followed by Merrill, who depended on Gagnepain for identifying the plant. There is no indication on the original label that *C. monis* (*monas*) has anything to do with *C. montanus* Lour.

Ding Hou drew attention to the native names *Yam muei*, *Yam mai*, or *Yong mai*, used for *Myrica*, a common widespread edible fruit of China, a transliteration mistake of *Yam* to *Yong* is possible. *Yong mai* referring also to *Cephalanthus*, *Soy yong mai* is the sour or acid *yong mai* (*C. tetrandra* contains alkaloids); *San yong mai* (*C. montanus*) the montane *yong mai*. The description of *C. montanus* is brief, but the major elements would not be contradictory to it representing a species of *Myrica*.

10. *C. navillei* Léveillé, Fl. Kouy Tcheou (1915) 365. — T y p e: *Esquirol* 3631 (*n.v.*) = **Neonauclea navillei** (Léveillé) Rehder, J. Arn. Arb. 16 (1935) 319.
11. *C. orientalis* L., Sp. Pl. ed. 1 (1753) 95. = **Nauclea orientalis** (L.) L., Sp. Pl. ed. 2, 1 (1762) 243.

C. orientalis was based on the following elements:

a. Fl. Zeyl. 53, based on plate 338 in Hermann's herbarium.
b. *Platanocephalos* Vaill., Acta Paris (1722) 259, based on Rheede t. 33.
c. Rheede, Hort. Malabar. 3 (1682) 29, t. 33.
d. Description or material of two loose fruits from Bernard Jussieu, no recorded correspondence as far as I can trace and no extant material.
e. The record of its occurrence in Asia and Africa; there is no extant material from Africa.

Clearly most important is the material that Linnaeus had before him. This may be traced through the reference to Fl. Zeyl. (1748) 22, no. 53, which contains the following elements:

— *C. foliis oppositis*, represented by plate 338 in Hermann's herbarium.
— *Platanocephalos* Vaill., Acta Paris (1722) 259, based on Rheede, t. 33.
— Rheede, Hort. Malabar. 3 (1682) 29, t. 33.
— *Arbor indica* Ray, Hist. Pl. 2 (1688) 1441, based on Rheede t. 33.

Considering all the references in Species Plantarum and Fl. Zeylanica it can be seen that basically only three elements were involved:

1. *C. foliis oppositis.*
2. Rheede, Hort. Malabar. 3 (1682) 29, t. 33.
3. Information or material from Bernard Jussieu.

This latter element is clearly a later addition as in the Linnean copy of Fl. Zeyl. Linnaeus has added the annotation found in Sp. Pl. ed. 1 (1753) 95, to the reference. Thus the information or material was assumably received between 1748 and 1753, or at least added to the references in that period.

There are three interpretations of Rheede, Hort. Malabar. 3 (1682) 29, t. 33:

a) Haviland (J. Linn. Soc. Bot. 33. 1897: 32) and Merrill (J. Wash. Ac. Sc. 5. 1915: 533) interpreted this as *Nauclea missionis* W. & A.
b) Wight & Arnold (Prodr. 1834: 392) interprete the plant to represent *Neonauclea purpurea* (Roxb.) Merr. (*Nauclea purpurea* Roxb.).
c) Rumph (Herb. Ambon. 3 1743: 37), Trimen (Handb. Fl. Ceyl. 2. 1894: 292), and Bakh. *f.* (Taxon 19. 1970: 473) consider the plant to represent *Anthocephalus chinensis* (Lamk.) A. Rich. *ex* Walp.

The derivation of the name is important for the interpretation. According to Bourdillon (For. Tr. Travancore 1908: 210—211), Gamble & Fischer (Fl. Madras 2. 1921: 582—584), and R. Rao (Fl. Pl. Travancore 1914: 200—201) the following names are used for the three alternative choices:

	Bourdillon	Gamble	Rao
Neonauclea purpurea	—	*Ahwan*	—
Nauclea missionis	*Attu vanji*	*Attu vanji*	*Attuvanji*
Anthocephalus chinensis	Kodovara: *Attu tek, Chakka*	Kodavara: *Attu tek*	Kodavara: *Attuthekku*

The transliteration of '*Katu*' to '*Attu*' seems acceptable and '*Tsjaca*' to '*chakka*' also. The application of the native name *Katu Tjsaca* now written as *Attu chakka* seems to be consistently used for the widespread *Anthocephalus*. Of the alternatives suggested by previous authors *Neonauclea purpurea* is unlikely, the flower colour, form of the stigma, and cross section of the fruit do not correspond very well with this plant which is rare in Travancore. It is not recorded by Bourdillon and is only briefly mentioned by Rao without any further details. The choise seems to rest between *Nauclea missionis* and *Anthocephalus chinensis*. *N. missionis* generally has more obovate leaves and conspicuous semi-persistent stipules. *Anthocephalus* does not usually have glabrous leaves with a cuneate base but these features sometimes occur. There are discordant elements in the description and illustration for either taxon.

Both flowers and fruits are illustrated, these would have been gathered at different times introducing the possibility that *Katu Tsjaca* is based on mixed elements. However, considering the constant association of the native name with *Anthocephalus chinensis* it is probable that Rheede intended to describe and represent *A. chinensis* (Lamk.) Miq. (syn. *A. cadamba* (Roxb.) Miq.). However, the references to this plate are clearly of subsidiary importance in typifying *Cephalanthus orientalis* L.

The important and leading reference is '*Cephalanthus foliis oppositis*' which may be directly correlated with plate 338 in Hermann's herbarium, which Linnaeus had before him. I consider that this typifies *Cephalanthus orientalis* L. and thus follow the interpretation of Merrill. The identity of plate 338 is beyond doubt, representing the plant which Bakhuizen *f.* refers to as *Nauclea coadunata* Roxb. *ex* J. E. Smith.

Cephalanthus orientalis L. is the basionym of *Nauclea orientalis* (L.) L. Sp. Pl. ed. 2, 1 (1762) 243. Here the following references occur:

1) *Cephalanthus foliis oppositis* Fl. Zeyl. 53. Sp. Pl. 1, p. 95.

2) *Platanocephalos* Vaill., Acta Paris (1722) 259, based on Rheede 33.
3) *Arbor Ind.* Ray, Hist. Pl. 2 (1688) t. 33.
4) *Bancalus* Rumph., Herb. Ambon. 3 (1743) 84, t. 55?

Again the important reference is to *Cephalanthus foliis oppositis*. The addition here is the reference to Rumphius' plate in Herb. Ambon. about which Linnaeus was uncertain. This reference may be traced back to Linnaeus, Syst. Nat ed. 10 (1759) 887 which reads '*oriental. l.c. fol. oppositis*. Rumph. amb. 3. t. 55. Osb. it. 242'. Once again the basic reference with the additions of Rumphius & Osbeck. The Osbeck plant is in the herbarium of Linnaeus and bears the name of *Nauclea orientalis*. Clearly this is material that was added later by Linnaeus.

Bakhuizen *f.* (Taxon 19. 1970: 473—476) has rejected Merrill's lectotypification of *Nauclea* on the grounds that the type specimen of *Cephalanthus orientalis* has been lost and is only represented by a plate in Hermann's herbarium, which cannot be considered to be part of the protologue of *Cephalanthus orientalis*. I consider this to be wrongly argumented. Hermann's herbarium has always consisted of volumes of plants + plates all of which were available to Linnaeus. There never was a specimen which has been lost, only a plate which is extant. Thus *Cephalanthus orientalis* is typified by plate 338 in Hermann's herbarium. It is also the type of the monotypic genus *Nauclea* L., Sp. Pl. ed. 2, 1 (1762) 243. This plant does not correspond to the generic description of *Nauclea* L., Gen. Pl. ed. 6 (1764) 90, no. 223, which is based on the Osbeck material. However, this is a later emendation of the genus by Linnaeus and it represents *Adina globiflora* Salisb. Thus *Nauclea* of Linnaeus 1764 consists of *Cephalanthus foliis oppositis* + *Adina globiflora* Salisb. I maintain that if the two elements be kept as apart genera, then clearly the type of *Nauclea* as intended by Linnaeus is not the Osbeck plant but *Cephalanthus foliis oppositis* as typified above. This is to some extent confirmed by the examination of Linnaeus copy of Sp. Pl., ed. 1 (1753) 95, where there is a written annotation by Linnaeus 'new genus'. The latter emendation and material of Osbeck cannot be the type. Indeed the same standpoint was taken by Smith in Rees Cyclop. 5 (1819) 24 where he indicates that the material in Linnaeus herbarium represents *Nauclea adina* (*nom. illeg.* for *Adina globiflora* Salisb.).

Article 41 Seattle Code states 'An exception is made for the generic names first published by Linnaeus in Species Plantarum ed. 1 (1753) and ed. 2. (1762—63), which are treated as being validly published on those dates'. Thus *Nauclea* L. was validly published in 1762, as a monotypic genus based on *Cephalanthus orientalis* L., and later the generic concept was emended to include *Adina* — the Osbeck material — which cannot be considered as the type.

12. *C. peruvianus* Spruce *ex* K. Schum. in Mart., Fl. Brasil. 6, 6 (1888) 129. — T y p e: *Spruce* 4910 (*n.v.*) = **Ixora peruvianus** (Spruce) Standley, Field Mus. Bot. 11 (1936) 217.
13. *C. pilulifera* Lam., Enc. Méth. Bot. 1 (1785) 679 = **Adina pilulifera** (Lamk.) Franch. *ex* Drake de Castillo, in Morot, J. de Bot. 9 (1895) 207. Probably this will prove to be an earlier basionym for the plant known, as *Adina globiflora* Salisb. [*A. orientalis* (L.) Lindman *ex* Bakh. *f*.].
14. *C. pilluliflorus* Willd. *ex* Roem. & Schult., Syst. 3 (1818) 525. — T y p e: *Herb. Willd. no.* 2519 (B). I have not examined the material; from the IDC photo it is not possible to ascertain the identity. It is most probably an *Adina*, or a *Metadina*.
15. *C. procumbens* Lour., Fl. Cochinch. (1790) 195; ed. Willd. (1793) 240; Merr., Comm. Lour. (1935) 400. — *Stilbe procumbens* Spreng., Syst. Veg. 1 (1825) 418. — *Silamus*

procumbens Rafin., Sylva Tellur. (1838) 61. — *Cephalanthus dioicus* Lour. *ex* Gomes, Mem. Acad. Sci. Lisb. Cl. Sci. Mor. Pol. Bel.-Let. n.s. 4 (1869) 26. — Type: *Loureiro* (LISB. †).

Not rubiaceous; like Merrill and all other authors I can offer no suggestion as to the identity.

16. *C. spathelliferus* Baker = **Breonardia microcephala** (Del.) Ridsd.

ACKNOWLEDGEMENTS

The present work was completed whilst holding a research grant from the Foundation for Advancement of Malesian Botany.

I am indebted to dr. W. Vink for critically reading the manuscript and to miss M. van Zoelen for the typing of it.

INDEX TO SCIENTIFIC NAMES

Accepted names are in plain type, synonyms in *italics*. Numbers refer to the number of the accepted species; dub., excl.: dubious and excluded respectively.

Nauclea *coadunata* J. E. Smith: excl. 11
missionis W. & A.: excl. 11
orientalis L.: excl. 11
purpurea Roxb.: excl. 11
stellata Wall.: 1
Neonauclea navillei Rehder: excl. 10
purpurea Merr.: excl. 11
Platanocephalus Vaill.: excl. 11
Sarcocephalus cordatus Miq.: excl. 11
Silamnus procumbens Rafin.: excl. 15
Stilbe procumbens Spreng.: excl. 15
Uncaria scandens Hutch.: excl. 4