

## Abstract

MAAS, P. J. M. & WESTRA, L. Y. Th.: Studies in Annonaceae. II. A monograph of the genus *Anaxagorea* A. St. Hil., Part 1. — Bot. Jahrb. Syst. 105: 73—134. 1984. — ISSN

*Anaxagorea* A. St. Hil. is distinct from other Annonaceae by the fruits. Unlike most members of the family, it occurs both in the Neotropics and in the Palaeotropics. Several chapters are devoted to a.o. morphology, anatomy, karyology, palynology, chemistry, pollination and seed dispersal, geography and ecology, economic uses and vernacular names, partly compiled from existing literature or collectors' notes, partly as a result of own investigations. A cladistic analysis of intrageneric relationships is given.

The taxonomic part provides descriptions, synonyms (nomina nuda are not included), dichotomous keys. For practical reasons, separate keys are given for neotropical and palaeotropical taxa. For neotropical species, a synoptic key is also provided. Altogether, 20 neotropical species and 3 palaeotropical species (including 2 varieties) are recognized, and 14 taxa are brought into synonymy. Another two taxa from the Neotropics are apparently new, but are not formally published because of incomplete material, and one palaeotropical species cannot be properly evaluated because of insufficient material. An index to exsiccata is appended.

# Studies in Annonaceae. II

## A monograph of the genus *Anaxagorea* A. St. Hil.

### Part 2

By

P. J. M. Maas and L. Y. Th. Westra\*

With 21 figures in the text

### Abstract

MAAS, P. J. M. & WESTRA, L. Y. Th.: Studies in Annonaceae. II. A monograph of the genus *Anaxagorea* A. St. Hil., Part 2. — Bot. Jahrb. Syst. 105: 145—204. 1985. —ISSN 0006-8152.

For the abstract see part 1, Bot. Jahrb. Syst. 105: 73. 1984.

#### 14.2.2. Descriptions of neotropical species (continuation)

8. *Anaxagorea dolichocarpa* Sprague & Sandw., Bull. Misc. Inform. 1930: 475. 1930; R. E. Fries, Acta Horti Berg. 12(1): 17. 1934; R. E. Fries in Pulle, Fl. Suriname 2(2): 356. 1940. — Type: *Jenman 5089*. Guyana. Bartica, Nov 1888, fl (holotype, K; isotype, UG). Fig. 18.
- = *Anaxagorea mutica* R. E. Fries, Acta Horti Berg. 12(1): 19. 1934; Jansen-Jacobs in Pulle, Fl. Suriname 2(2): 665. 1976. — Type: *Ule 5006*. Brazil. Amazonas: Rio Juruá, Marary, Sep 1908, fl (holotype, B, not seen: lost?; isotypes, G, K, L, MG, S).
- = *Anaxagorea megalophylla* R. E. Fries, Acta Horti Berg. 12(1): 20. 1934; R. E. Fries, Field Mus. Nat. Hist., Bot. Ser. 13(2): 749. 1938. — Type: *Pearce s.n.*. Peru. Loreto: Monte Rico, Mar 1867, fl, fr (holotype, K).

Tree or shrub, up to 15 m tall. Leafy twigs 1—10 mm in diam., ferruginous-puberulous, often glabrescent. Petioles 5—27 mm long, 1.5—6 mm in

\* P. J. M. MAAS and L. Y. Th. WESTRA are the editors of the monograph and authors of all chapters for which no further authorship is indicated.

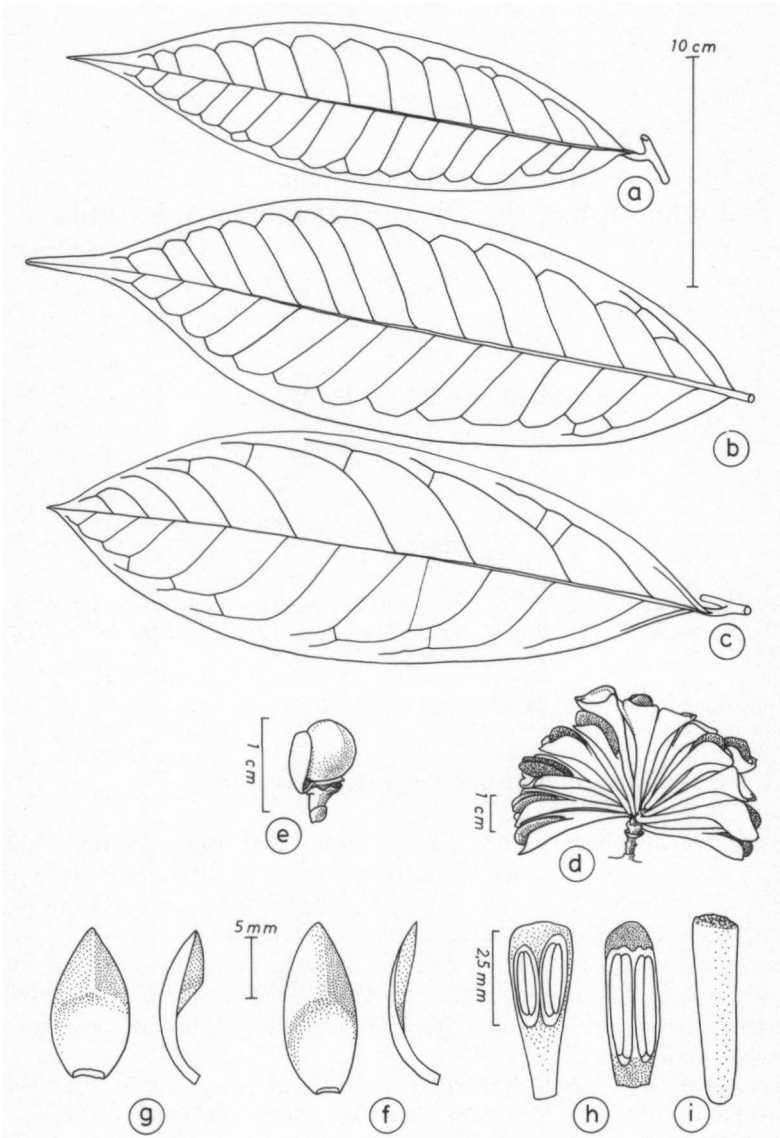


Fig. 18. *A. dolichocarpa* (a, e, BW 2646; b, BW 1644; c—d, van Donselaar 3055; f—i, Lindeman et al. 269). a—c, leaves; d, infructescence; e, flower bud; f, outer petal, inner side and lateral view; g, inner petal, inner side and lateral view; h, outer and inner stamens; i, staminode.

diam., ferruginous-puberulous, often glabrescent. Lamina (narrowly) elliptic to ovate or obovate, 9—45 cm long, 3—16 cm wide, ferruginous-puberulous on

lower side, base rounded to acute and slightly decurrent, apex acuminate to obtuse; primary vein slightly impressed to flat on upper side; secondary veins curved (to more or less straight), ca. 8—17 on each side of the primary vein, flat (to slightly raised) on upper side, angles with primary vein up to 70°, loop-forming at acute to right angles, loops mostly indistinct, smallest distance between loops and margin 2—8 mm.

Inflorescences axillary, rarely terminal (possibly due to abortion of the primary shoot apex), often cauliflorous, short-pedunculate to sessile, with 1—several flowers at a time, flowers originating from axils of lower pedicel bracts in rhipidium-mode, and often also from axils of peduncular bracts; peduncle (or sympodial rhachis) up to 10(—14) mm long; pedicels 3—12(—20) mm long, 1.5—3(—4) mm thick at the base and 2.5—5.5 mm thick below the flower; upper bract 1—7(—10) mm below the calyx, with an outer diameter of 3—9 mm, caducous or persistent. Flower buds globose to broadly ovoid, brownish or shades of green to orange, or reddish at the base (in vivo). Flowers coloured like the buds, or the inner side somewhat lighter in colour than the outer side, with “fragrance of pickles or fruits” (in vivo).

Indument of floral parts: pedicels densely to sparsely ferruginous-puberulous to glabrescent, outer side of sepals and petals densely to sparsely ferruginous-puberulous, inner side of petals glabrous.

Sepals free or connate, then soon splitting up to near base, ovate to broadly ovate, (5.5—)7—11(—13) mm long, (4—)6—10(—13) mm wide, acute, soon reflexed, persistent or less frequently deciduous before or after flowering. Outer petals ovate to obovate, 10—18(—23) mm long, 6—11(—13.5) mm wide, acute to obtuse, inner side flat to bifacial or rarely keeled above the middle, keel, when present, up to 1.7 mm wide, total thickness including keel, when present, up to 2.5 mm. Inner petals ovate to obovate, 9—16.5(—22) mm long, 5—10.5(—12) mm wide, acute, inner side bifacial to keeled above the middle, total thickness 3—10.5 mm including keel. Stamens ca. 40—90, 2.7—5.7 mm long, 0.9—1.7 mm wide, thecae 1—4 mm long, mostly not broader than the connective, apical prolongation of connective 0.1—1 mm long, 0.6—1.9 mm wide, rounded to truncate, Staminodes ca. 1—50, narrowly oblong to narrowly ovate or narrowly obovate, 2.2—5.5 mm long, (0.5—)0.7—1.8 mm wide, truncate to rounded, apex with glandular margin. Carpels ca. 10—25, 2.5—4.5 mm long.

Monocarps 25—47 mm long, green, yellow, brown, to red (in vivo), densely to sparsely ferruginous-puberulous or glabrescent, stipitate part 17—35 mm long, beak 0.8—2.7 mm long. Seeds 11—18 x 6—10.5 mm.

Specimens examined: COLOMBIA. Amazonas-Vaupés: 17 Jun 1951, *Schultes & Cabrera* 12628 fr (GH, S, U, US). Caquetá: 22 Apr 1953, *Romero Castañeda* 4064 fr (VEN). Putumayo: 29 Nov 1940, *Cuatrecasas* 10852 fr (US).

VENEZUELA. Bolívar: 17 Feb 1964, *Agostini* 338 fl, fr (VEN), 346 fl (VEN); 4 Dec 1959, *Bernardi* 7837 fl (VEN); 10 Apr 1964, *Breteler* 3760 fl, fr

(NY, S, U, US, VEN, WAG); 16 Apr 1957, *Couret 147* fr (US); Mar 1975, *Delascio & Lopez 2773* fr (VEN); 30 Dec 1956, *Foldats 2714* fl (NY, S); 6 Jul 1975, *Gentry & Berry 14947* fr (MO, MY, VEN); Dec 1952, *Ginés 4898* fl, fr (US); 1—3 Aug 1978, *Liesner & Gonzalez 5887* fr (NY); 11 Feb 1964, *Marcano Berti 59* fl (BR, GH, MY, NY, S, U, US, VEN); 29 Nov—18 Dec 1964, *Marcano Berti 442* fr (NY, US, VEN); May 1896, *Rusby & Squires 154* fr (BM, E, F, G, GH, M, MICH, MO, NY, US, Z); 30—31 Mar 1953, *Steyermark 74735* fr (F, NY, S, VEN); 24 May 1953, *Steyermark 75549* fl, fr (F, NY, VEN); 31 Oct 1960, *Steyermark 87134* fl (NY, VEN); 7 Nov 1960, *Steyermark 87350* fl (GH, NY, U, VEN); 16 Aug 1957, *Trujillo 3584* fr (MY, U); 23 Nov 1967, *Wessels Boer 2077* fr (U); 25 Nov 1967, *Wessels Boer 2098* fl (NY, U). Sucre: 12 Jul 1972, *Dumont VE-7602* fl, fr (F, NY, VEN); 9 Aug 1966, *Steyermark & Rabe 96200* fl (NY, S); 1 Dec 1979, *Steyermark & Liesner 120859* fl (MO); 22 Feb 1980, *Steyermark et al. 121568* fl, fr (MO); 23 Feb 1980, *Steyermark et al. 121663* fr (MO).

GUYANA. Apr 1926, *Altson 500* fr (K, RB); Jul 1908, *C. W. Anderson 35* fl, fr (K); Oct 1904, *Bartlett 8088* st (K, UG); Jan 1907, *Bartlett 8639* fl (K, UG); Jul 1906, *Beckett 8633* fr (K, UG); 28 Jan 1955, *Cowan 39360* fl, fr (F, GH, K, NY, RB, S); 18 Jan 1955, *Cowan 40520* fr (MO, NY, S, W); 9 Mar 1962, *Cowan & Soderstrom 2086* fl, fr (NY, S); 10—15 Feb 1923, *de la Cruz 3328* fr (F, GH, MO, NY, US); 10—23 May 1923, *de la Cruz 4027* fl (F, GH, MO, NY, US); 18—28 Sep 1923, *de la Cruz 4356* fl (F, GH, MO, NY, US); 5 Feb 1931, *Forest Dep. Br. Guiana 1018* (K); 25 Jan 1943, *Forest Dep. Br. Guiana 3920* (K); 14 May 1953, *Forest Dep. Br. Guiana 7788* fl (NY); 25—27 Jun 1921, *Gleason 180* st (NY); 14 Jul 1918, *Hobenkerk 35 B* fl, fr (NY, S, UG); *Hancock s.n.* (K); Nov. 1884, *Jenman 2511* fl (K, NY, UG); Sep 1887, *Jenman 4234* fr (K, NY); Jun 1894 *Jenman 6658* fr (UG), *6733* (K); 8 Aug 1977, *Maas & Maas 2432* fl (K, U); 4 Nov 1979, *Maas & Westra 3937* fl (U), 14 Nov 1979, *Maas & Westra 4446* fl (U); May 1929, *Martyn 40* fr (UG); 27. Aug 1976, *Mori et al. 8208* fr (NY, U); 28 Aug 1976, *Mori et al. 8233* fr (NY, U); *Rudge s.n.* fr (BM); 14 Aug 1929, *Sandwith 6* fl, fr (K, NY, RB); 25 Sep 1929, *Sandwith 340* fr (K, NY); 9 Oct 1929, *Sandwith 410* (K); 15. Aug 1960, *Tillett & Tillett 45139* fr (NY); *45139 A* fr (NY); 17 Sep 1960, *Tillett & Tillett 45434* fr (NY); 23 Sep 1960, *Tillett & Tillett 45487* fr (NY); 12 Oct 1960, *Tillett et al. 45634* fl (NY); 17 Aug 1960, *Tillett & Tillett 45883* fl (NY); 19 Aug 1960, *Tillett et al. 45897* fr (NY); 16 Jun 1933, *Tutin 184* fl (BM, K, U, US); 9 Jul 1933, *Tutin 306* fl (BM, K).

SURINAME. 14—25 Nov 1934, *Archer 2807* fr (US); 1 Oct 1901, *Boon 1218* fr (U); 8 Nov 1915, *BW 1327* fr (U); 9 Dec 1915, *BW 1519* (BM, MO, RB, U); 19 Feb 1916, *BW 1644* (U); 19 Jun 1916, *BW 1803* (U); 24 May 1916, *BW 1845* st (U); 2 Aug 1916, *BW 2212* (U); 11 Aug 1916, *BW 2270* (MO, U); 19 Oct 1916, *BW 2358* (U); 11 Oct 1926, *BW 2456* fl (GH, U); 5 Jul 1916, *BW 2492* fl (U); 14 Dec 1916, *BW 2516* (U); 8 Nov 1917, *BW 2646* fl, fr (LIL, U); 11 Apr 1917, *BW 2769* fl, fr (K, U); 7 Jun 1917, *BW 2915* fr

(NY, S, U); 30 Jul 1917, *BW 3051* (U); 3 Oct 1917, *BW 3349* fl (U); 20 Dec 1917, *BW 3496* st (U); 26 Jun 1918, *BW 3874* fr (U); 25 Jul 1918, *BW 3901* (U); 28 Aug 1919, *BW 4401* st (NY, U); 5 Oct 1921, *BW 5444* fr (NY, U); 14 Dec 1921, *BW 5550* fl (F, U); 10 Mar 1922, *BW 5721* fr (S, U); 26 Dec 1954, *Cowan 38988* fl, fr (NY, S); 27 Dec 1954, *Cowan 39012* fr (NY, S); 3 Jan 1955, *Cowan & Lindeman 39104* fl, fr (NY, S, U); 21 Sep 1959, *Daniels & Jonker 1169* st (U); 16 Dec 1965, *van Donselaar 2787* fr (P); 24 Jan 1965, *van Donselaar 3055* fr (U); 21 Nov 1950, *Florschütz 380* fl (U); 9 Feb 1951, *Florschütz & Florschütz 1246* fr (NY, U); 16 Nov 1951, *Florschütz & Florschütz 1469* st (NY, U); 28 Dec 1964, *Florschütz & Maas 2547* fl, fr (IJ, U); 30 Jul 1963, *Irwin et al. 54488* fl (NY); 1 Aug 1963, *Irwin et al. 54545* fl (NY, S, UC, W); 12 Aug 1963, *Irwin et al. 54713* st (F, FHO, NY, S, US); 21 Aug 1963, *Irwin 54925* fl (B, COL, F, LE, M, NY, P, US, W), *54928* fl (F, MO, NY, U, UC, VEN, W); 26 Aug 1963, *Irwin et al. 55092* fr (NY), *55095* (NY); 29 Sep 1963, *Irwin 55156* fl (F, FHO, NY); 15 Feb 1956, *Jonker-Verhoef & Jonker 628* fr (U); 16 Mar 1961, *Kramer & Hekking 3124* fr (U); 16 Oct 1911, *Kuyper 83* fl (U); 27 Sep 1948, *Lanjouw & Lindeman 500* st (U); 11 Jan 1949 *Lanjouw & Lindeman 1769* fr (K, NY, U); 22 Jul 1953, *Lindeman 4451* fr (U); 19 Sep 1953, *Lindeman 4646* fr (U); 24 May 1954, *Lindeman 5817* st (U); 2 Jun 1954, *Lindeman 6052* st (U); 17 Dec 1954, *Lindeman 6872* fr (U); 21 Sep 1969, *Lindeman LBB 12094* fl (U); 24 Sep 1975, *Lindeman 269* fl, fr (F, K, MO, NY, U, Z); 3 Oct 1975, *Lindeman et al. 704* fl, fr (U), *706* fl, fr (NY, U), *707* fl, fr (K, NY, U), *709* fl (U); 9 Nov 1974, *Maas et al. 2313* fl, fr (K, NY, U); 13 Apr 1965, *Maas & Tawjoeran 3179* fl (U); 1 Jul 1944, *Maguire 24021* fl (F, GH, K, MO, NY, RB, U, UC, US); 12 Jul 1944, *Maguire 24097* fl, fr (MICH, NY, U); 3 Sep 1944, *Maguire 24605* fl, fr (B, G, NY, U); Nov 1961, *Schulz LBB 9331* fl (U, Z); 25 Jul 1963, *Schulz LBB 10156a* fl (U); Jul 1945, *Stabel 343* fl (K, NY, U, WAG, WIS); 10 Jun 1975, *Teunissen LBB 15182* fl (U); 24 Mar 1963, *Wessels Boer 1076* fr (F, U); 14 Apr 1910, *anonymous collector 121* fr (U).

FRENCH GUIANA. 9 Jan 1914, *Benoist 576* fr (P); 29 Nov 1977, *Berg 782* fl (U); 15 Nov 1983, *Billiet & Jadin 2023* fl (U); 20 Dec 1954, *Cowan 38906* fr (NY, S); 20 Nov 1977, *Cremers 5094* fr (CAY); 10 May 1979, *Cremers 5569* fr (U); 6 Feb 1969 *de Granville 37* fr (CAY, P); 7 May 1969, *de Granville 174* fr (CAY, P); 5 Mar 1971, *de Granville 801* fr (CAY, P, U); 26 Jan 1978, *de Granville 2821* fr (CAY); 5 Oct 1980, *de Granville 4135* fl (U); 20 Oct 1972, *de Granville B-4617* fl (CAY, P, U); 30 Jun 1973, *de Granville B-4863* fr (CAY, P, U); 12 Mar 1979, *de Granville B-5487* fr (P, U); 2 Jan 1975, *Grenand 620* fr (CAY); 28 Feb 1978, *Jacquemin HJ-2158* fr (CAY, P); 28 Feb 1978, *Jacquemin HJ-2158bis* fl, fr (CAY); 10 Mar 1978, *Jacquemin HJ-2158ter* (CAY); *Martin s.n.* (BM); 1862, *Mélinon 21* (P); 1861, *Mélinon 31* fl (P); 22 Sep 1965, *Oldeman 1534* fl, fr (CAY, P, U); 6 Feb 1969, *Oldeman 2962* fl, fr (CAY, P); 7 Jan 1967, *Oldeman B-818* fr (CAY); 27 Feb 1969, *Oldeman B-2230* fr (CAY); 17 Apr 1970, *Oldeman B-3019* fr (CAY); 15 Dec 1971, *Olde-*

*man B-4203* fl (CAY); 4 Mar 1972, *Oldeman B-4332* fr (CAY, P); 13 Aug 1968, *Oldeman T-98* fr (CAY); 12 Feb 1968, *Oldeman & Sastre 187* fr (CAY); 12 Aug 1960, *Pires 47463* fr (FHO, MG, MICH, NY, US); 1819—1821, *Poitteau s.n.* fr (G); 15 Feb 1978, *Prévost 189* fl (CAY, P); 13 Apr 1978, *Prévost 240* st (CAY, U), *241* fr (CAY, U), *242* fr (CAY, U), *243* fr (CAY, U), *244* (CAY, U), *245* st (CAY, U), *246* (CAY, U), *247* fr (CAY, U), *248* st (CAY, U); 9 Sep 1980, *Prévost & Grenand 996* fr (U); 26 Feb 1979, *Puig 10260* (U); 1854?—1858?, *Sagot 8* fr (B); 1855, *Sagot s.n.* st (BR, S); 23 Mar 1968, *C. & F. Sastre 236* fr (CAY, P); 23 Apr 1975 (fr), *Sastre et al. 3941* fr (CAY); *Wachenheim 57* (K, P); Feb 1920, *Wachenheim 118* st (BM, K, P, US).

ECUADOR. Napo: 7 Aug 1980, *Brandbyge 32618* fl (AAU, U); 6 Aug 1981, *Brandbyge et al. 33257* fr (AAU, U); 25 Aug 1981, *Brandbyge et al. 36136* fl (AAU); 17 Sep 1977, *Foster 3707* fl (AAU, F, U); 26 Aug 1979, *Holm-Nielsen et al. 19913* fr (AAU); 31 Jan 1980, *Jaramillo & Coello 2176* fr (AAU); 12 Feb 1965, *Pinkley 16* fr (ECON); 19 Oct 1966, *Pinkley 522* fl, fr (ECON, S).

PERU. Amazonas: 10 Mar 1973, *Berlin 951* fr (GH, MO); 3 Sep 1979, *Huashikat 318* fl (MO, U); 12 Nov 1979, *Huashikat 1222* fr (MO, U); 5 Dec 1979, *Huashikat 1447* fr (MO, U); 8 Feb 1980, *Huashikat 2006* fr (MO); 14 Dec 1979, *Tunqui 339* fr (U). Huanuco: 15 Dec 1968, *Schunke Vigo 2887* fr (DUKE, F, GH, NY, VEN). Loreto: 10 Dec 1978, *Diaz et al. 757* fr (MO, U); 1—5 Sep 1929, *Killip & Smith 28942* st (NY), *28970* fr (NY, US); 13 Jul 1978, *Ramirez 14* fr (U); 2 Dec 1972, *Schunke Vigo 5647* fl (F); 6 Mar 1968, *Simpson & Schunke Vigo 802* fr (F, NY, US).

BRAZIL. Acre: 15 Aug 1933, *Krukoff 5532* st (GH, K, NY, S, U, US); 3 Sep 1933, *Krukoff 5749* fl, fr (A, B, BM, F, M, MICH, MO, NY, S, U, UC, US); 20 Oct 1980, *Lowrie et al. 597* fl (U). Amapá: 7 Dec 1954, *Cowan 38685* fr (NY). Amazonas: 6 Jun 1933, *Krukoff 4700* fl, fr (B, BM, F, GB, GH, K, LE, M, MICH, MO, NY, S, SB, U, UC, US); 28 Jun 1933, *Krukoff 5057* fl (A, BM, K, M, MICH, MO, NY, S, U, UC, US); 9 Jul 1971, *Prance et al. 14066* fr (INPA); 14 Jul 1971, *Prance et al. 14209* fr (INPA). Bahia: 31 Mar 1976, *Harley et al. 17549* fl, fr (MO, NY, P, U); 25 Sep 1980, *Mattos Silva et al. 1094* st (U); 8 Feb 1982, *Mattos Silva et al. 1478* fl (U); May 1822, *Riedel s.n.* fl, fr (BM, LE, S); Goiás: 28 May 1956, *Dawson 15131* fl, fr (S); 8 Jan 1917, *Constantino RB 8658* fl, fr (RB, S). Guanabara: 19 Aug—18 Sep 1946, *Duarte 228-232* fr (NY, RB); 26 Sep 1949, *Duarte 3726* fr (RB); May 1960, *Duarte 5222* fl, fr (RB); May 1887, *Glaziou 15822* st (C, G, K, LE, P); 13 Oct 1928, *Horto Florestal, personnel of, 89* fl, fr (RB); 9 Nov 1927, *Horto Florestal, personnel of, 90* fl (RB); 17 Jun 1927, *Horto Florestal, personnel of, 91B* fr (RB); 24 Nov 1927, *Kuhlmann 91A* fl (RB); 1 Aug 1977, *Martinelli et al. 2826* fr (RB); 18 Sep 1946, *Ochbioni 713* fl, fr (MO, NY, RB). Maranhão: 23 Sep 1980, *Daly et al. D228* fl, fr (NY, U); 14 Sep 1903, *Ducke MG 383* fl, fr (MG, S); 30 Nov 1978, *Rosa & Vilar 2744* fr (NY). Mato Grosso: 19 Oct 1973, *Berg et al. P18660* fl, fr (U); 12 Jul 1977, *Oliveira 25* fl, fr (RB); 28 Jun 1977, *Rosa &*

*Santos* 2191 fr (INPA, MG, MO); 15 Jul 1977, *M.J. & M.G. Silva* 3340 fr (MG). Pará: 24 Oct 1977, *Berg et al.* BG 693 fl, fr (U); 28 Jul 1971, *Cavalcante & Silva* 2823 fl (MG); 26 Apr 1959, *Coêlho de Moraes* 2058 fl (RB); 8—12 Dec 1981, *Daly et al.* 1847 fl (U); 16 Dec 1906, *Ducke* MG 7978a fr (MG); 8 Sep 1960, *Egler* 1365 fl (MG); Aug 1905, *J. Huber* MG 7035 fl, fr (BM, G, MG); 16 Aug 1959, *Kublmann & Jimbo* 13 (MG, SP); 5 Aug 1963, *Maguire et al.* 56025 fl (F, K, NY, S, US); 7 Aug 1963, *Maguire* 56065 fr (VEN); Aug 1908, *Museu Goeldi, personnel of*, MG 9597 fr (MG); 1 Nov 1965, *Prance & Pennington* 1883 fr (F, NY, S, US, VEN); 24 Aug 1964, *Prance & Silva* 58852 fl, fr (F, GH, K, NY, RB, S, U, US); 26 Aug 1964, *Prance & Silva* 58884 fl, fr (F, GH, K, S, U, US, VEN); 12 Feb 1903, *Rodriguez* MG 3383 fr (MG); 11 Jun 1978, *Rosario* 33 fr (MG, NY); 19 Jan 1966, *M. Silva* 460 fl, fr (MG). Pernambuco: 12 Jun 1950 *Leal et al.* 27 fr (NY, RB); 15 Aug 1963, *Paiva* 1049 fl, fr (US); 25 Oct 1962, *Tavares* 1119 fr (US). Rondônia: 5 Aug 1968, *Prance et al.* 6822 fr (INPA).

BOLIVIA. Cochabamba: 2 May 1979, *Beck* 1483 fr (MO).

Distribution: (Fig. 34): Eastern Venezuela, the Guianas, Amapá in Brazil, most of the Amazon region, northeastern and eastern Brazil. Usually in wet forests, at alt. 0—1300 m.

Discussion: This is the most widespread and common of all neotropical *Anaxagorea* species. It is also the most variable one, especially in the size and shape of the leaves, the size of the monocarps, the number of stamens, and the length of the apical prolongation of the connective.

Specimens from Ecuador (Napo) and Peru (Loreto, Amazonas) mostly have pedicels of more-than-average length for this species (these are the values given between parentheses in the description). It is not very well possible to express this by assigning them formal taxonomic rank.

The sepals in specimens from Venezuela and Guyana are free and persistent, soon becoming reflexed. Elsewhere, the sepals are mostly connate to a greater or lesser extent, and they are often caducous. Some specimens from the western part of the area show sepals connate in bud to near the apex (also, the apical prolongation of the connective in these specimens is very short, the shortest within the range).

*A. dolichocarpa* and *A. acuminata* much resemble each other in the vegetative parts and in the fruits. In regions where both species occur, identification without flowers becomes difficult. Perhaps the best way to try is closer examination of the secondary veins: the secondary veins in *A. dolichocarpa* are usually curved, usually at an angle of less than 70° with the primary vein, and they are mostly fairly conspicuous on the lower side, whereas the secondary veins in *A. acuminata* are more or less straight, usually at an angle of more than 70° with the primary vein, and are mostly inconspicuous (except in Venezuela) on the lower side.



Another species closely resembling *A. dolichocarpa* is *A. brevipes*. *A. brevipes*, however, is clearly distinct from *A. dolichocarpa* by the combination of floral characters already mentioned. Without flowers, again, the two species may become difficult to separate. The glabrous appearance of *A. brevipes* is a distinctive feature of that species, which will mostly distinguish it from *A. dolichocarpa* (although a trained eye and a good hand lens remain absolutely necessary). Since, however, the indument of *A. dolichocarpa* is variable, and practically glabrous individuals of *A. dolichocarpa* are not uncommon, identifications made without flowers should not always be relied upon too much in regions where both species are known or may be expected to occur.

*A. dolichocarpa* as a whole appears to be hardly characterizable. The concept strikes one as rather plasmodial, so to say, and in practical situations identification is made per exclusionem in many cases. Further investigation is needed here.

9. *Anaxagorea floribunda* Timmerman in Maas, Timmerman & Westra, Proc. Kon. Ned. Akad. Wetensch., Ser. C, 87 (3): 300. 1984. — Type: *Klug* 33. Peru. Loreto: Mishuyacu near Iquitos, Oct—Nov 1929, alt. 100 m, fl (holotype, NY). Fig. 19.

Shrub, ca. 1 m tall. Petioles 7 mm long, 3.5—4 mm in diam., glabrous. Lamina narrowly elliptic, 15—30 cm long, (4.5—)5—9.5 cm wide, sparsely ferruginous-puberulous on lower side, cuneate to rounded towards the base, the base manifestly asymmetrical, apex acuminate, obtuse at the tip itself; primary vein impressed on upper side; secondary veins curved, ca. (9—)11—14 on each side of primary vein, slightly impressed on upper side, angles with primary vein up to 70°, loop-forming at right angles, loops fairly distinct, smallest distance between loops and margin 4—11 mm.

Inflorescences apparently cauliflorous from the base of the stem, prostrate, flagelliform, ca. 20 cm long or more, producing many flowers in succession on paniculately arranged rhipidia; pedicels 3.5—6.5 mm long, 0.5—1.5 mm thick at the base and 1—2 mm thick below the flower; upper bract close to the calyx to 2.5 mm below the calyx, with an outer diameter of 2—2.5 mm. Flower buds ovoid. Flowers red (in vivo).

Indument of floral parts: pedicels, sepals, and petals subglabrous.

Sepals connate at the base, ovate, 5—6.1 mm long, 2.5—3 mm wide, acuminate, persistent, subchartaceous, with reflexed apex, persistent. Outer petals ovate to narrowly ovate, 3—4.5 mm long, 1.3—1.9 mm wide, acuminate, inner side flat to slightly bifacial above the middle. Inner petals ovate, 2.5—4.2 mm long, 1.3—2 mm wide, acuminate, inner side keeled above the middle. Stamens ca. 10, 1.3—3 mm long, 0.4—0.6 mm wide, thecae (0.6—)0.9—2 mm long, broader than the connective, apical prolongation of connective 0.3—0.5 mm long and wide, rounded. Staminodes ca. 5, narrowly oblong, 1—2.2 mm long, 0.3—0.4 mm wide. Carpels ca. 5, 1.4—2 mm long.

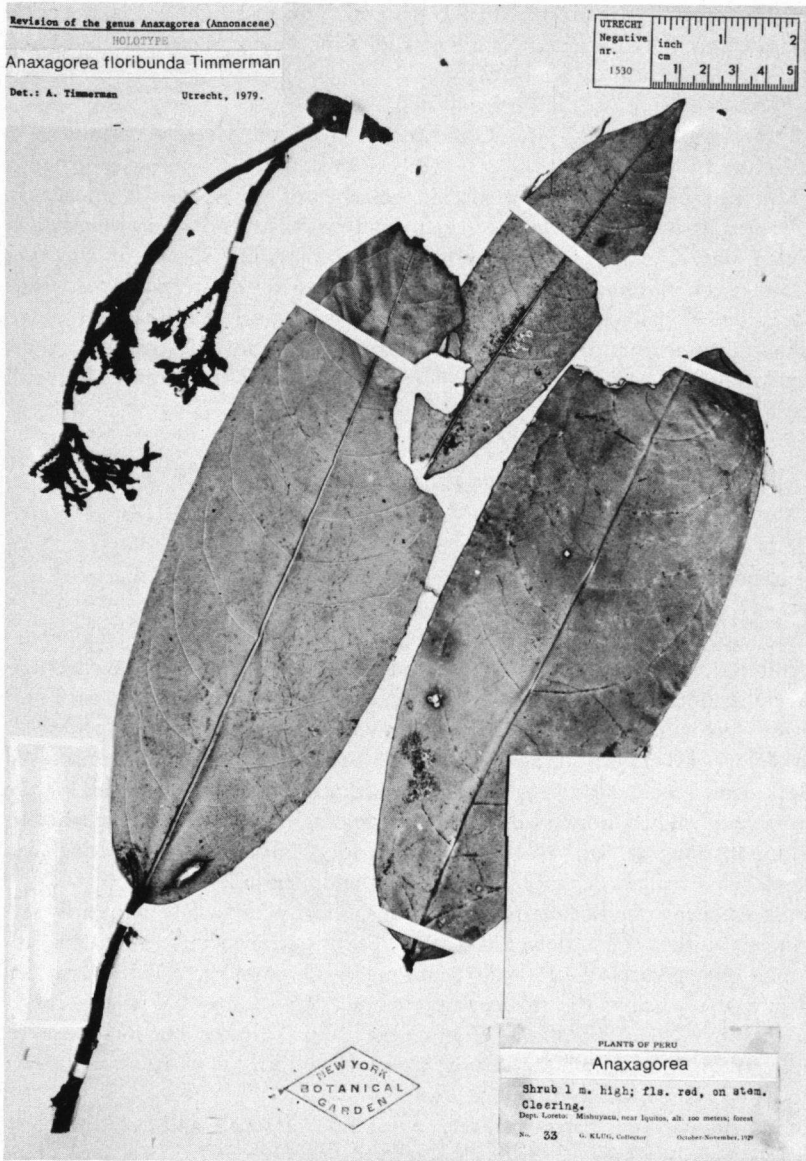


Fig. 19. *A. floribunda* (Klug 33).

Monocarps ca. 30 mm long, with obtusely conical apex (the beak proper caducous?).

Specimen examined: PERU. Loreto: Maynas, Quebrada Sucusari, Llachapa camp of Explorama, N side of Río Napo below Mazan, alt. 140 m, 7 Nov 1979, Gentry *et al.* 27626 fr (MO).

Distribution (Fig. 35): Only known from the vicinity of Iquitos in Peru, in forest.

Discussion: The size of the inflorescence of this species is unusual in *Anaxagorea*. It is the only species in this genus as far as known showing flagelliflory. A similar mode of flowering is also found in some species of *Duguetia* A.St.Hil. (sect. *Geanthemum* R.E. Fries), which is quite interesting. *A. floribunda* is further characterized by the manifestly asymmetrical leaf base.

The measurements of the floral parts given in the above description are approximations, since it was hard to determine whether the largest (but still closed!) flowers on the type sheet were truly mature or not.

10. *Anaxagorea gigantophylla* R.E. Fries, Mem. New York Bot. Gard. 9: 330. 1957. — Type: *Maguire et al.* 36774. Venezuela. Amazonas: Cerro de la Neblina, Río Yatua, alt. 140 m, 14 Dec 1953, fl, fr (holotype, NY; isotypes, F, S, US). Fig. 20.

Tree, up to ca. 12 m tall. Leafy twigs 3–15 mm in diam., ferrugineous-puberulous. Petioles 15–45(–60) mm long, 4–8(–10) mm in diam., ferrugineous-puberulous. Lamina narrowly elliptic, (25–)35–75 cm long, (7–)10–25 cm wide, ferrugineous-puberulous to glabrescent on lower side, base rounded, often slightly asymmetrical, apex acuminate to acute; primary vein impressed on upper side; secondary veins slightly curved, ca. 18–28 on each side of the primary vein, slightly impressed on upper side, angles with primary vein up to 70°, loop-forming at right to obtuse angles, loops pronounced, resulting in a marginal vein, smallest distance between loops and margin 2–5 mm.

Inflorescences ramiflorous to cauliflorous, short-pedunculate to nearly sessile, mostly with a single flower at a time; peduncle (or sympodial rhachis) up to 7 mm long; pedicels 7–15(–22) mm long, 2–3.5 mm thick at the base and 4–6 mm thick below the flower; upper bract 2.5–9 mm below the calyx, with an outer diameter of 6–10 mm, persistent. Flower buds globose to broadly ovoid. Flowers white, creamy, pale yellow with tawny hairs, or brown without and yellow within (in vivo).

Indument of floral parts: pedicels, outer side of sepals and petals densely ferrugineous-puberulous, the pedicels soon glabrescent; inner side of sepals and petals sparsely whitish- to brownish-puberulous.

Sepals connate at the base, broadly ovate to ovate, 9–13 mm long, 6.5–10 mm wide, acute, persistent, reflexed. Outer petals oblong-elliptic to narrowly oblong-elliptic, 12.5–22 mm long, 8–9 mm wide, acute to obtuse, inner side flat or almost flat above the middle. Inner petals ovate-elliptic to narrowly ovate-elliptic, 11.5–20 mm long, 5–10.5 mm wide, obtuse, inner side bifacial

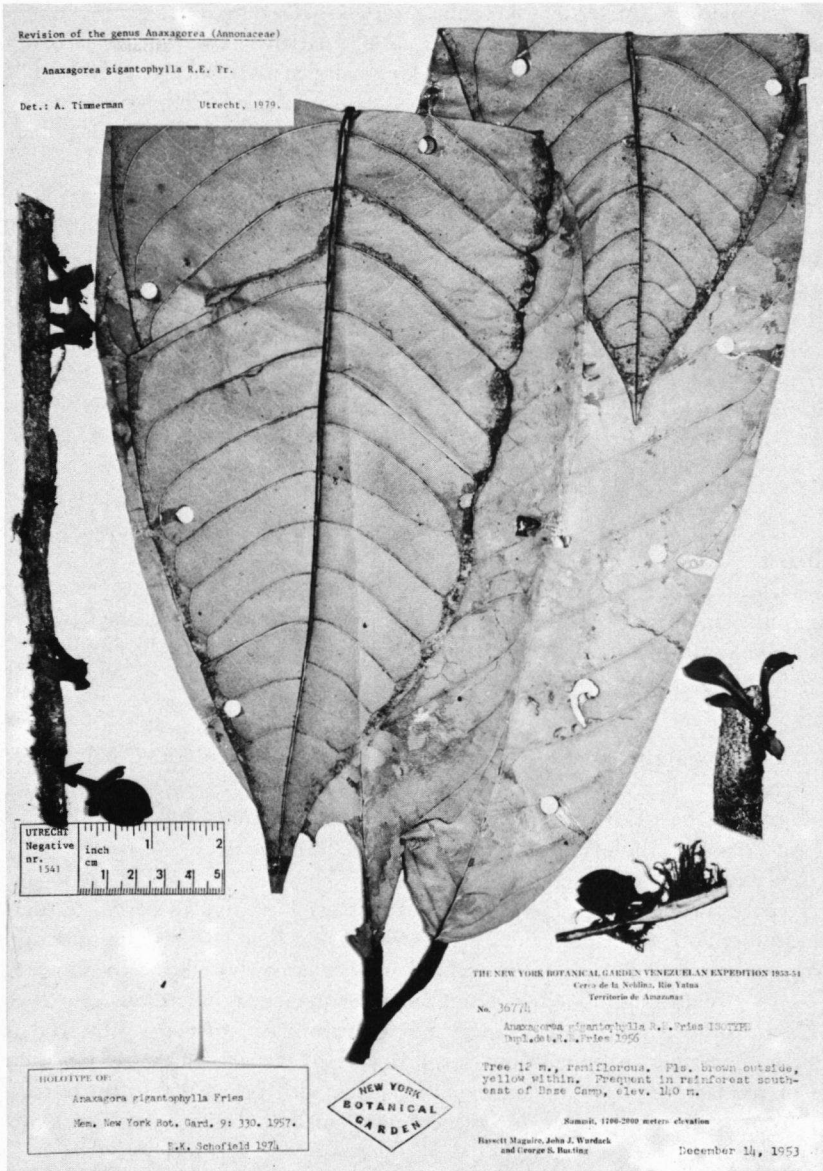


Fig. 20. *A. gigantophylla* (Maguire et al. 36774).

in upper two-thirds, 3—4 mm thick in upper part. Stamens ca. 125, 3.8—5.2 mm long, 1.2—1.6 mm wide, thecae 1.9—3.8 mm long, broader than the con-

nective, apical prolongation of connective 0.5—1.2 mm long, 1.2—1.7 mm wide, rounded to truncate. Staminodes ca. 35, narrowly obovate to narrowly oblong, 4—5 mm long, 0.7—1.7 mm wide, rounded to truncate, apex with a glandular margin, slightly thickened. Carpels ca. 15—20, 3—4 mm long.

Monocarps 30—35 mm long, brown (in vivo), densely ferruginous-puberulous, stipitate part 20—22 mm long, beak (1—)1.5—4 mm long.

Specimens examined: VENEZUELA. Amazonas: Uppermost Río Yatua, alt. 100—140 m, 7—8 Dec 1953, *Maguire et al.* 36713 fl, fr (NY, S); Sierra Parima, vicinity of Simarawochi, Río Matacuni, 18 Apr—23 May 1973, *Steyermark* 107488 fl, fr (MO, NY, VEN).

BRAZIL. Amazonas: Rio Tipirico, affluent of Rio Cauaburi, alt. 100 m, 12 Apr 1964, *Ewel* 85 fr (MY); Rio Tucano, alt. 850 ft, 2 Dec 1965, *Maguire et al.* 60311 fl (F, NY, S, US); Serra da Neblina, Rio Maturacá, between Palmito and Tatu Camps, alt. 400—600 m, 21 Dec 1965, *N.T. Silva & Brazão* 60709 fr (NY, US, VEN).

Distribution (Fig. 34): Southernmost Venezuela and the adjacent area in Brazil.

Discussion: This species is distinguished by its very large leaves with a maximum size near 70 cm long and 25 cm wide, values not reached by any other *Anaxagorea* species and probably by hardly any member of the family.

11. *Anaxagorea guatemalensis* Standley, *Trop. Woods* 7: 4. 1926; R.E. Fries, *Acta Horti Berg.* 12(1): 26. fig. 2f—g. 1934. — Type: *Record* 41. Guatemala. Izabal: Lower Río Motagua, between Los Andes and Entre Rios, 3 Jan 1926, fl, fr (holotype, US; isotypes, FHO, S). Fig. 21.

Tree or shrub, up to ca. 6 m tall. Leafy twigs 1—6 mm in diam., ferruginous-puberulous to glabrescent. Petioles 7—14 mm long, 1—3.5 mm in diam., ferruginous-puberulous to glabrescent. Lamina (narrowly) elliptic to obovate, 10—28(—36) cm long, (3—)6—16 cm wide, ferruginous-puberulous on lower side, base obtuse to rounded, apex shortly acuminate; primary vein flat to slightly impressed on upper side; secondary veins curved, ca. 9—15 on each side of primary vein, flat on upper side, angles with primary vein up to 70°, loop-forming at acute angles, loops indistinct, smallest distance between loops and margin 2—6 mm.

Inflorescences axillary, pedunculate, with (mostly) 1—2 flowers at a time; peduncle (or sympodial rhachis) up to 8(—13) mm long; pedicels 6—12 mm long, 1—2 mm thick at the base and 2—3.5 mm thick below the flower; upper bract 1.5—2.5(—3.5) mm below the calyx, with an outer diameter of 3—4 mm, persistent. Flower buds conical. Flowers yellow to yellowish-green (in vivo).

Indument of floral parts: pedicels and outer side of sepals and petals dense-

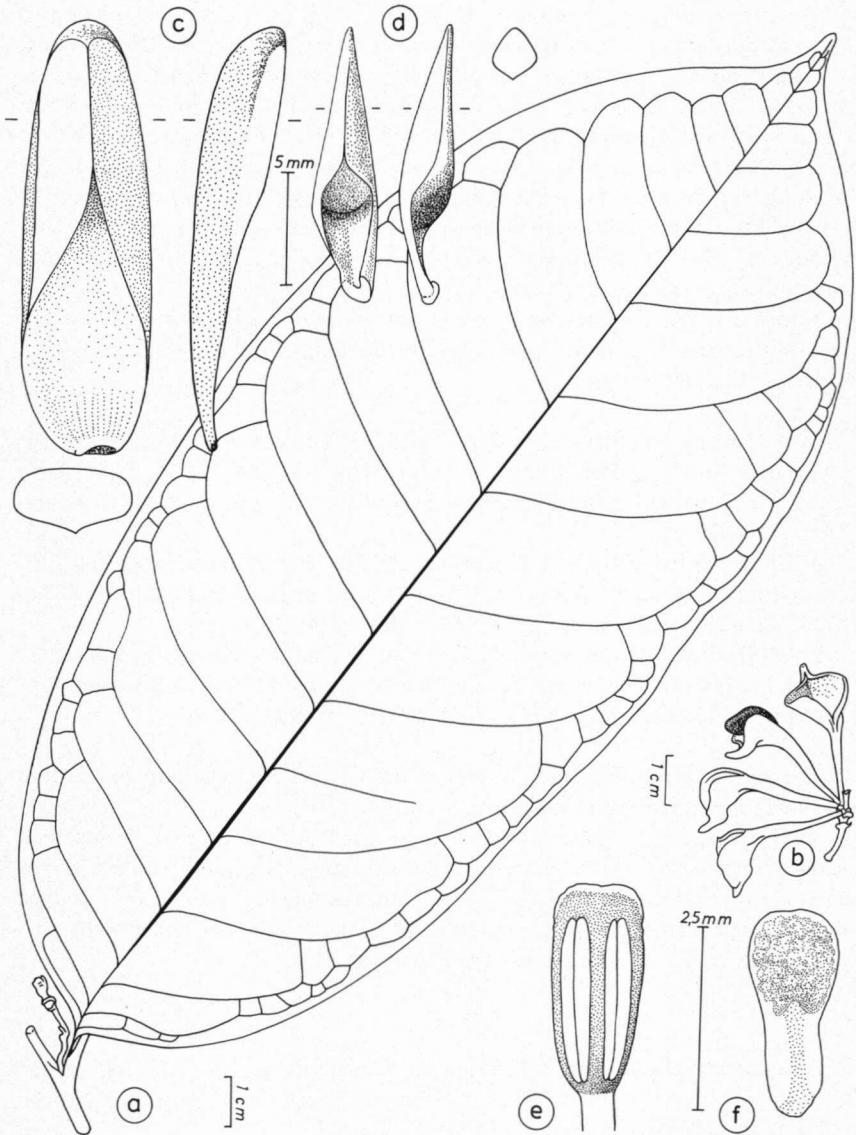


Fig. 21. *A. guatemalensis* (a—b, Contreras 9338; c—f, Proctor et al. 35927). a, leaf; b, inflorescence; c, outer petal, inner side, lateral view, and cross section; d, inner petal, inner side, lateral view, and cross section; e, stamen; f, staminode.

ly ferrugineous-puberulous, inner side of sepals sparsely ferrugineous-puberulous, inner side of petals sparsely white-puberulous.

Sepals free, ovate to triangular, 6—10 mm long, 3—5 mm wide, obtuse to acute, apically reflexed. Outer petals narrowly ovate to ovate, 9—20 mm long, 3—6 mm wide, obtuse, inner side bifacial in upper third, thickness in upper part to ca. 3 mm. Inner petals narrowly ovate, 7.5—12.5 mm long, 2.7—3 mm wide, acute, inner side bifacial above the middle, thickness in upper part to ca. 2.5 mm. Stamens ca. 25—35, 2—4 mm long, 0.5—1.1 mm wide, thecae 1—2.2 mm long, not broader than the connective, apical prolongation of connective 0.4—1.3 mm long, 0.5—1 mm wide, (retuse,) truncate, obtuse, to acute. Staminodes ca. 10—15, narrowly obovate, 2—3 mm long, 0.5—1 mm wide, truncate, obtuse, to acute. Carpels ca. 5—10, 2—2.5 mm long.

Monocarps 30—36 mm long, green (in vivo), densely to sparsely ferruginous-puberulous, stipitate part 18—25 mm long, beak 2.5—4.5 mm long. Seeds 14—15.5 x 7—9 mm.

Specimens examined: GUATEMALA. El Petén: Los Arcos, km 163 of Cadenas Road, 12 Dec 1969, *Contreras 9338* fr (DUKE, NY, S, U, US). Izabal: Puerto Mendez, on San Felipe Road, 7 km S, 12 Sep 1969, *Contreras 9139* fl (DUKE).

BELIZE. Toledo: beyond Colombia, 22 Feb 1947, *Gentle 6176* fl (MO, US); vicinity of Sapote Camp, ca. 6.5 miles west of Medina Bank, alt. 800—1200 ft, 23—27 Apr 1976, *Proctor 35927* fr (BM, IJ, MO).

HONDURAS. Comayagua: N of Lake Yojoa, alt. 200 m, 5 Mar 1974, *Hazlett 1219* fr (MO); Cuenco del Rio Varsavia, por la aldea Cerro Azul, este del Lago, alt. 1000 m, 15 Jan 1975, *Hazlett 2419* fr (CR, MO).

Distribution (Fig. 30): Northeastern Guatemala, southern Belize, and western Honduras, at altitudes between 250—1000 m.

Discussion: *A. guatemalensis* can be distinguished from *A. crassipetala*, a closely related species, by more glabrescent young twigs and petioles, leaves which are often widest above the middle, and the smaller number of — larger — monocarps from a single flower, and also by the somewhat larger seeds. See also remarks under *A. allenii*, another related species.

12. *Anaxagorea macrantha* R.E. Fries, Acta Horti Berg. 12(1): 27. fig. 1d—g. 1934. — Type: *Ducke RB 23696*. Brazil. Amazonas: Upper Rio Negro, Cãmãnaus, 30 Nov 1929, fl (holotype, S). Fig. 22.

Small tree. Leafy twigs ferruginous-puberulous. Petioles 7—11 mm long, 3—5 mm in diam., ferruginous-puberulous. Lamina narrowly elliptic, (16—) 26—42 cm long, 5—11 cm wide, ferruginous-puberulous on lower side, lower side with a waxy appearance, base obtuse (to acute), apex acuminate to acute; primary vein impressed on upper side; secondary veins straight, ca. (12—)22—29 on each side of primary vein, slightly impressed on upper side, angles with





primary vein up to 70°, loop-forming at right angles, loops distinct, smallest distance between loops and margin 2—3 mm.

Inflorescences axillary, a condensed panicle or cluster of rhipidia, with several flowers at a time; peduncle (or sympodial rhachis) up to 8 mm long; pedicels 4.5—6 mm long, 2—2.5 mm thick at the base and 3.5 mm thick below the flower; upper bract 1—1.5 mm below the calyx, with an outer diameter of 7.5—8.5 mm, caducous before flowering. Flower buds conical. Flowers yellow-white, fragrant (in vivo).

Indument of floral parts: pedicels and outer side of sepals and petals densely ferrugineous-puberulous, inner side of sepals and petals sparsely whitish-puberulous.

Sepals connate in lower half, soon splitting down to the base, ovate, ca. 10 mm long and ca. 5 mm wide, acute, apically reflexed. Outer petals narrowly obovate, constricted in the lower half, 18—30 mm long, 5.3—7 mm wide, obtuse. Inner petals narrowly elliptic, 16.5—28.5 mm long, 3—4.5 mm wide, obtuse, inner side keeled in upper two-thirds, thickness including keel ca. 1 mm. Stamens (number to be established) 2—3 mm long, ca. 0.7 mm wide, thecae 1.2—2.2 mm long, not broader than the connective, apical prolongation of connective 0.5—0.7 mm long and wide, obtuse to rounded. Staminodes narrowly oblong. Carpels 3—3.5 mm long.

Fruits unknown.

Distribution (Fig. 30): Only known from the type collection.

Discussion: The holotype specimen was the only material available to us, and apparently also was all that FRIES had at his disposal. For this reason, we cannot give a complete description of the androecium and gynoecium, since that would have involved dissecting another flower.

*A. macrantha* is the largest-flowered species in the genus. The outer petals are remarkable because of the constriction in the lower half, a unique feature within *Anaxagorea*. Another remarkable feature of *A. macrantha* are the discoloured leaves; this is not found in other *Anaxagorea* species either.

13. *Anaxagorea manausensis* Timmerman in Maas, Timmerman & Westra, Proc. Kon. Ned. Akad. Wetensch., Ser. C, 87 (3): 301. 1984. — Type: *Prance et al. 14745*. Brazil. Amazonas: vicinity of Manaus, Reserva Florestal Ducke, vicinity of Igarapé Araçá, 14 Sep 1971, fl (holotype, INPA; isotypes, NY, VEN), Fig. 23.

Tree or shrub, up to 6 m tall. Leafy twigs 1—3 mm in diam., dark brown-puberulous. Petioles 4—9 mm long, 1—2 mm in diam., dark brown-puberulous. Lamina narrowly elliptic, 8—17 cm long, 2—5 cm wide, dark brown-puberulous to glabrous on lower side, base obtuse to acute, slightly decurrent, apex long-acuminate; primary vein impressed on upper side; secondary veins straight, ca. 8—14 on each side of primary vein, slightly impressed on upper



Fig. 23. *A. manausensis* (Prance et al. 1971).

side, angles with primary vein up to 75°, loop-forming at right angles, loops distinct, smallest distance between loops and margin 3—5 mm.

Inflorescences axillary on older parts of branchlets, to cauliflorous, short-pedunculate to nearly sessile, mostly 1-flowered at a time; peduncle (or sympodial rhachis) up to 8 mm long; pedicels 10—19 mm long, 1—1.5 mm thick at the base and 2.5—3 mm thick below the flower; upper bract 3—9 mm below the calyx, with an outer diameter of 2 mm. Flower buds globose. Flowers chestnut-coloured, or sepals brown and petals cream (in vivo).

Indument of floral parts: pedicels densely dark brown-puberulous to glabrescent, outer side of sepals and petals densely dark brown-puberulous, inner side of sepals glabrous, inner side of outer petals with some scattered white hairs in the middle, inner side of inner petals glabrous.

Sepals free, broadly ovate to depressed ovate, 3.5—4 mm long, 4 mm wide, rounded, caducous before flowering, curved upward. Outer petals elliptic, 8—9.5 mm long, 5.5—7 mm wide, obtuse. Inner petals obovate to broadly obovate, 6.5—7.5 mm long, 4.5—6 mm wide, inner side keeled above the middle, thickness including keel ca. 3 mm. Stamens ca. 25, 3.5—5 mm long, 1.2—1.5 mm wide, thecae 2—3 mm long, not broader than the connective, apical prolongation of connective 0.4—0.7 mm long, 0.9—1.3 mm wide, truncate. Staminodes ca. 10, narrowly oblong to narrowly obovate, 3—4 mm long, 0.8—1.1 mm wide, truncate to rounded. Carpels ca. 20—30, ca. 3 mm long.

Fruits unknown.

Specimen examined: BRAZIL. Amazonas: vicinity of Manaus, Reserva Florestal Ducke, Igarapé Riacho Grande, 3 Oct 1957, *Ferreira 136/57* fl (INPA, MG, S).

Distribution (Fig. 36): Only known from the type locality.

Discussion: *A. manausensis* should be placed within the alliance of *A. dolichocarpa*. It is distinct from *A. dolichocarpa* and related species by the rather small leaves with secondary veins forming distinct loops. The very small size of the upper bract, with an outer diameter not (or hardly) exceeding 2 mm, is noteworthy.

14. *Anaxagorea pachypetala* (Diels) R.E. Fries, *Acta Horti Berg.* 10: 175. 1931; R.E. Fries, *Acta Horti Berg.* 12(1): 10. 1934; R.E. Fries, *Field Mus. Nat. Hist., Bot. Ser.* 13(2): 748. 1938.
- ≡ *Oxandra pachypetala* Diels, *Notizbl. Bot. Gart. Berlin-Dahlem* 10: 173. 1927. — Type: *Tessmann 4893*. Peru. Loreto: N of Río Apaga, basin of Río Marañon, 31 Dec 1924, fl (holotype, B; isotypes, F, G, NY).
- ≡ *Guatteria pachypetala* (Diels) Macbride, *Field Mus. Nat. Hist., Bot. Ser.* 4: 171. 1929.
- = *Anaxagorea pallida* Diels, *Notizbl. Bot. Gart. Berlin-Dahlem* 11: 79. 1931;

R.E. Fries, Acta Horti Berg. 12(1): 215. 1934; R.E. Fries, Field Mus. Nat. Hist., Bot. Ser. 13(2): 750. 1938. — Type: *Ll. Williams 4873*. Peru. Loreto: Lower Río Huallaga, Sapoteyaco, Santa Rosa, alt. 155—210 m, Oct—Nov 1929, fr (holotype, B, not seen: lost?; isotype, F).

Tree, up to ca. 8 m tall. Leafy twigs 0.5—3 mm in diam., sparsely ferrugineous-pubescent, soon glabrescent, cortex whitish. Petioles 3—8(—10) mm long, 0.5—1.2 mm in diam., sparsely ferrugineous-puberulous, soon glabrescent. Lamina narrowly elliptic, 5—16 cm long, 1.5—5 cm wide, ferrugineous-puberulous on lower side, to glabrous, base acute to obtuse, slightly decurrent, apex long-acuminate; primary vein slightly impressed on upper side; secondary veins curved, ca. 6—14 on each side of primary vein, slightly raised on upper side, angles with primary vein up to 80°, loop-forming at right to obtuse angles, loops indistinct to distinct, smallest distance between loops and margin 2—4 mm.

Inflorescences axillary, short-pedunculate to nearly sessile, mostly with a single flower at a time; peduncle (or sympodial rhachis) up to 8 mm long; pedicels (17—)19—28 mm long, 0.5—1.5 mm thick at the base and 1—2 mm thick below the flower; upper bract 8—18 mm below the calyx, with an outer diameter of 1—2 mm. Flower buds globose. Flowers brownish yellow (in vivo).

Indument of floral parts: pedicels and outer side of petals densely ferrugineous-puberulous, pedicels soon glabrescent, inner side of petals (sub-)glabrous.

Sepals connate to the middle or to above the middle, ovate (fide FRIES 1934), 3—3.5 mm long, 2.5—2.7 mm wide, somewhat obtuse (fide FRIES 1934), erect, caducous before anthesis, leaving a ring-shaped scar of 2—3.5 mm in diam. Outer petals elliptic to narrowly elliptic, 7—9.5 mm long, 3.5—5 mm wide, acute, inner side almost flat to bifacial at a broad angle above the middle, ca. 2 mm thick at the middle. Inner petals obovate, 6—8.5 mm long, 3—4.5 mm wide, obtuse to subacute, inner side bifacial above the middle, thickness 2—2.5 mm. Stamens ca. 30, 2.5—3.5 mm long, 0.6—1 mm wide, thecae 1.3—2 mm long, not broader than the connective, apical prolongation of connective 0.1—0.2 mm long, obtuse to truncate. Staminodes ca. 5, narrowly obovate, about as long as the stamens, 0.6—0.7 mm wide, obtuse to truncate. Carpels ca. 15—25, 1.5—2 mm long.

Monocarps 25—30 mm long, brilliant yellow (in vivo), (sub-)glabrous, stipitate part 15—18 mm long, beak 0.5—0.7 mm long, caducous. Seeds 9.5—13.5 x 6.5—7.5 mm.

Specimen examined: PERU. San Martín: Río Huallaga, Challua Yacu, alt. 460 m, 13 Sep 1963, *Schunke Vigo 6281* fl, fr (F, US).

Distribution (Fig. 32): Peru, Río Huallaga region.

Discussion: A very distinctive feature of *A. pachypetala* are the long and rather thin pedicels with the upper bract at about the middle or below the

middle. There is no doubt that *A. pallida*, described from a fruiting collection, is conspecific with *A. pachypetala*.

15. *Anaxagorea panamensis* Standley, J. Wash. Acad. Sci. 15: 101. 1925; R.E. Fries, Acta Horti Berg. 12(1): 24, t. 1. 1934; R.E. Fries, Ann. Missouri Bot. Gard. 49: 194. 1962. — Type: *Standley 26168*. Panama. Panamá: Río Tapia, 7 Dec 1923 — 11 Jan 1924, fl, fr (holotype, US nr. 1216856; isotypes, K, NY). Fig. 24.

Shrub, up to ca 3.5 m tall. Leafy twigs 0.5—2.5 mm in diam., ferrugineous-puberulous, soon glabrescent. Petioles 2—8 mm long, 0.8—1.3 mm in diam., sparsely ferrugineous-puberulous, soon glabrescent. Lamina narrowly elliptic, 7—16 cm long, 2—5 cm wide, sparsely ferrugineous-puberulous on lower side, base acute to obtuse, apex shortly acuminate; primary vein impressed on upper side; secondary veins straight, ca. 6—10 on each side of primary vein, flat on upper side, angles with primary vein up to 80°, loop-forming at obtuse (to acute) angles, loops distinct, smallest distance between loops and margin 2—5 mm.

Inflorescences axillary, mostly pedunculate, mostly with a single flower at a time; peduncle (or sympodial rhachis) (1 $\frac{1}{2}$ )—4—20(—30) mm long; pedicels 10—18(—25) mm long, 0.5—1 mm thick at the base and 1.5—2 mm thick below the flower; upper bract close to the calyx to 3(—4.5) mm below the calyx, with an outer diameter of 2—3(—4) mm, persistent. Flower buds conical. Flowers greenish yellow to pale yellow (in vivo).

Indument of floral parts: pedicels, sepals, and petals densely ferrugineous-puberulous, soon glabrescent.

Sepals free, ovate, 8.5—10.5 mm long, ca. 5 mm wide, shortly acuminate, membranous, apically reflexed. Outer petals narrowly ovate, 16—30 mm long, ca. 5 mm wide, obtuse, inner side flat to slightly keeled in the upper third. Inner petals narrowly elliptic, 10—17.5 mm long, 2.5—3 mm wide, acute, inner side bifacial to keeled above the middle. Stamens ca. 25, 3.5—4 mm long, 1.3—1.7 mm wide, thecae 1.7—2.1 mm long, not broader than the connective, apical prolongation of connective 0.5—0.7 mm long, truncate (to acute). Staminodes ca. 5, obovate to oblong, 3—3.5 mm long, 1.2—1.5 mm wide, rounded to truncate. Carpels 5—10, 3—4 mm long.

Monocarps 22—32 mm long, green, bronze, or red (in vivo), densely ferrugineous-puberulous, soon glabrescent, stipitate part 13—23 mm long, beak 2—2.5(—3.5) mm long. Seeds 12—14.5 x 6—7.5 mm.

Specimens examined: COSTA RICA. Limón: Finca Castilla, alt. 30 m, 25 Jul 1936, *Dodge & Goerger 9293* fl (US).

PANAMA. Canal Zone: Barro Colorado Island, N of Zetek Trail 700, 8 Jul 1970, *Croat 11158* fl (DUKE, F, MO, NY, UC), Zetek Trail 600, N of trail, 12 Nov 1970, *Croat 12569* fr (DUKE, F, MICH, MO, NY, UC), N of

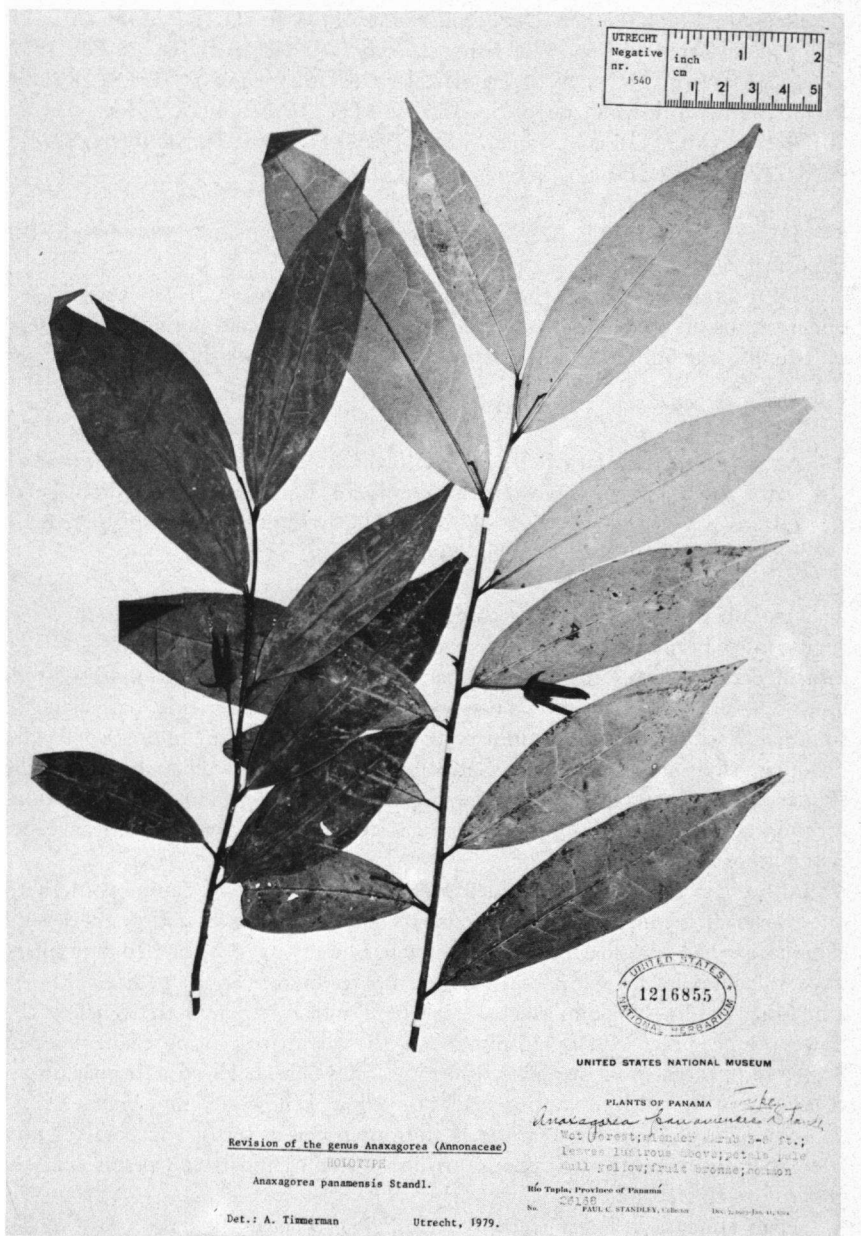


Fig. 24. *A. panamensis* (Standley 26168).

Zetek 6—7, alt. 100 m, 8 Dec 1969, *Foster 1445* fr (DUKE, GH, MICH, MO), N of Zetek 6, Jun 1970, *Foster 1777* fl (DUKE), Arraijan, 28 Feb 1952, *Zetek 5565* fr (F, MO); N of Frijoles, 19 Dec 1923, *Standley 27589* fr (US). Panamá: stream flowing out of Serrania de Maje, 10 Feb 1977, *Folsom & Collins 1699* fr (MO, U); Río Tapia, 7 Dec 1923—11 Jan 1924, *Standley 28247* fr (US), *28289* fl, fr (GH, US), *30660* fr (NY, US).

**Distribution** (Fig. 32): Costa Rica (rare) and Panama: most frequent in the Canal Zone.

**Discussion**: This is the only small-leaved species (with less than 10 secondary veins on each side of the primary vein) which occurs in Central America. It is also the only small-leaved species with conical flower buds.

16. *Anaxagorea petiolata* R.E. Fries, *Lloydia* 2: 179. 1939. — Type: *A.C. Smith 3192*. Guyana. Western extremity of Kanuku Mts., in drainage of Takutu River, alt. 600 m, 4—22 Mar 1938, fr (holotype, S; isotypes, A, B, F, G, K, LE, MO, NY, U, US, W).

Tree, up to 15 m tall. Leafy twigs 1—5 mm in diam., brownish red to ferruginous-puberulous, with blackish cortex. Petioles 7—21 mm long, 1—2.5 mm in diam., glabrescent. Lamina narrowly elliptic (to obovate), 10—27 cm long, 2.5—8.5 cm wide, reddish brown-puberulous on lower side, base acute to rounded, decurrent, apex acuminate to acute; primary vein impressed to flat on upper side; secondary veins slightly curved, ca. 8—14 on each side of the primary vein, flat on the upper side, angles with primary vein up to 75°, loop-forming at right angles, loops rather faint to indistinct, smallest distance between loops and margin 2—7 mm.

Inflorescences axillary on older parts of branchlets, to cauliflorous, with one flower at a time, or sometimes up to several flowers at a time on several rhipidia (perhaps originating from peduncular bracts, or possibly from auxiliary buds?); peduncle (or sympodial rhachis) up to 11 mm long; pedicels 12—35 mm long, 1—2(—2.5) mm thick at the base and 3—4.5 mm thick below the flower; upper bract (3—)5—15 mm below the calyx, with an outer diameter of 2.5—5 mm, often caducous after flowering. Flower buds globose, brown (in vivo). Flowers brownish or various shades of yellow, yellow-green, or orange.

Indument of floral parts: pedicels and outer side of sepals and petals densely to sparsely ferruginous-puberulous, inner side of sepals and petals sparsely puberulous to glabrous.

Sepals connate in lower third, soon splitting to near the base, ovate to depressed-ovate, 3.5—6.2 mm long, 3.8—7 mm wide, obtuse, soon reflexed, often persistent, chartaceous. Outer petals ovate to elliptic, 5.8—12 mm long, 3.7—7 mm wide, obtuse, inner side bifacial (at a broad angle) above the middle, thickness 1.5—2.5 mm. Inner petals elliptic to obovate, 5—9.5 mm long, 2.8—

4 mm wide, acute to obtuse, inner side bifacial above the middle, thickness 2—3.5 mm. Stamens ca. 30—35, 2.2—4.1 mm long, 0.5—1.1 mm wide, thecae 1.2—2.7 mm long, broader than the connective, apical prolongation of connective 0.2—0.5 mm long, 0.4—0.7 mm wide, rounded, truncate, or retuse. Staminodes ca. 10, narrowly oblong to narrowly ovate, 1.7—2.6 mm long, 0.5—0.9 mm wide, rounded to truncate. Carpels ca. 20—35, 1—2.5 mm long.

Monocarps 28—40 mm long, brown to yellow (in vivo), densely to sparsely ferruginous-puberulous, stipitate part 18—24 mm long, beak 0.3—1 mm long, caducous, black (in herbarium specimens). Seeds 10.2—16 x 5.4—7 mm.

Specimens examined: VENEZUELA. Amazonas: 29 Nov 1950, *Mauguire et al.* 29820A fr (NY, S), 29820B fr (NY, S, US); 18—23 May 1972, *Steyermark* 106015 fl (U, US, VEN); Feb 1975, *Tillett* 752—308 fl, fr (US, VEN). Bolívar: 7 Jan 1956, *Bernardi* 2806 st (NY, S), 2806bis (NY, S, VEN); 1 Mar 1967, *Koyama & Agostini* 7332 fr (NY, VEN); 25 Apr 1946, *Lasser* 1395 fl (F, NY); 30 May 1946, *Lasser* 1847 fl, fr (F, NY, VEN); 18 Dec 1952, *Mauguire & Wurdack* 33819 fr (F, K, NY, S); 27 Oct 1944, *Steyermark* 59424 fr (F, S); 20—21 Nov 1944, *Steyermark* 60420 fr (F, NY, S, VEN).

GUYANA. 28 Jun 1943, *Forest Dep. Br. Guiana* 3489 st (S), 7903 (K, NY).

BRAZIL. Roraima: 22 Jan 1939, *Pinkus* 172 fl, fr (F, G, GH, K, NA, NY, US); 6 Feb 1969, *Prance et al.* 9627 fl (VEN); 8 Feb 1969, *Prance et al.* 9733 fl, fr (INPA, U); 19 Feb 1969, *Prance et al.* 10079 fl (VEN); 23 Jan 1966, *Silva & Brazão* 60850 fr (NY, S, US).

Distribution (Fig. 31): States of Amazonas and Bolívar, Venezuela, Guyana, and Territory of Roraima, Brazil. Forested slopes at alt. 400—1500 m.

Discussion: This species is somewhat difficult to recognize. It is characterized by staminodes which are considerably shorter than the stamens, in combination with the rather long pedicels. The inflorescences resemble those of *A. phaeocarpa*. In *A. petiolata*, however, upper bract and sepals do not come off until after flowering; moreover, the upper bract in *A. petiolata* is placed at quite some distance from the calyx, sometimes inserted at about the middle of the pedicel, whereas in *A. phaeocarpa* the upper bract is always well beyond the middle of the pedicel.

The leaf base is often markedly narrowed into the petiole in *A. petiolata*.

17. *Anaxagorea phaeocarpa* Martius in Martius, Fl. Bras. 13(1): 40. t. 5, fig. 4. 1841 (p.p.). — Type: *Martius s.n.* Brazil. Amazonas: Rio Negro, Dec 1820, fr (holotype, M; isotype, G).  
= *Anaxagorea costaricensis* R.E. Fries, Acta Horti Berg. 12(1): 25. 1934; Standley, Field Mus. Nat. Hist., Bot. Ser. 18(2): 440. — Type: *Standley*



& Valerio 47014. Costa Rica. Cartago: near Pejivalle, alt. 900 m, 7—8 Dec 1926, fr (holotype, US).

Tree or shrub (or liana), up to 12 m tall. Leafy twigs 1—5.5 mm in diam., brownish red-puberulous, soon glabrescent. Petioles 6—22 mm long, 1—3.5 mm in diam., brownish red-puberulous, soon glabrescent. Lamina (narrowly) elliptic to obovate, 11—36 cm long, 3—12 cm wide, brownish red-puberulous especially near the base, to glabrescent on lower side, base acute to rounded, slightly decurrent, apex acuminate; primary vein impressed (to flat) on upper side; secondary veins straight, ca. 10—20, impressed on upper side, angles with primary vein up to 70°, loop-forming at obtuse (to right) angles, loops pronounced, forming a marginal vein, smallest distance between loops and margin 1—7 mm.

Inflorescences axillary on older parts of branchlets, to cauliflorous, with 1—several flowers at a time, flowers originating from axils of lower pedicel bracts in rhipidium-mode and/or from axils of peduncular bracts; peduncle (or sym-podial rhachis) up to 8(—12) mm long; pedicels 8—20(—40) mm long, 1—2.5(—3.5) mm thick at the base and 2.5—4 mm thick below the flower; upper bract 1.5—7(—10) below the calyx, with an outer diameter of 6—7 mm, caducous before flowering. Flower buds ovoid with acute apex (rarely broadly ovoid and obtuse at the apex), brownish (in vivo). Flowers cream or various shades of yellow or (red-)brown, sometimes whitish within (in vivo).

Indument of floral parts: pedicels and outer side of sepals and petals densely ferruginous-puberulous, inner side of sepals and petals densely to sparsely beige- to orange-puberulous.

Sepals connate to above the middle, ovate, 5—11 mm long, 3.5—7 mm wide, acute to acuminate, caducous before flowering, subchartaceous, erect. Outer petals narrowly ovate (to ovate), 10.3—19.5 mm long, 3.8—8 mm wide, acute (to obtuse), inner side flat above the middle, 1.5—2.5 mm thick in the middle. Inner petals narrowly ovate (to ovate), 9—18 mm long, 3.5—7 mm wide, acute, inner side bifacial to keeled in upper two-thirds, 2—3 mm thick including keel. Stamens ca. 35—85, 2.5—5 mm long, 0.6—1.3 mm wide, thecae 0.6—3.9 mm long, not broader than the connective, apical prolongation of connective 0.3—0.9 mm long, 0.6—1.3 mm wide, rounded, truncate, or slightly retuse. Staminodes ca. 20—45, narrowly obovate to narrowly oblong, 2.8—5.2 mm long, 0.6—1.3 mm wide, rounded to retuse, apex with glandular margin. Carpels ca. 15—45, 2.5—5 mm long.

Monocarps (22—)25—38(—42) mm long, green, cream, orange, or brown (in vivo), densely to sparsely ferruginous-puberulous, stipitate part (13—)16—27 mm long, beak 0.5—1(—1.5) mm long, caducous at maturity. Seeds 11—13 x 6—7.8 mm.

Specimens examined: COSTA RICA. Heredia: 29 Jun 1971, *Gentry 1050* fr (CR, MO); 27 Apr 1973, *Hartshorn 1166* fr (MO); 2 Nov 1974, *Hartshorn 1591* fr (US). Limón: 14 Mar 1978, *Davidson 6930* fr (MO); 14 May 1975, *Poveda 992* fr (CR).

PANAMA. Bocas del Toro: 9 Jun 1941, *von Wedel* 2210 fr (GH, MO). Darién: 30 Apr 1968, *Kirkbride & Duke* 1320 fr (MO). Panamá: 18 Dec 1980, *Sytsma et al.* 2675 fr (MO).

COLOMBIA. Chocó: 13 Jan 1979, *Gentry & Renteria* 24126 fl (MO, U); 28 Dec 1980, *Hartman* 12322 fr (U). Nariño: 22 Jun 1950, *Fernández* 408 fr (US). Valle: 13 Feb 1983, *Gentry et al.* 40201 fl, fr (U). Vaupés: 6 Jul 1979, *Zarucchi* 2436 fr (GH).

FRENCH GUIANA. 9 Feb 1975, *Grenand* 743 fr (CAY, P); 13 Jan 1966, *Oldeman* 1897 fr (CAY, P); 18 Dec 1968, *Oldeman B-2053* fr (CAY, P).

ECUADOR. Carchi: 26 Jul 1966, *Játiva* 329 fr (NY, US); 26 Jul 1966, *Játiva & Epling* 1136 (NY).

PERU. Loreto: 25 Jul 1972, *Croat* 18446 fl, fr (F, GH, MO, NY, US); 31 Jul 1972, *Croat* 18616 fl, fr (F, GH, MO, NY, US); 8 Oct 1979, *Diaz & Jaramillo* 1475 fl (MO); 19 Aug 1929, *Killip & Smith* 28529 fl, fr (F, NY, US); 15 Nov 1978, *Rimachi* 4071 fr (NY); 3 Jan 1981, *Vásquez & Jaramillo* 1172 fr (MO, U); 23 Oct 1929, *Ll. Williams* 3965 fr (F). San Martín: 6 Jan 1971, *Schunke Vigo* 4625 fl, fr (F, GH, INPA, K, MO, NY); 19 Jan 1971, *Schunke Vigo* 4672 fl (F, GH, INPA, MO, NY); 14 May 1971, *Schunke Vigo* 4897 fl, fr (F, MO, NY, US); 23 Jul 1973, *Schunke Vigo* 6362 fr (F, GH, MO, NY).

BRAZIL. Amapá: 8 Sep 1961, *Pires et al.* 50760 fr (F, FHO, NY, US, VEN). Amazonas: 5 Apr 1967, *Albuquerque & Contreras* 67—11 fr (INPA); 24 Mar 1974, *Campbell et al.* P20893 fl, fr (U); 26 Oct—11 Dec 1936, *Krukoff* 9042 fr (NY); 19 Aug 1973, *Lleras et al.* P17415 fl (U); 11 Nov 1966, *Prance* 3089 fl, fr (INPA, K, NY, US, VEN); 24 Nov 1976, *Prance et al.* 24259 fr (U); 3 Dec 1959, *Rodrigues & Coêlho* 1450 fr (INPA); 14 Jan 1960, *Rodrigues & Coêlho* 1467 fl (INPA); 28 Dec 1960, *Rodrigues & Coêlho* 2027 fr (INPA); 3 May 1961, *Rodrigues & Coêlho* 2460 fl (INPA); 2 Dec 1966, *Rodrigues & Monteiro* 8278 fl (INPA); 6 Dec 1966, *Rodrigues & Monteiro* 8280 fl (INPA); 20 Feb 1974, *Steward et al.* P20396 fl, fr (U); Pará: 18 Jul 1950, *Black et al.* 50-9881 fl, fr (MG, S); 16 Dec 1906, *Ducke MG 7978a* fr (MG); 4 May 1923, *Ducke RB 17865* fl (S); 23 May 1927, *Ducke RB 19631* fl (B, S, U, US); Oct—Nov 1957, *Pires & Silva* 6652 fl, fr (S); 20 Sep 1965, *Prance et al.* 1381 fl, fr (NY, US); 23 Sep 1965, *Prance et al.* 1463 fr (F, GH, K, NY, S, U, VEN, W); 25 Nov 1977, *Prance et al.* P25745 fr (U). Rondônia: 15 Mar 1978, *Anderson* 12139 fl (NY).

Distribution (Fig. 31): Costa Rica, Panama, Pacific side of Colombia, and throughout the Amazon region extending to French Guiana and Amapá, Brazil.

Discussion: The distinct marginal vein is a good vegetative character by which *A. phaeocarpa* may be recognized. The pedicels are rather long, and both upper bract and sepals are caducous at an early stage. See also remarks under *A. petiolata*.

18. *Anaxagorea prinoides* (Dunal) A.DC., Mém. Soc. Phys. Genève 5: 211. 1832; Martius in Martius, Fl. Bras. 13(1): 40. 1841 ("Anaxagoraea"); Bailon, Hist. pl. 1: 213, 214. 1868; Sagot, Ann. Sci. Nat. Bot., Sér. 6(11): 137 1881; R.E. Fries, Kongl. Svenska Vetenskapsakad. Handl. 34(5): 25. 1900; R.E. Fries, Acta Horti Berg. 12(1): 9. 1934. Fig. 25.  
≡ *Xylophia prinoides* Dunal, Monogr. Anonac. 122. 1817; A.P. de Candolle, Syst. Nat. 1: 501. 1818; A.P. de Candolle, Prodr. 1: 93. 1824. — Type: *Anonymus collector*. French Guiana, fl, fr (holotype, G).

Tree, up to ca. 8 m tall. Leafy twigs 0.5–2.5 mm in diam., sparsely ferruginous-puberulous, soon glabrescent. Petioles 2–6(–10) mm long, 0.5–1 mm in diam., sparsely ferruginous-puberulous, soon glabrescent. Lamina (narrowly) elliptic to (narrowly) obovate, 5–13 cm long, 1.5–3 cm wide, sparsely ferruginous-puberulous on lower side, base acute, slightly decurrent, apex acuminate to obtuse; primary vein impressed on upper side; secondary veins curved, ca. 5–10 on each side of primary vein, flat on upper side, angles with primary vein up to 75°, loop-forming at obtuse angles, loops thin but pronounced, smallest distance between loops and margin 2–5 mm.

Inflorescences axillary, mostly short-pedunculate, mostly with a single flower at a time; peduncle (or sympodial rhachis) 0.5–2.5(–5) mm long; pedicels 6–11(–15) mm long, 0.5–1 mm thick at the base and up to 1.5 mm thick below the flower; upper bract close to the calyx, often more or less reflexed, with an outer diameter of 2–3.5 mm. Flower buds globose. Flowers pale yellow to yellowish brown (in vivo).

Indument of floral parts: pedicels, sepals, and petals densely ferruginous-puberulous, soon glabrescent.

Sepals free, ovate to broadly ovate, 5.5–7 mm long, 3.5–6 mm wide, acute to obtuse, membranous, erect. Outer petals elliptic (to narrowly elliptic), 7.5–10.5 mm long, 3.5–4.5 mm wide, acute to obtuse, inner side flat (to slightly concave). Inner petals elliptic to narrowly elliptic, 6.5–10 mm long, 2.5–4.5 mm wide, acute, inner side bifacial to keeled above the middle. Stamens ca. 15–20, 3.5–4.5 mm long, 0.8–1.3 mm wide, thecae 1.7–2.2 mm long, not broader than the connective, apical prolongation of connective 1–1.6 mm long, 0.5–1.6 mm wide, acute. Staminodes ca. 5–10, narrowly obovate to narrowly elliptic, 3.8–4.2 mm long, 0.6–1.3 mm wide, acute to obtuse. Carpels ca. 5–15, 1.7–2.2 mm long.

Monocarps 22–30 mm long, yellow to green (in vivo), glabrous, stipitate part 14–20 mm long, beak 0.5–1 mm long, sometimes caducous. Seeds 10–11 x 6–6.5 mm.

Specimens examined: SURINAME. 3 Oct 1975, *Lindeman et al.* 713 fl (U).

FRENCH GUIANA. 3 Mar 1971, *de Granville* 755 fr (CAY, P, U); 1834, *Leprieur* 313 fl, fr (F, G, P); 1819, *Martin s.n.* fl (B, S); *Patris s.n.* fl. (G); 1819–1821, *Poiteau s.n.* fl (G); 15 Feb 1978, *Prévost* 190 fr (CAY, P).



Fig. 25. *A. prinoides* (Silva & Babia 3549).

BRAZIL. Amapá: 1 Oct 1949, *Black* 49-8282 fl (NY); 4 Nov 1954, *Cowan & Maguire* 38136 fl (F, NY, S, US); 16 Nov 1954, *Cowan* 38353 fl (K, NY, S); 22 Nov 1954, *Cowan* 38515 fl (NY, RB, S); 30 Sep 1961, *Pires et al.* 51374 fl (F, NY, US). Maranhão: 13 May 1979, *Rosa & Vilar* 3125 fl (U). Pará: 16 Aug 1978, *Bahia* 56 fl, fr (NY); 21 Nov 1981, *Daly et al.* 1513 fr (U); 14 Aug 1955, *Fróes* 32053 st (MG), 32063 fr (S), 32140 fr (MG); 4 Sep 1972, *de Granville* B-4529 fl (CAY, P, U); 4 Sep 1959, *Kublmann & Jimbo* 187 fr (SP, US); 13 Dec 1979, *Maciel et al.* 508 fr (F); 3 Nov 1965, *Prance & Pennington* 1925 fl, fr (F, GH, K, NY, RB, S, U, US, VEN); 23 Jun 1907, *Siguero* 8264 fl (G); 31 Mar 1971, *M. Silva* 2698 fr (MG); 14 May 1978, *M.G. Silva & Bahia* 3549 fl (NY).

Distribution (Fig. 32): Eastern Suriname, French Guiana, and States of Amapá and Pará, Brazil.

Discussion: *A. prinoides* is an easily recognized species. Distinctive features are the comparatively long, thin pedicels, and the upper bract which is always close to the calyx and often becomes more or less reflexed.

19. *Anaxagorea rufa* Timmerman in Maas, Timmerman & Westra, Proc. Kon. Ned. Akad. Wetensch., Ser. C, 87 (3): 301. 1984. — Type: *Schultes & Cabrera* 14464. Colombia. Vaupés: Río Kananarí (affluent of Río Apaporis), Cerro Isibukurí, 28 Oct 1951, fl (holotype, U; isotypes, GH, S, US). Fig. 26.

Tree or shrub, up to 5(—10) m tall. Leafy twigs 2—12 mm in diam., dark purplish red-puberulous, glabrescent. Petioles 8—26 mm long, 2.5—6.5 mm in diam., purplish red-puberulous, glabrescent. Lamina narrowly elliptic to (ob)ovate, (15—)20—48 cm long, 5—15 cm wide, purplish red-puberulous, rarely glabrescent, on lower side, base acute to rounded, sometimes slightly asymmetrical, apex acuminate to acute, margin often slightly revolute; primary vein flat or slightly raised on upper side; secondary veins curved at least toward the margin, ca. 11—20 on each side of the primary vein, slightly raised on upper side, angles with primary vein up to 60°, loop-forming at acute angles, loops mostly indistinct, to more or less distinct toward the apex, smallest distance between loops and margin 2—8 mm.

Inflorescences axillary, (usually) on older parts of branchlets, pedunculate to nearly sessile, mostly with a single flower at a time; peduncle (or sympodial rhachis) up to 5(—10) mm long; pedicels 3—8.5 mm long, 2—3 mm thick at the base and 3.5—5 mm thick below the flower; upper bract close to the calyx to 3.5 mm below the calyx, with an outer diameter of 7.5—10 mm, caducous before flowering. Flower buds globose to ovoid, brown (in vivo). Flowers brownish, greenish, greenish cream, or yellowish without, white within (in vivo).



Fig. 26. *A. rufa* (Gentry & Reville 20424).

Indument of floral parts: pedicels, and outer side of sepals and petals densely rufo-puberulous, inner side of sepals and petals sparsely pale brown- to orange-puberulous.

Sepals free, ovate to broadly ovate, 7.5—14.5 mm long, 6—10.5 mm wide, obtuse to broadly rounded, erect, rigid. Outer petals ovate, 10—18.5 mm long, (4.3—)6—7.5 mm wide, obtuse to rounded, margins involute, inner side keeled above the middle, the keel ca. 1 mm wide at the base and to 1.5—2 mm high, thickness including the keel 2.3—5 mm. Inner petals ovate, 9.5—16.5 mm long, (3.5—)5—7 mm wide, rounded, margins involute, inner side keeled above the middle, thickness including the keel 3.2—4.5 mm. Stamens ca. 125, 3.6—5 mm long, 0.6—1.1 mm wide, thecae 1.5—3.5 mm long, broader than the connective, apical prolongation of connective 0.5—0.9 mm long, 0.8—1.1 mm wide, rounded to truncate. Staminodes ca. 30, narrowly obovate, 4.1—6 mm long, 0.8—3 mm wide, rounded, apex with a glandular margin. Carpels ca. 10—20, 4—4.5 mm long.

Monocarps 25—32 mm long, white, yellow, or wine-coloured (in vivo), densely rufo-puberulous, stipitate part 14—22 mm long, beak (0.6—)1.5—2.2 mm long, sometimes caducous. Seeds 14—15.5 x 7.5—8 mm.

Specimens examined: COLOMBIA. Vaupés: 24 Sep 1939, *Cuatrecasas* 6990 fl (US); 1—15 Dec 1951, *García Barriga* 13925 fl (US); 13 Nov 1952, *Romero Castañeda* 3444 fl (VEN); 12 Aug 1951, *Schultes & Cabrera* 13522 fl (US); 4 Dec 1951, *Schultes & Cabrera* 14745 fr (GH); 6 Feb 1952, *Schultes & Cabrera* 15171 fr (US); 16 Oct 1952, *Schultes & Cabrera* 17870 fl (US).

VENEZUELA. Amazonas: 21 Sep 1975, *Berry* 1476 fl (VEN); 6—19 Jul 1969, *Bunting et al.* 3773 fr (MY); 1 Mar 1979, *Clark* 7047 fr (NY); 24 Mar 1974, *Gentry & Tillett* 10883 fl (MO); 26 Mar 1974, *Gentry et al.* 10956 fl (MO); 21 Nov 1977, *Liesner* 3723 fl, fr (MO), 3736 st (MO), 3745 (MO); 24 Nov 1977, *Liesner* 3793 fl (MO); 4 Apr 1979, *Liesner* 6154 fr (MO); 20 Apr 1979, *Liesner* 6815 fl, fr (MO), 6816 fl (MO); 5 May 1979, *Liesner* 7226 fr (MO); 20 Jan 1980, *Liesner* 8476 fr (MO, U); 3 May 1970, *Steyermark & Bunting* 103034 fr (US, VEN); 24 Jan 1942, *Ll. Williams* 13957 fr (F, G, IJ, NY, US, VEN); 4 Mar 1942, *Ll. Williams* 14620 fr (F, G, S, US, VEN).

PERU. Loreto: 8 Nov 1977, *Gentry & Revilla* 20424 fl (MO).

BRAZIL. Amazonas: 18 Feb 1959, *Cavalcante* 641 fr (MG); 28 Feb 1936, *Ducke RB* 29012 fr (S); 21—26 Nov 1930, *Holt & Blake* 469 st (US); 9 Nov 1947, *Pires* 937 (S); 17 Feb 1959, *Rodrigues* 928 fr (INPA, S); Feb 1959, *Rodrigues* 1000 fr (INPA).

Distribution (Fig. 35): Upper Amazon Region in Colombia, Venezuela, and Brazil.

Discussion: *A. rufa* is a distinctive species which is to be placed within the alliance of *A. dolichocarpa*. It may be recognized a.o. by the comparatively broad midrib which is often slightly raised on the upper side in the basal half

of the lamina, and by the large size of the upper bract (which drops during flowering). The hairs on vegetative parts and outer side of sepals and petals have a very dark purplish-red colour not found in other species of *Anaxagorea*, where the hairs, if at all, are merely brown-coloured at most.

20. *Anaxagorea silvatica* R.E. Fries, Acta Horti Berg. 12(1): 10. 1934. —  
Type: *Mexia* 4696. Brazil. Minas Gerais: Viçosa, Fazenda de Creçiuma, alt. 700 m, 14 May 1930, fr (holotype, S; isotypes, A, BM, GB, GH, K, MICH, MO, NY, U, UC, Z).

Tree to ca. 8 m tall. Leafy twigs 0.5—3.5 mm in diam., ferruginous-puberulous, soon glabrescent. Petioles 4—14 mm long, 1—2 mm in diam., soon glabrescent. Lamina narrowly obovate, (5—)8—19 cm long, 2—6 cm wide, sparsely ferruginous-puberulous on lower side, base acute, apex acuminate to obtuse, margin slightly revolute; primary vein slightly impressed on upper side; secondary veins curved, ca. 9—14 on each side of primary vein, very slightly raised on upper side, angles with primary vein up to 70°, loop-forming at acute angles, loops indistinct, smallest distance between loops and margin 1—5 mm.

Inflorescence leaf-opposed, short-pedunculate to nearly sessile, or terminal, mostly with a single flower at a time; peduncle up to 7 mm long; pedicels 8—14 mm long, 1—3 mm thick at the base and 2.5—5 mm thick below the flower; upper bract 4.5—9 mm below the calyx, with an outer diameter of 2.5—4.5 mm, persistent. Flower buds and flowers unknown.

Indument of floral parts: pedicels subglabrous.

Monocarps ca. 13—20 in number, green to dark green (in vivo), subglabrous, stipitate part 20—32 mm long, beak 0.5—1 mm long. Seeds 10—13.5 x 6.2—8.4 mm.

Specimen examined: BRAZIL. Minas Gerais: Viçosa, Fazenda de Aguada, alt. 725 m, 16 Sep 1930, *Mexia* 5053 fr (A, B, BM, F, G, GB, GH, K, MICH, MO, NY, U, UC, Z).

Distribution (Fig. 34): Only known from the type locality at an altitude of ca. 700 m.

Discussion: *A. silvatica* is distinct from all other neotropical species by its leaf-opposed or terminal, but never axillary, inflorescences. It is curious that this has escaped FRIES's attention, and all the more so where FRIES (1959) used the position of the inflorescence as an important character to define sect. *Rhopalocarpus*. In Chapter 12 arguments have been given for not maintaining the two sections in *Anaxagorea*.

*A. silvatica*, as far as one can see without having flowers, might seem nearest *A. javanica*, an impression which is supported by anatomical features of primary vein and petiole, but contradicted by other leaf anatomical features, see Chapter 4.2.



### 21. *Anaxagorea* spec. A

Treelet, 2 m tall. Leafy twigs ferruginous-puberulous, glabrescent. Petioles 14–21 mm long, ca. 3 mm in diam., ferruginous-puberulous, glabrescent. Lamina (narrowly) obovate, ca. 28 cm long, 10–12 cm wide, ferruginous-puberulous on lower side, base subacute to obtuse, apex acute to acuminate; primary vein slightly impressed to flat on upper side; secondary veins straight to more or less curved, ca. 12 on each side of primary vein, slightly raised on upper side, angles with primary vein up to 70°, loop-forming at mostly right angles, loops indistinct, smallest distance between loops and margin 2–4 mm.

Inflorescence axillary, with peduncle (or sympodial rhachis) 5 mm long; pedicel 15 mm long, 2 mm thick at the base and 2.5 mm thick below the flower; upper bract ca. 2 mm below the calyx, with an outer diameter of 4 mm, persistent.

Indument of floral parts: pedicels densely ferruginous-puberulous.

Flowers not seen.

Monocarps ca. 10, ca. 30 mm long, green (in vivo), sparsely ferruginous-puberulous stipitate part ca. 20 mm long, beak 5.5–6 mm long, forming an angle of 90° with the stipe. Seeds not seen.

Specimen examined (map, see Fig. 33): PANAMA. Darién: slopes of Cerro Pirre, alt. 200–500 m, 30 Dec 1972, *Gentry & Clewell 7039 fr* (MO).

Discussion: This specimen comes closest to *A. crassipetala* and *A. guatemalensis*. With *A. crassipetala* it has in common the length of the petiole and the length of the pedicel, and with *A. guatemalensis* it shares the glabrescent young twigs and petioles, and the leaves with the largest width above the middle. It is distinct from *A. allenii*, another Central American species, by the smaller size of the upper bract. The most conspicuous feature is the very long beak of the monocarps, placed at a right angle with the stipe and making the whole monocarp appear more or less like a hook. This not found in any of the *Anaxagorea* species hitherto described.

### 22. *Anaxagorea* spec. B

Tree, 8 m tall. Leafy twigs ferruginous-puberulous. Petioles 10–22 mm long, 3–4 mm in diam., ferruginous-puberulous. Lamina narrowly elliptic to obovate, 28–35 cm long, 12–15 cm wide, ferruginous-puberulous on lower side especially near the base, base obtuse to rounded, apex acuminate; primary vein flat on upper side; secondary veins ca. 12–15 on each side of primary vein, flat on upper side, angles with primary vein up to ca. 60°, forming indistinct loops, smallest distance between loops and margin 2–4 mm.

Inflorescence axillary, with peduncle (or sympodial rhachis) 12–13 mm long; pedicel 20 mm long, 2 mm thick at the base and 4 mm thick below the flower; upper bract close to the calyx to 1 mm below the calyx, caducous before flowering. Flower buds conical.

Indument of floral parts: pedicels, sepals, and outer side of petals densely ferruginous-puberulous.

Sepals free, ovate, 9 mm long, 5.5—7.5 mm wide, acute. Outer petals 7 mm long and 3 mm wide in bud.

Monocarps ca. 20, 28—30 mm long, densely ferruginous-puberulous, stipitate part 15—18 mm long, beak 2 mm long. Seeds 12.5—13.5 x 6—7.5 mm.

Specimen examined (map, see Fig. 33): COLOMBIA. Valle: coast of the Pacific, Río Yurumanquí, El Papayo, forest, alt. 10—20 m, 5 Feb 1944, *Cuatrecasas 15996* fl, fr (F, S).

Discussion: This is an apparently undescribed species. The flowers, however, are too immature.

### 14.3. Palaeotropical species

by P. J. M. MAAS, L. Y. TH. WESTRA & F. D. J. VAN BENTHEM (Utrecht)

#### 14.3.1. Key to palaeotropical species

- 1 Inflorescences axillary, to cauliflorous; upper bract close to the calyx.  
..... 23. *A. borneensis*
- Inflorescences leaf-opposed or terminal, to cauliflorous; upper bract at a distance of 2 mm or more from the calyx. .... 2
- 2 Outer petals mostly up to 10 mm long; stamens up to ca. 30, all fertile; carpels up to 5; beak of monocarps 1.5 mm long or more.  
..... 25. *A. luzonensis*
- Outer petals mostly more than 10 mm long; stamens ca. 45, or more, the inner ones staminodial; carpels 7 or more; beak of monocarps up to 1 mm long at most. .... 24. *A. javanica*
- Insufficiently known: ..... 26. *A. radiata*

#### 14.3.2. Descriptions of palaeotropical species

23. *Anaxagorea borneensis* (Becc.) James Sincl., Sarawak Mus. J. 5: 598. 1951. Fig. 27.
- ≡ *Eburopetalum borneense* Becc., Nuovo Giorn. Bot. Ital. 3: 181. pl. 2. 1871.  
— Type: *Beccari 3936*. Malaysia. Borneo: Sarawak, 1865—1866 (holotype, ?FI, not seen; isotype, K).
- = *Anaxagorea ramiflora* Boerl., Icon. bogor. 1: 157. t. 51. 1899. — Type: *Jaheri in Nieuwenhuis 1220*. Borneo (holotype presumably at BO, not seen; fragment, B).

Tree, up to 9 m tall. Leafy twigs 1–3 mm in diam., ferruginous-puberulous to glabrescent. Petioles 6–13 mm long, 1–2 mm in diam., ferruginous-puberulous to glabrescent. Lamina narrowly elliptic to obovate, (12–)17–26 cm long, 4–10 cm wide, sparsely ferruginous-puberulous on lower side, base acute (to obtuse), often slightly asymmetrical and decurrent, apex acuminate; primary vein impressed on upper side; secondary veins curved, ca. 9–12 on each side of primary vein, slightly raised on upper side, angles with primary vein up to 60°, loop-forming at acute to right angles, loops rather distinct, smallest distance between loops and margin 1–3 mm.

Inflorescences axillary or on short axillary shoots, also on older parts of branchlets, to cauliflorous, short-pedunculate to sessile, with 1–several flowers at a time, the flowers often in 2–few rhipidia together; peduncle (or sympodial rhachis) up to 10 mm long; pedicels 20–30 mm long, 1 mm thick at the base and 1–1.5 mm thick below the flower; upper bract close to the calyx, with an outer diameter of 3–4.5 mm, persistent. Flower buds broadly conical.

Indument of floral parts: pedicels, outer side of sepals and petals, and carpels densely puberulous, inner side of sepals and petals glabrous.

Sepals free, broadly ovate, (2.5–)3.5–5.5 mm long, (3–)3.5–6(–7) mm wide, rounded to obtuse. Outer petals broadly ovate, 7.5–9 mm long, 6–7.5 mm wide, acute to obtuse, inner side flat to bifacial, to keeled, above the middle, keel 2–2.5 mm thick. Inner petals absent. Stamens ca. 30, 1.3–2.1 mm long, 0.5–1 mm wide, thecae 0.3–0.6 mm long, not broader than the connective, apical prolongation of connective under 0.2 mm long, broadly truncate. Staminodes ca. 10–15, obovate to obtriangular, 0.6–1.1 mm long, 0.4–0.7 mm wide, broadly rounded to truncate. Carpels ca. 15–20, 1.2–1.4 mm long, stigma finely tuberculate.

Monocarps 17–25 mm long, densely puberulous, becoming sparsely puberulous, stipitate part 12–15 mm long, beak 0.3–1 mm long. Seeds not seen.

Specimens seen: MALAYSIA. Borneo: Sarawak, Kuching, 25 Jul 1963, *Chew Wee-Lek* 648 fl (A, K, L), 1929, *J. & M. S. Clemens* 20570 fl (K, Z), 8 Apr 1974, *Laijanai* S 34147 fr (L), 26 May 1974, *Othman Ismawi* S 33724 fr (L), Busau, Sep 1905, *Ridley* 12387 (K), Marudi, 5 May 1965, *Sibat ak Luang* S 23040 fr (L).

INDONESIA. Borneo: Kalimantan, 24 Nov 1955, *Endert* 5206 fr (K, L).

Distribution (Fig. 37): Only known from Borneo.

Discussion: *A. borneensis* is clearly distinct from other Asiatic *Anaxagorea* species by the axillary position of the inflorescences. Other special features of this species include the possession of only 3 petals, the inner whorl lacking, and the finely tuberculate stigmatic surface. A total reduction of the inner petals elsewhere in *Anaxagorea* is known only in varieties of *A. javanica*. The stigmatic surface in other *Anaxagorea* species is smooth, as already mentioned in the chapter on flowers. The stamens in *A. borneensis* all have short thecae

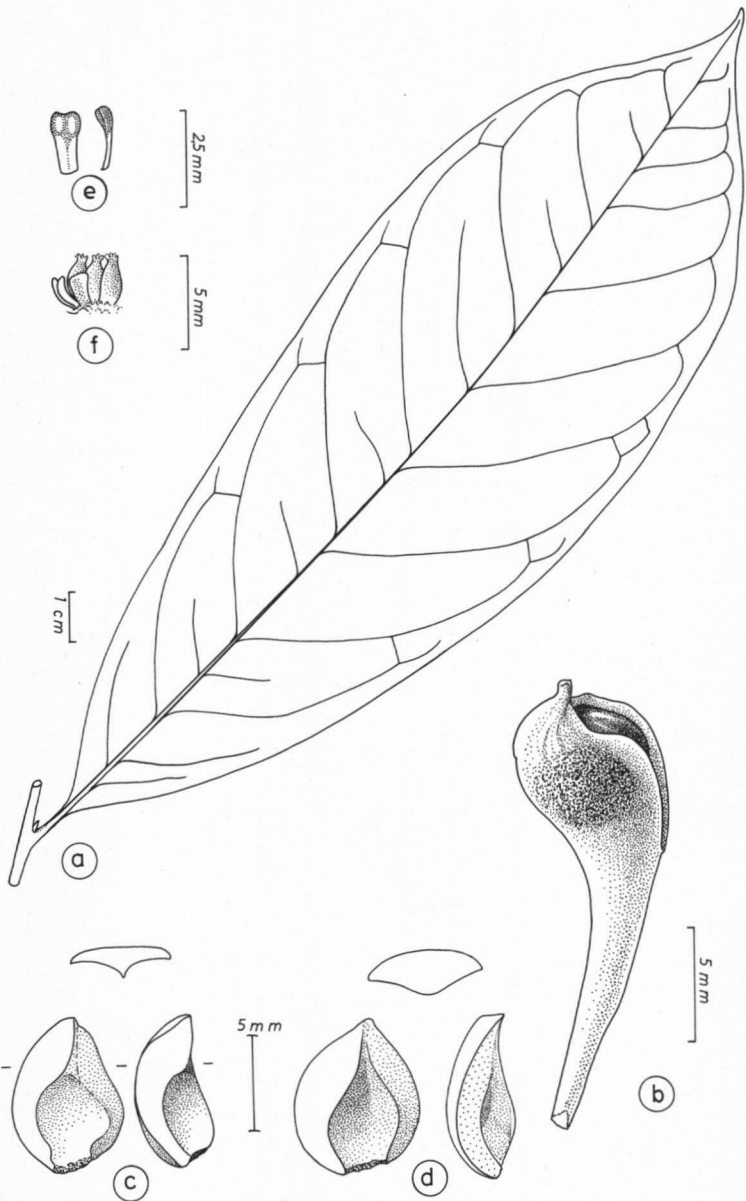


Fig. 27. *A. borneensis* (a—b, Sibat ak Luang S 23040; c, Ridley 12387; d—f, Clemens 20570). a, leaf; b, one monocarp; c—d, outer petals, inner side, lateral view, and cross section; e, stamen, seen from two sides; f, stamens and carpels.

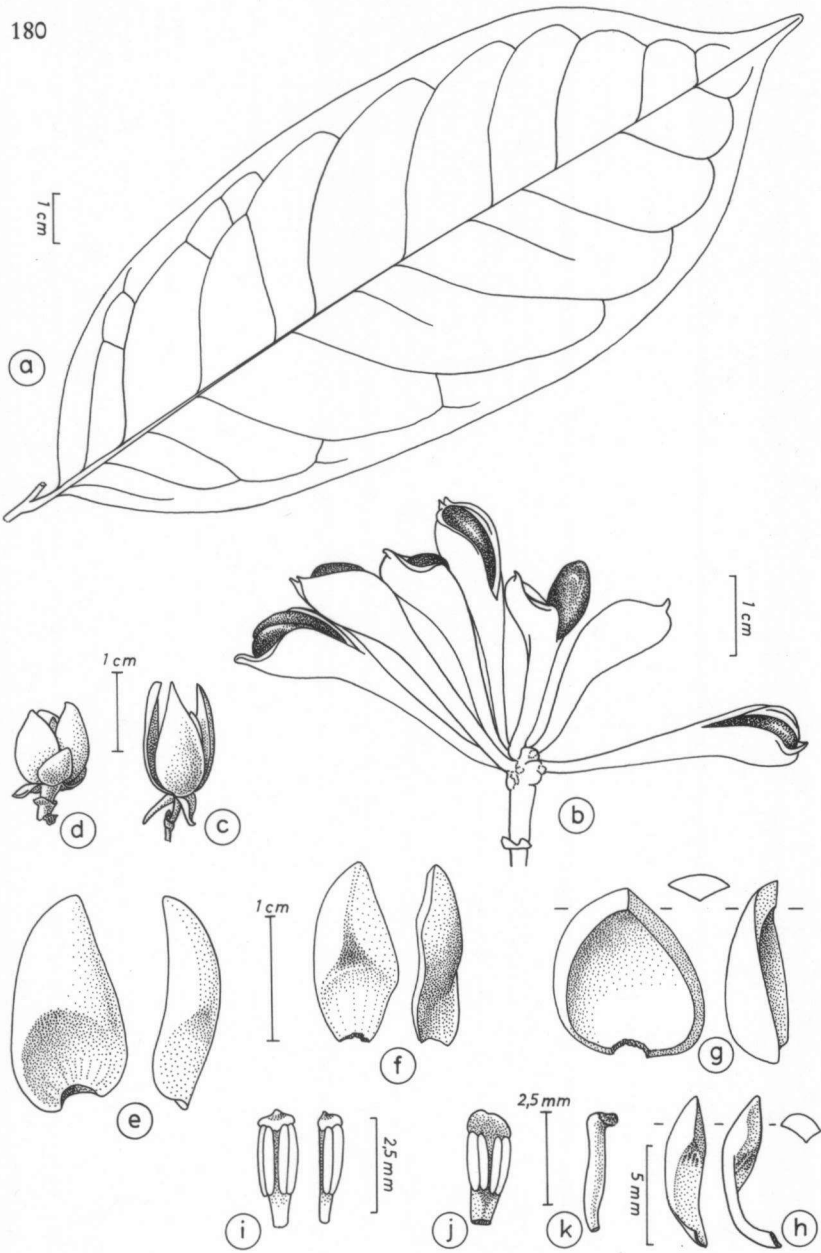


Fig. 28. *A. javanica* var. *javanica* (c, *Herb. Kerr* 53; g—h, j—k, *Sinclair & bin Salleh* 40909), *A. javanica* var. *dipetala* (a, d, *Everett FRI* 14131; e, *Brand SAN* 24583), *A. javanica* var. *tripetala* (f, i, *Kostermans* 5329), and *A. javanica* var. *indet.* (b, *Chan FRI* 6672). a, leaf; b, infructescence; c—d, flowers; e—f, outer petals, inner side and lateral view; g, outer petal, inner side, lateral view, and cross section; h, inner petal, inner side, lateral view, and cross section; i, stamens; j, stamen, also in cross section; k, staminode.

(less than half of the length of the whole stamen), and a very short apical prolongation.

24. *Anaxagorea javanica* Blume, Fl. Javae 66. t. 32, 36 (A). 1830; Zollinger, Linnaea 29: 323. 1858; Boerlage, Icon. bogor. 1: 109. 1899; Koorders & Valeton, Meded. Lands Plantentuin 61: 295. 1903; Corner, Gard. Bull. Straits Settlem. 10: 12. 1938; Sinclair, Gard. Bull. Straits Settlem. 14(2): 347. fig. 24. 1955. Backer & Bakhuizen van den Brink, Fl. Java 1: 105. 1963. — Type: *Reinwardt s.n.* Indonesia. Java: coastal forest near Batavia (Jakarta), fr (lectotype, L; isolectotype, L); *Blume s.n.*. Indonesia. Java: Anjer, province of Bantam, fr (syntypes, A, B, K, L, LE, S, U). Fig. 28.

Tree or shrub, up to ca. 8(–15) m tall. Leafy twigs 1–4 mm in diam., ferruginous-puberulous, soon glabrescent. Petioles 7–12(–16) mm long, 1–2.5 mm wide, ferruginous-puberulous, soon glabrescent. Lamina oblong to obovate, 10–22(–29) cm long, 3–12 cm wide, ferruginous-puberulous to soon glabrescent on lower side, base obtuse to rounded, slightly asymmetrical and decurrent, apex acuminate (to acute); primary vein slightly impressed on upper side; secondary veins curved, ca. 6–10(–13) on each side of primary vein, flat to slightly raised on upper side, angles with primary vein up to 70°, loop-forming at acute angles, loops indistinct, smallest distance between loops and margin 2–8 mm.

Inflorescences terminal or leaf-opposed, also on older parts of branchlets, short-pedunculate to sessile, with 1–several flowers at a time, sometimes producing up to ca. 20 flowers in succession on a sympodially elongating axis up to 20 mm long; peduncle up to 5 mm long; pedicels (6–)8–12(–16) mm long, 0.5–1 mm thick at the base and 1–2 mm thick below the flower; upper bract (2–)4–7 mm below the calyx, with an outer diameter of 2–3 mm, persistent. Flower buds globose to ovoid or conical. Flowers white to greenish-white or yellowish-white, fragrant (in vivo).

Indument of floral parts: pedicels, bracts, and outer side of sepals and petals densely puberulous to glabrescent, outer side of inner petals sparsely puberulous to glabrous, inner side of sepals and petals glabrous or with some scattered hairs along the margin.

Sepals free, 3 or 2, broadly ovate, 3–6 mm long, 2.5–5.5 mm wide, acute to obtuse. Outer petals 3 or 2, ovate to broadly ovate, 8–16.5(–23) mm long, 4.5–10 mm wide, acute to obtuse, inner side bifacial just below the apex and concave over the greater part, or bifacial in the upper half to two-thirds, or flat in the upper half to two-thirds, the apical part 2–4.5 mm thick. Inner petals 3 or absent, rhomboid to narrowly triangular-obovate, 8–11(–15) mm long, 2–5 mm wide, acute, inner side bifacial to broadly keeled in the upper third, the apical part 1.3–1.6 mm thick including keel. Stamens ca. 45–65, 3–4 mm long, 1–1.6 mm wide, thecae 1.5–2.5 mm long, (mostly) broader than the connective, apical prolongation of connective 0.5–1.1 mm long, 1–1.6 mm

wide, rounded to truncate. Staminodes ca. 10—20, oblong, 4—5.5 mm long, 0.4—0.8 mm wide, truncate. Carpels ca. 5—25, 2.5—3.5 mm long.

Monocarps 22—47 mm long, green (in vivo), densely puberulous, glabrescent in age, stipitate part 14—33 mm long, beak 0.2—0.6(—1) mm long. Seeds 10—15 x 5—9 mm.

**Key to varieties of *Anaxagorea javanica***

- 1 Petals 6, in two trimerous whorls . . . . . 24a. var. *javanica*
- Petals in one whorl, inner whorl absent. . . . . 2
- 2 Sepals and petals 3. . . . . 24b. var. *tripetala*
- Sepals and petals 2. . . . . 24c. var. *dipetala*

**24a. *Anaxagorea javanica* Blume, var. *javanica*. Fig. 28c, g, h, j, k.**

= *Melodorum fuscum* Craib, J. Nat. Soc. Siam 6: 43. 1923. — Type: *Eryl Smith* 536. Thailand. Khao Ram, fl (holo?-type, K).

Flower buds globose. Sepals and petals in whorls of 3. Sepals broadly ovate, 3.5—5.5 mm long, 2.5—4.5 mm wide. Outer petals ovate to broadly ovate, 9—14.5(—18) mm long, 6—9 mm wide, inner side variable from bifacial just below the apex to bifacial, or broadly keeled, in the upper third (to upper half), apex acute to obtuse. Inner petals present.

Specimens examined: THAILAND. Aug 1927, *Herb. Kerr* 53 fl, fr (K); Dec 1924, *Kerr* 9591 fr (BM, C, E, K, L); 22 Dec 1928, *Kerr* 16285 fl (BM, K); 1970, K. & S.S. Larsen 3577 fl (K); 11 Aug 1975, *Maxwell* 75—752 fl (L); 21 Apr 1950, *Plermchit* 338 fl (K); 19 Sep 1961, *Smitinand & Sleumer* 1181 fl, fr (C, K, L); Mar 1915, *Vanpruk* 622 fl (K).

MALAYSIA. Malaya: Johore, 25 Nov 1971, *Loh FRI* 19195 fl (L); Kedah, Nov 1916, *H.C. Robinson s.n.* fl (BM); Kelantan, 17 Mar 1967, *Cockburn FRI* 7117 fl (L), 5 Jul 1935, *Henderson* 29534 fl (K); Pahang, 20 Aug 1928, *Hoshuno SF* 20529 fl (K); Perak, 15 Oct 1927, *Henderson* 19398 (K); Trengganu, 20 Sep 1955, *Sinclair* 8695 fl (E), 20 Sep 1955, *Sinclair & Kiah bin Salleh SF* 40909 fl (E, K), 15 Sep 1969, *Suppiah FRI* 11393, fl. fr (K, L).

SINGAPORE. 29 Jun 1955, *Sinclair* 8447 fl, fr (E), *SF* 40651 fl, fr (BM, E, F, K, L); *Teb s.n.* fr (MO).

INDONESIA. Sumatra: *Forbes* 2608 fl, fr (BM, L, LE).

Distribution (Fig. 38): Thailand, Malaya, Singapore, Indonesia. Collected in primary forests at alt. 20—300 m.

**24b. *Anaxagorea javanica* var. *tripetala* Corner, Gard. Bull. Straits Settle.**

10: 12. 1939; Sinclair, Gard. Bull. Straits Settle. 14(2): 347. fig. 24. 1955.

- Type: *Henderson 23788*. Malaya. Perak: Gunong Pondok, 7 Jun 1930, fl (holotype, SING, not seen; isotype, K). Fig. 28f, i.
- = *Anaxagorea scortechinii* King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61: 68. 1892; King, Ann. Roy. Bot. Gard. (Calcutta) 4: 85. t. 119. 1893; Boerlage, Icon. bogor. 1: 110. 1901; Ridley, Fl. Malay Peninsula 1: 62. 1922; Craib, Fl. siam. 1: 46. 1925; Corner, Gard. Bull. Straits Settlem. 10: 11. 1939. — Type: *King 2375*. Malaysia. Malaya: Perak, Sep 1881 (syntypes, BM, L); *King 4508*, ibidem, Jul 1883 (syntype, K); *King 4823*, ibidem, Aug 1883, fl, fr (syntype, K); *King 7361*, ibidem, Mar 1885, fr (syntypes, A, BM, K, LE); *King 10508*, ibidem, Jul 1886 (syntype, K); *Scortechini 1624*, ibidem, Dec 1884 (syntype, K); *Scortechini s.n.*, ibidem, fr (syntypes, BM, US); *Wray 3400*, ibidem, 28 May 1889, fl (syntype, P).

Flower buds ovoid (to globose). Sepals and petals in whorls of 3. Sepals ovate to broadly ovate, 3.5–5.5(–8) mm long, 3–4(–5.5) mm wide, apex acute to obtuse. Outer petals ovate, 8–16.5(–23) mm long, (4.5–)5.5–7.5(–10) mm wide, apex acute to obtuse, inner side bifacial in the upper half or two-thirds, thickness in apical part 2–4.5 mm. Inner petals lacking.

Specimens examined: THAILAND. 13 Aug 1923, *Kerr 7605* fl (BM, C, E, K, UC).

MALAYSIA. Malaya: Kedah, Dec 1928, *Meh CF 9043* fl (K); Pahang, 16 Nov 1924, *Haniff & Nur SF 17180* fr (UC), 1891, *Ridley 2424* fr (BM, K); Perak, 1887, *Curtis 1282* (K), 7 Dec 1965, *Shah & Sidek 1147* fr (K, L), Aug 1909, *Ridley 14734* fl (BM, K), 28 Oct 1958, *Sinclair 9886* fl (A, E, K, L), 30 Mar 1931, *Symington CF. 25822* (L); Selangor, 8 Apr 1965, *Ng KEP 99068* fr (L), May 1896, *Ridley 7220* (BM, K), 7285 (K), 27 Nov 1974, *Stone 12126* fl (MO), 28 Mar 1930, *Symington CF 22951* fr (K); Trengganu, 13 Jul 1953, *Sinclair 7655* fl (E), 13 Jul 1953, *Sinclair & Kiah bin Salleh SF 39928* fl (BM, E, K, L). Borneo: 11 Jul 1932, *Bakar 2477* fr (A, K); 16 Jul 1970, *Cockburn SAN 71009* fr (L); Oct 1922–Mar 1923, *Elmer 20558* (B, BM, BR, C, E, GH, K, L, M, MICH, MO, NY, S, U, UC, Z), 21131 fr (A, BM, BR, C, F, GH, K, L, M, MICH, MO, NY, P, S, U, UC, US, Z); 7 Aug 1926, *Evangelista in D.D. Wood 2558* fl (UC); 11 Dec 1973, *Gibot SAN 76685* fr (L); 14 May 1932, *Puasa 1851* fr (K); 19 Jul 1959, *Meijer SAN 19644* fr (B, K, L, US), 22 Nov 1962, *Meijer SAN 28373* fl (L); 16 Jul 1970, *Talip SAN 70877* fr (L), 17 Jul 1970, *Talip SAN 70955* fl (L).

INDONESIA. Borneo: 11 Jun 1951, *Kostermans 5144* fl, fr (K, L); 18 Jun 1951, *Kostermans 5313* fl (K, L); 19 Jun 1951, *Kostermans 5329* fl (K, L); 27 Jul 1957, *Kostermans 13235* fr (K, L); 22 Sep 1957, *Kostermans 14010* fl, fr (K, L); 12 Oct 1963, *Kostermans 21248* fr (L).

Distribution (Fig. 38): Thailand, Malaya, Borneo. Collected in evergreen, primary or disturbed forests, along paths or along streams; at alt. 10–450(–1100) m.



- 24c. *Anaxagorea javanica* var. *dipetala* Corner, Gard. Bull. Straits Settlement. 10: 12. 1939; Sinclair, Gard. Bull. Straits Settlement. 14(2): 349. 1955. — Type: *Corner SF 28792*. Malaysia. Malaya: Johore, Sungei Berassau, Mawai-Jemaluang Road, 6 Feb 1935, fl (holotype, SING, not seen; isotype, A). Fig. 28a, d, e.

Floral buds ovoid. Sepals and petals in whorls of 2. Sepals broadly ovate, 4—5.5 mm long, 4.5—5.5 mm wide, apex obtuse. Outer petals ovate, 11—15 mm long, 8—9.5 mm wide, apex obtuse, inner side flat in the upper half to two-thirds, the apical part to ca. 3.5 mm thick. Inner petals lacking.

Specimens examined: MALAYSIA. Malaya: Johore, Sungei Kayu Ara, Mawai-Jemaluang Road, 15 May 1935, *Corner SF 29464* (A, K), Mile 15 on Mawai-Kemaluang Road, 30 Oct 1936, *Corner SF 31932* fl (A, K, P), Bt. Panjang, Ulu Sedili, alt. 210 m, 10 Apr 1970, *Everett FRI 14131* fr (A, K), Mile 23 on Kota Triggi-Jemaluang Road, 21 May 1954, *Sinclair 8085* fl, fr (E), *SF 40300* fr (E, K, L). Borneo: Sabah, Lahad Datu Distr., K/Bay Block 82, 20 Apr 1964, *Agam & Aban SAN 41631* fr (L), Pulau Sakar, Lahad Datu, 19 Mar 1961, *Brand SAN 24583* fl, fr (K, L).

Distribution (Fig. 38): Malaya and Borneo.

Specimens not identified to variety (map, see Fig. 38): THAILAND. 26 Mar 1949, *Bunkert 14* fr (A, K); 13 May 1973, *Geesink & Santisuk 5418* fr (C, E, K, L, P); 29 Jan 1966, *Hansen & Smitinand 12155* fr (C, L); 13 Apr 1928, *Kerr 15155* fr (BM, E, K); Feb. 1930, *Kerr 18193* fr (BM, E, K); 11 Mar 1974, *K. & S.S. Larsen 33140* (C); 17 May 1970, *Phusomsaeng et al. 342* fr (C, K, P); 9 Jan 1968, *Sangklachand 1510* fr (C, E, L, P); 26 Feb 1935, *Seidenfaden 2764* fr (C); 25 Jan 1958, *Sørensen et al. 654* fr (C).

MALAYSIA. Malaya: Johore, 5 Jul 1970, *Samsuri bin Ahmad 327* fr (A, C, K, L), 31 May 1970, *Shah & Samsuri 1724* (A, C, K, L), 1 Feb 1971, *Shah & Ahmad bin Shukor 2297* fr (A, C), 10 May 1968, *Whitmore FRI 8658* fr (C), *8659* fr (A); Kedah, 12 Apr 1968, *Sidek bin Kiah 378* fr (A, C, K, L); Kelantan, 30 Jun 1968, *Chan FRI 6672* fr (A, K, L), 10 Jun 1967, *Ng FRI 5319* fr (A, L), 28 Apr 1976, *Stone & Sidek 12580* fr (L), 18 Jun 1968, *Suppiah KEP 104598* fr (L), 13 Jun 1968, *Suppiah KEP 104814* fr (L), 27 Jul 1962, *Unesco Limestone Expedition 1962 42* (A, K, L), 23 Jul 1967, *Whitmore FRI 4198* fr (L); Negri Sembilan, 8 Sep 1969, *Suppiah FRI 11357* fr (L); Pahang, 14 Jul 1967, *Chelliah KEP 104428* fr (L), 27 Mar 1959, *Kadim bin Tassim & Mahmud bin Awang 30* (K, L), 1 Jun 1972, *Kochummen FRI 16524* fr (L), 16 Feb 1971, *Samsuri bin Ahmad & Ahmad bin Shukor 410* fr (C), 16 Jul 1970, *Shah & Noor 1901* (A), 17 Feb 1971, *Suppiah FRI 11577* fr (K, L); Perak, 30 Jul 1970, *Chan FRI 13337* fr (K, L), 3 Apr 1968, *Ng FRI 5996* fr (L); Selangor, 21 Apr 1959, *Kochummen KEP 78967* fr (K, L), 14 Apr 1961, *Kochummen KEP 98256*

fr (L), 13 Oct 1973, *Shah & Ali* 3006 fr (C, HBG), 17 Jul 1965, *Stone* 5957 (MO); Trengganu, 1 Jun 1968, *Cockburn FRI* 8385 fr (A, L), 10 Jun 1968, *Cockburn FRI* 10563 fr (L), 1 Jun 1974, *Shah et al.* 3302 fr (C). Borneo: Sabah, 11 Apr 1964, *Agam & Aban SAN* 41603 fr (L), 25 Jun 1963, *Agam & Gibot SAN* 36043 fr (K, LE), 9 Sep 1961, *Bakar SAN* 26185 fr (K), 16 Aug 1976, *Cockburn SAN* 84869 fr (K, L), 8 Dec 1962, 27 Mar 1963, *Elleb SAN* 35591 fr (K, L), *Madani SAN* 33176 fr (L), 20 Mar 1962, *Madani SAN* 35128 fr (L), 14 Mar 1974, *Madani SAN* 78745 fr (K, L), 18 Apr 1961, *Meijer SAN* 24868 fr (K, L), 25 Jul 1970, *Muroh SAN* 71084 fr (K, L), 27 Aug 1965, *Nordin SAN* 46055 fr (L), 31 Aug 1976, *Stone SAN* 85185 fr (K, L), 3 Apr 1978, *Sundaling SAN* 87968 fr (K, L), 5 Mar 1955, *Wood A* 2914 fr (A, L).

SINGAPORE. 25 May 1929, *J. & M. S. Clemens* 22540 fr (NY); 31 May 1976, *Samsuri bin Ahmad* 1255 fr (MO); 18 Jul 1967, *Shah* 1199 fr (E).

INDONESIA. Sumatra: 18 Feb 1920, *Achmad* 1698 fr (L), 20 Oct 1924, *Iboet* 461 fr (L). Java: 19 Nov 1913, *Backer* 10053 fr (B, BR, K, L, P, U), 1880—1882, *Forbes* 1293 (L).

Discussion: *A. javanica* is one of the two common and widespread *Anaxagorea* species in Asia, easily recognized by the leaf-opposed or terminal inflorescences. When in flower, it is distinguishable from *A. luzonensis*, the other Asiatic species with similarly placed inflorescences, by the rather large number of stamens and the presence of staminodes. Fruiting *A. javanica* can be distinguished from *A. luzonensis* by the short-beaked monocarps. The most curious and puzzling aspect of *A. javanica* is the variation in the perianth in an otherwise quite homogeneous species, with forms with 2 whorls of petals and forms with only the outer whorl of petals, the latter divided again in trimerous and dimerous forms. CORNER's vision (CORNER 1939, l.c.) assigning these forms varietal status under *A. javanica* is followed here. Breeding and/or crossing experiments, if such ever could be realized, should prove very interesting.

25. *Anaxagorea luzonensis* A. Gray, U.S. Expl. Exped., Phan. 1: 27. 1854; J.D. Hooker & T. Thomson, in Hooker, J.D., Fl. Brit. India 1: 68. 1872; King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 61: 68, 1892; King, Ann. Roy. Bot. Gard. (Calcutta) 4: 84. t. 118. 1893; Trimen, Handb. fl. Ceylon 1: 27. 1893; Boerlage, Icon. bogor. 1: 108. t. 31. 1899; Merrill, Philipp. J. Sci. 1, Supl. 1: 53. 1906, 3: 76. 1908; Finet & Gagnepain, in Lecomte, Fl. Indo-Chine 1: 76. fig. 10. 1907; Ridley, Fl. Malay Penins. 1: 62. 1922; Merrill, Enum. Philipp. flow. pl. 2: 158. 1923; Craib, Fl. siam. 1: 46. 1925; Corner, Gard. Bull. Straits Settlm. 10: 12. 1939; Backer & Bakhuizen van den Brink, Fl. Java 1: 105. 1963. — Type: *Gray s.n.* Philippines. Luzon: prov. Laguna, Los Baños, 1838—1842, fr (holotype, US; isotype, GH). Fig. 29.

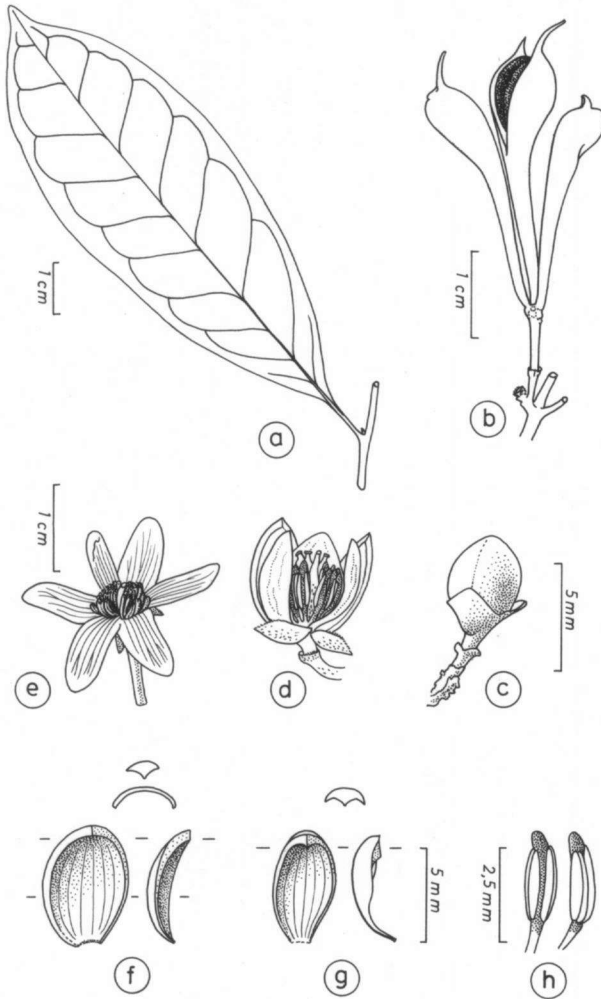


Fig. 29. *A. luzonensis* (a, c, Walker, "Herb. Wight 27"; b, Ramos BS 13623; e, Lobb 457; d, f—h, Poilane 6664). a, leaf; b, infructescence; c, flower bud; d, flower, seen from aside; e, flower laid open; f, outer petal, inner side, lateral view, and cross section; g, inner petal, inner side, lateral view, and cross section; h, stamens.

= *Anaxagorea zeylanica* Hooker & Thomson, Fl. Ind. 1: 144. 1855; Miquel, Fl. Ned. Ind. 1(2): 49. 1858; Thwaites & J.D. Hooker, Enum. 10. 1858; Beddome, Icon. pl. Ind. or. 1: 10. t. 46. 1870. — Type: *Champion s.n.* Sri Lanka (syntype, not seen); *Cuming 831*. Philippines. Luzon: prov. Tayabas, Mts. of Cristobal and Mayayai, 1841, fl (syntypes, BM, E, K, LE, OXF, P, S); *Lobb 457*. Philippines. Luzon (syntype, K); *Walker 146*. Sri

- Lanka (syntype, GH); "*Herb. Wight 27*" = *Walker 1209* ? Sri Lanka (syntypes, E, GH, K).
- = *Rhopalocarpus fruticosus* Teysm. & Binnend. ex Miq., Ann. Mus. Bot. Lugduno-Batavi 2: 22. t. 2, fig. B. 1865; Bentham in Bentham & Hooker, Gen. pl. 1: 957. 1867. — Type: *Teysmann s.n.* Indonesia. Moluccas: Batjan, 7 Mar 1867, fl, fr (holotype not located; iso(?) -types, BM, L).
- ≡ *Anaxagorea fruticosa* (Teyism. & Binnend. ex Miq.) Scheffer, Flora 52: 302. 1869; Scheffer, Natuurk. Tijdschr. Ned.-Indie 31: 9. 1870.

Shrub (or small tree), up to 4 m tall. Leafy twigs 1–3 mm in diam., ferruginous-puberulous to soon glabrescent. Petioles 3–13 mm long, 1–3 mm in diam., ferruginous-puberulous to soon glabrescent. Lamina (narrowly) elliptic (to obovate), (3.5–)6–21 cm long, 2–8 cm wide, ferruginous-puberulous to soon glabrescent on lower side, base acute (to obtuse), slightly decurrent, apex acuminate (the apex itself often obtuse); primary vein impressed on upper side; secondary veins curved to straight, ca. 5–7 on each side of primary vein, slightly impressed on upper side, angles with primary vein up to 65°, loop-forming at obtuse to acute angles, loops distinct, smallest distance between loops and margin 2–5 mm.

Inflorescences terminal or leaf-opposed, occasionally on older parts of branchlets, to cauliflorous, (mostly) short-pedunculate to sessile, with mostly one flower, or up to several flowers, at a time; peduncle up to 2(–12) mm long; pedicels 4–9(–12) mm long, 0.5–1 mm thick at the base and 0.7–1.5 mm thick below the flower; upper bract 2–6 mm below the calyx, with an outer diameter of 1–2 mm, persistent. Flower buds globose to ellipsoid or ovoid. Flowers white (in vivo).

Indument of floral parts: pedicels, bracts, outer side of sepals and outer petals densely puberulous, to glabrescent in age, outer side of inner petals sparsely puberulous to glabrous, inner side of sepals and petals glabrous.

Sepals free, broadly ovate, (1.8–)2.3–3(–4) mm long, 1.8–3(–3.7) mm wide, acute to rounded. Outer petals ovate, 6–9(–12) mm long, 2.2–5 mm wide, acute (to obtuse), the inner side bifacial just below the apex, concave over the greater part. Inner petals elliptic to obovate, 5–8 mm long, 1.5–3.5 mm wide, acute (to acuminate), the inner side bifacial to broadly keeled just below the apex, concave over the greater part. Stamens ca. 15–30, 3.2–3.8 mm long, 0.4–0.7 mm wide, thecae 1.7–2.7 mm long, broader than the connective, apical prolongation of connective 0.3–0.4 mm long, rounded to truncate. Staminodes absent. Carpels up to ca. 5, 3.3–4.5 mm long.

Monocarps 18–34 mm long, green (in vivo), densely puberulous, to glabrescent in age, stipitate part 11–24 mm long, beak 1.2–5 mm long. Seeds (7.5–)9–11 x 4.5–6.5 mm.

Specimens examined: SRI LANKA. *Thwaites 3883* fr (BR, FHO, GH, K, LE, P, UC, W).

INDIA. Andamans: 23 Jul 1974, *Bhargava* 1857 fl (E, L); 31 Jul 1974, *Bhargava* 1948 fl (E, L); 21 Jul 1975, *Bhargava* 2466 fr (L); 8 Jan 1976, *Bhargava* 3364 fr (L); 3 Nov 1977, *Bhargava et al.* BSI 6312 fl, fr (L); 1884, *King* 402 fr (BM, E, L, LE, K, P); 29 Sep 1890, *King s.n.* (BM); 31 Oct 1891, *King s.n.* fr (L); 20 Aug 1892, *King s.n.* fl (K); 8 Aug 1894, *King s.n.* fr (Z); 10 Sep 1894, *King s.n.* fr (A, P); *S. Kurz s.n.* (K); 31 Jan 1974, *Nair* 832 fr (L); 16 Sep 1915, *Parkinson* 246 (K); Oct 1900, *Prain* 85 fl, fr (Z); Feb—Mar 1934, *Ram* 3709 fr (A, E).

BURMA. 29 May 1919, *Kerr* 21611 fr (BM); *J. Kurz* 66 (K); Dec 1937, *Maung Po Chui* 4404 (K); *McLellan s.n.* (E); 12 Feb 1927, *Parker* 2587 fl, fr (UC); *Scott s.n.* (K, L).

THAILAND. 25 Oct 1971, *van Beusekom & Geesink* 3345 fr (L); Sep 1914, *Collins* 474 (K); Sep 1914, *Collins* 529 fr (K, US); 30 Sep 1924, *Collins* 1037 fr (K, US); 30 Mar 1925, *Herb. Kerr* 34 fl (BM, K); 31 May 1922, *Kerr* 6041 fl (BM, E, K, P, UC); 28 Sep 1924, *Kerr* 9228 fl (BM, E, K); 16 Apr 1927, *Kerr* 12770 fl, fr (BM, E, K); 8 Nov 1930, *Marcant* 2539 fr (BM); 18 May 1975, *Maxwell* 75-531 fl (L); 23 Jan 1927, *Put* 513 fl, fr (BM, K); 10 Sep 1927, *Put* 1039 (BM); 12 Sep 1927, *Put* 1068 fr (BM, E, K); 11 Mar 1928, *Put* 1513 fl (BM, E, K); 16 Feb 1900, *Schmidt* 552 fl (C); 16 Jul 1921, *Winit* 624 fl, fr (K).

CAMBODJA. Nov 1921, *Evrard* 731 fr (A, B, K, NY, P); May 1870, *Pierre* 600 fr (A, BM, GH, K, L, LE, P, US).

VIETNAM. Jun 1909, *d'Alleizette* 90 (L); Sep 1876, *Harmand* 778 fr (P); Jul 1877, *Pierre* 1793 (BM, L, P); 15 May 1923, *Poilane* 6303 fl (A, P), 6328 fr (P); 24 May 1923, *Poilane* 6664 fl (A, NY, P); 10 Jun 1924, *Poilane* 10755 fl (A, P), 10775 (A); 13 Oct 1931, *Poilane* 19661 fr (A, P); 26 Oct 1932, *Poilane* 21251 fl (A, K, NY, P); 14 Aug 1936, *Poilane* 25375 fr (P); 19 Aug 1938, *Poilane* 27554 (K, P); 2 Jan 1966, *Vidal* 4957 fr (P).

CHINA. Hainan: 24 Apr 1932, *Ko* 53174 fl (A, NY); 27 Sep 1927, *Ts'ang Wai-Tak* 949, *LU* 16448 fr (A, E, K, NA, MO, NY, S, UC, US); 29 Oct 1933, *Wang* 34918 fr (A, NY, S); 11 Jan 1934, *Wang* 36360 fr (A, E, M, NY).

PHILIPPINES. Bohol: Aug—Oct 1923, *Ramos BS* 42647 fr (A, LE, UC). Guimaras: 6 May 1950, *Sulit PNH* 11824 fr (A, L). Leyte: Jan 1906, *Elmer* 7113 (A, E, K, LE, NY); 31 Jul 1915, *Wenzel* 1496 fl (A, BM, F, GH, MO); 7 Sep 1916, *Wenzel* 1615 fr (A, BM, F, GH, MO, NY). Luzon: Jul 1904, *Abern* 130 fr (US); Oct 1904, *Abern FB* 1889 fr (F, K, NY, US); Sep 1905, *Abern FB* 3316 fr (K, M); Jun 1904, *Borden FB* 1215 (F, K, NY, US), *FB* 1229 fl (BM, F, K, NY, US); Jul 1904, *Borden FB* 1327 fl (K, NY, US); Aug 1904, *Borden FB* 1770 (E, NY, US); 1840, *Calléry* 8 (P); 1866, *Cuming* 496 fl, fr, (BM, C, E, GOET, K, L, LE, MO, OXF); *Cuming* 499 (BM); Nov 1947, *Edaño PNH* 4077 fr (BR); 4 Dec 1926, *Edaño BS* 48700 fr (S, UC); Nov 1904, *Elmer* 6639 (E, K, NY); Jul 1916, *Elmer* 16544 fr (A, BM, C, GH, K, L, MICH, MO, NY, P, S, U, UC, US, Z); Jun—Jul 1917, *Elmer* 17739 fl (A, BM, C, F, GH, K, L, MO, NY, P, S, U, UC, US, Z); 9 Nov 1914, *Foxworthy* 13 fl (A); 24 Jan 1955, *Gabot PNH* 33454 fr (L); 27 Oct 1913, *Gates* 6603 fl (F); 18 Oct

1913, *Gates* 7190 fl, fr (F); 15 Dec 1903, *Hallier* 4025 fr (L); *Lobb* 222 fl (K); Oct 1909, *Loher s.n.* (UC); Nov 1912, *Loher s.n.* fr (UC); Sep 1913, *Loher s.n.* fl (UC); Jun 1892, *Loher* 27 fr (K, M, NY, US), 28 fr (K, M, US), 29 fr (K, M, US); 26 Oct 1890, *Loher* 30 (K, M, US); 3 Aug 1890, *Loher* 31 (K, M, US); Aug 1905, *Loher* 5521 (K, M); *Loher* 5615 fl (K); *Loher* 13230 (M); Aug 1913, *Loher BS* 14784 (M, UC); 8 Oct 1953, *Loreja* 62 fr (L); Nov—Dec 1910, *MacGregor BS* 12375 fr (K, L, P); Jun—Aug 1915, *MacGregor BS* 22908 (UC); Sep 1910, *Merrill* 426 fr (M, U, US, Z); 14 Nov 1903, *Merrill* 2500 fl (BM, GH, K, MO, NY, US); Oct 1903, *Merrill* 3136 fl, fr (BM, K, NY, P, US); Dec 1904, *Meyer FB* 2214 fr (K, NY, US); Sep 1906, *Ramos BS* 1492 fr (GH, K, NY, US); Aug 1914, *Ramos BS* 1873 fr (BM, GH, L, MO, P); Aug 1911, *Ramos BS* 13623 fr (E, F, MO, S); 26 Jan 1955, *Ranases PNH* 33448 fr (L); 11—14 Aug 1908, *C.B. Robinson BS* 6165 fr (L); 19 Feb. 1910, *C.B. Robinson BS* 9725 fr (L, P); Sep 1909, *Rosenbluth & Tamesis FB* 12689 fl (L); 2 Jan 1908, *Shaw* 751 fr (BM); 30 May 1958, *Sinclair & Edaño* 9464 fl (A, B, BM, E, K, L, M, NY); 14 Sep 1963, *Stern* 2068 fl (L, LE, MICH); 9 Nov 1963, *Stern* 2193 fr (MICH); 22 Jul 1915, *Swingle s.n.* fl (NA); Aug—Oct 1958, *Vidal y Soler* 10 fl, fr (A, K); Sep—Oct 1958, *Vidal y Soler* 10 fr (A); Aug—Oct 1958, *Vidal y Soler* 10c fr (A); Sep—Oct 1958, *Vidal y Soler* 10d fr (A); Jul 1904, *Whitford* 471 fl (F, K, NY, US), 505 fr (F, US); May 1905, *Whitford FB* 24037 fl (K); 29 Oct 1903, *R.S. Williams* 10 fr (K, L, NY, US). Mindanao: *Abern* 357 fl (US). Mindoro: Jun 1921, *Ramos BS* 39792 fr (A, BM, UC); Nov—Dec 1925, *Ramos BS* 46415 fr (BM, S, UC). Panay: Aug 1954, *Taleon PNH* 34027 fr (L). Samar: Jun 1924, *MacGregor BS* 43756 fl (UC), *BS* 43824 fr (UC).

INDONESIA. Borneo: 20 Nov 1971, *Kuswata Kartawinata* 871 fl (L); 6 Jun 1911, *Rutten* 260 fl (U); 1908, *Winkler* 2711 fr (BM, K, L, Z). Celebes: 1874, *Beccari s.n.* (K). Java: 10 May 1896, *Koorders* 22523 (L); 10 Apr 1897, *Koorders* 27268 (L). Moluccas: 26 Sep 1939, *Bloembergen* 4686 fr (A, L); 13 Aug 1900, *Boerlage* 570 fl (L); 13—17 Apr 1938, *de Haan & Anang* 558 fl (L); 1917, *van Hulstijn & Atje 25/i.n.* fl (L); 15 Nov 1918, *Rutten* 1896 fl (L, U); 20 Feb 1919, *Rutten* 2100 fl (L); 29 Oct 1974, *de Vogel* 3749 fl (L); 5 Nov 1974, *de Vogel* 3907 fr (L).

Distribution (Fig. 37): Sri Lanka, Andamans, Southeast Asia. China (Hainan), Philippines, and Indonesia as far as the Moluccas. Collected in primary and secondary evergreen forests at alt. up to 600 m.

Discussion: *A. luzonensis* is the other common and widespread Asian species, and it comes closest to *A. javanica*. It is very distinct from that species, however, especially by the relatively small number of stamens and the lack of staminodes. The long-beaked monocarps of *A. luzonensis*, hardly equalled within the genus, are also remarkable. *A. luzonensis* differs from *A. javanica* not only in floral characters, but also vegetatively. *A. luzonensis* usually is a small shrub to ca. 1.5 m tall (the maximum height given in the above description is exceptional), whereas *A. javanica* can grow into a much taller shrub or

tree. The pedicels in *A. luzonensis* are usually shorter and thinner than those in *A. javanica*.

26. *Anaxagorea radiata* Robinson, Bull. Torrey Bot. Club 35: 66. 1908; Merrill, Enum. Philipp. fl. pl. 2: 158. 1923. — Type: *R.S. Williams 3108*. Philippines. Jolo: near the base of Mt. Dajo, 27 Jul 1905, fr (holotype, A; isotype, UC).

Tree, 3—6 m tall, vegetatively similar to *A. javanica*.

Inflorescences terminal or leaf-opposed, very short-pedunculate to sessile, with one to perhaps several flowers (only seen in fruiting stage) at a time, sometimes probably producing a number of flowers (ca. 10?) in succession on a sympodially elongating rhachis up to 9 mm long; pedicels 6—10 mm long, (0.7—)1—2 mm thick at the base and 1.5—3 mm thick below the flower; upper bract 3—5 mm below the calyx, with an outer diameter of 2—3 mm, persistent. Flower buds globose. Flowers reported as white or yellow, not seen.

Indument of floral parts: pedicels and bracts densely puberulous, to sparsely puberulous in age.

Flowers unknown.

Monocarps (up to 16 counted — “12 to at least 20”, fide ROBINSON 1908, l.c.) 26—44 mm long, green (in vivo), densely puberulous, becoming sparsely puberulous in age, stipitate part 16—28 mm long, beak 0.2—0.6 mm long. Seeds 10—16.5 x 6—9 mm.

Specimens examined: PHILIPPINES. Basilan: Aug 1912, *Miranda FB 18846* fr (B, BM); Aug 1912, *Reillo BS 15484* fr (BM, K); 8—13 Apr 1948, *Santos 4152* fr (L, US). Mindanao: Bugasan, Parang, Cotabato, 10 Dec 1946, *Edaño PNH 1508* fr (A, F, L); Agusan, Apr—Jun 1921, *Mallonga FB 28647* fr (A). Palawan: Lipuun Point, Quezon, 28 May 1963, *Gutierrez & Espiritu PNH 80811* fr (L). Tawitawi: Jun 1940, *Alcasid & Celestino PNH 7395* fr (A).

Distribution (Fig. 38): Southern islands of the Philippines, at low altitudes.

Discussion: This species was described from fruiting material. Although two collections carry field notes on white and yellow flowers respectively, no flowers were present on any of the herbarium specimens seen by us. Vegetatively, the Philippine collections identified as *A. radiata* look similar to *A. javanica* from other areas. Moreover, the differentiating characters given with the original description of *A. radiata* (a terminal inflorescence, and more numerous carpels than in *A. javanica*) cannot be upheld after examination of much more material than presumably was at C.B. ROBINSON's disposal. We strongly suspect that *A. radiata* is nothing but *A. javanica*, but we have refrained from putting it in synonymy with the latter because flowers from Philippine populations should become available for examination first.

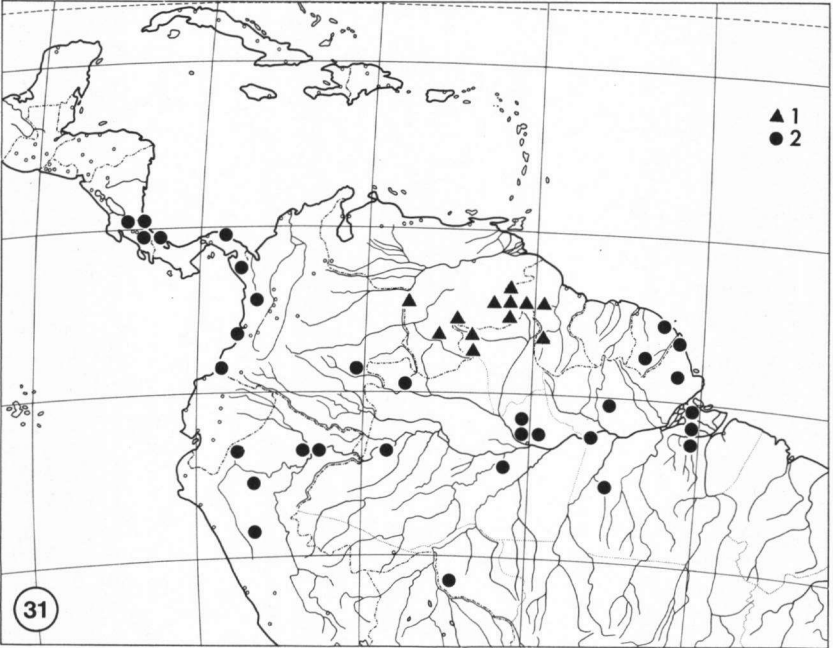
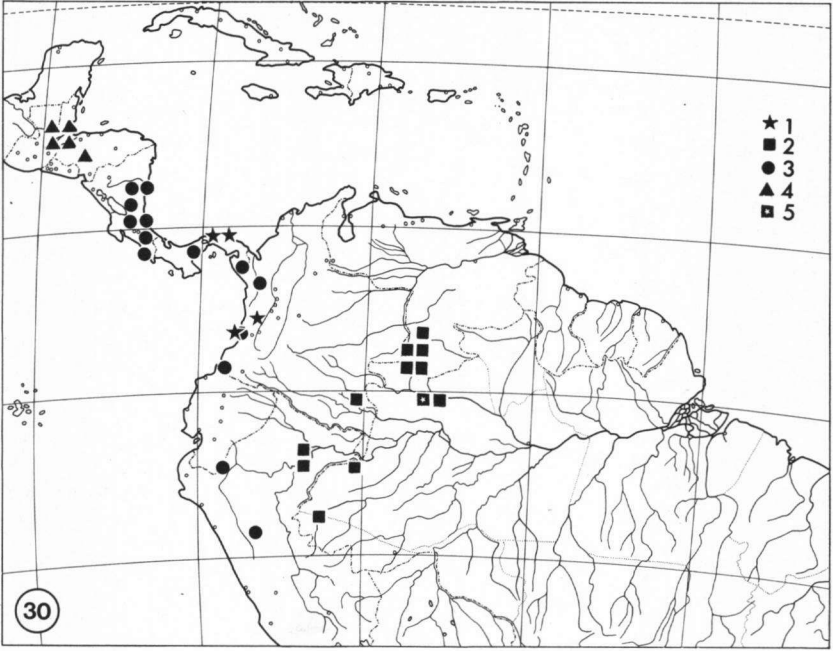


Fig. 30. Distribution of *A. allenii* (1), *A. brachycarpa* (2), *A. crassipetala* (3), *A. guatemalensis* (4), and *A. macrantha* (5). —Fig. 31. Distribution of *A. petiolata* (1) and *A. phaeocarpa* (2).



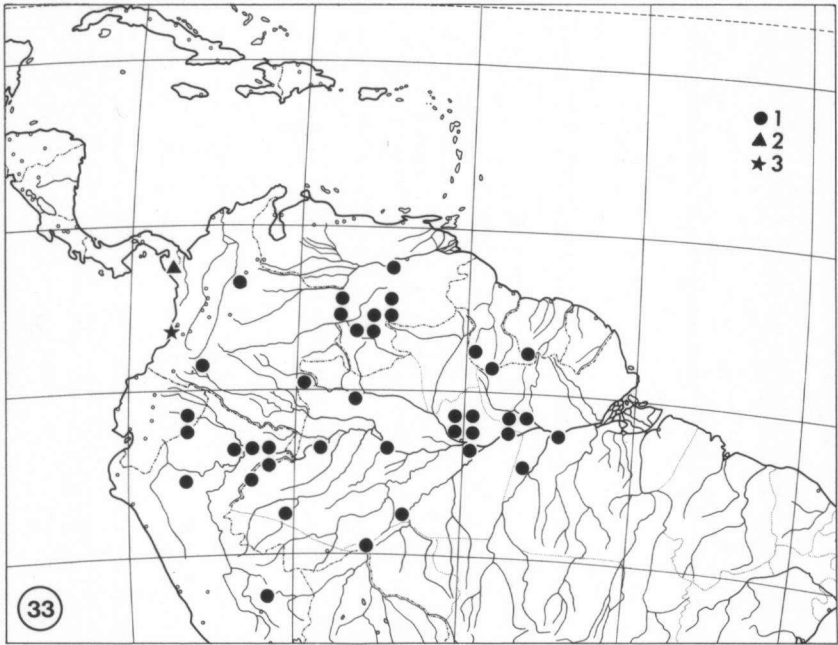
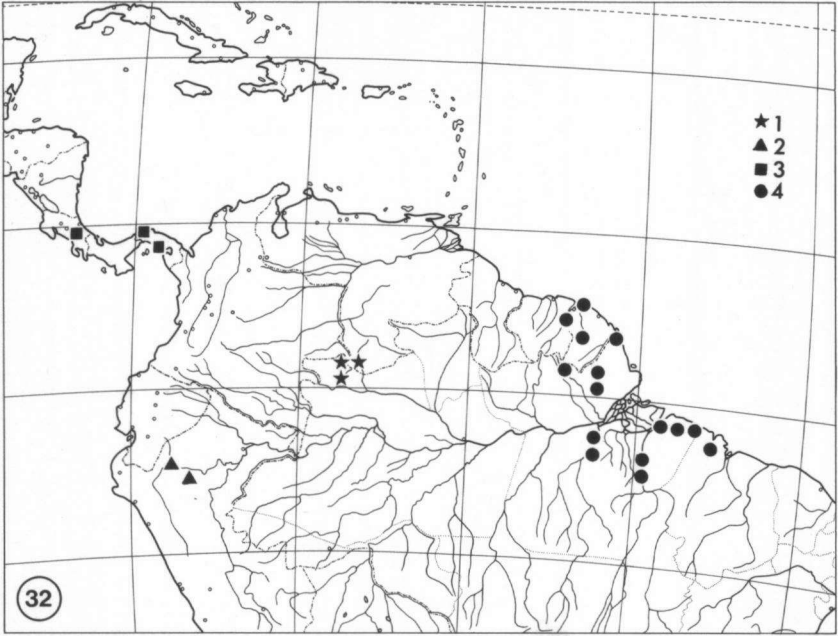


Fig. 32. Distribution of *A. angustifolia* (1), *A. pachypetala* (2), *A. panamensis* (3), and *A. prinoides* (4). —Fig. 33. Distribution of *A. brevipes* (1), *A. spec. A.* (2), and *A. spec. B.* (3).

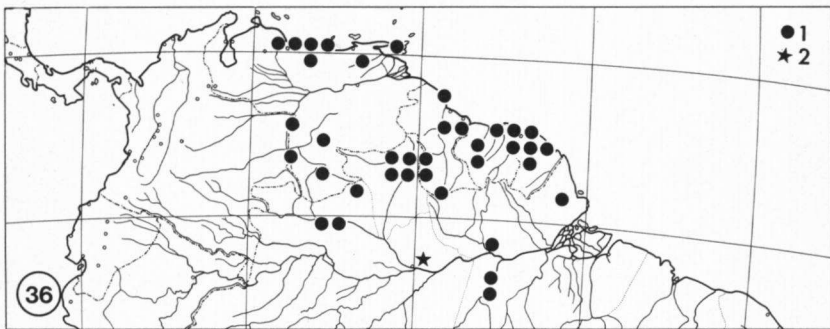
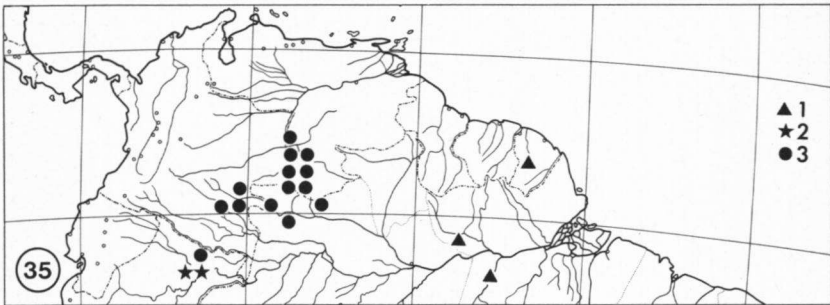
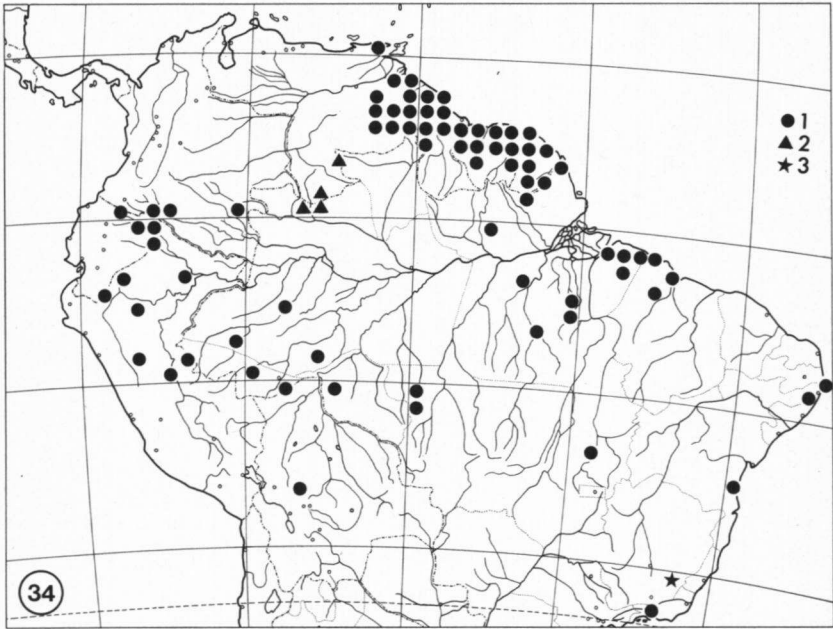


Fig. 34. Distribution of *A. dolichocarpa* (1), *A. gigantophylla* (2), and *A. silvatica* (3). —  
 Fig. 35. Distribution of *A. brevipedicellata* (1), *A. floribunda* (2), and *A. rufa* (3). — Fig.  
 36. Distribution of *A. acuminata* (1) and *A. manausensis* (2).

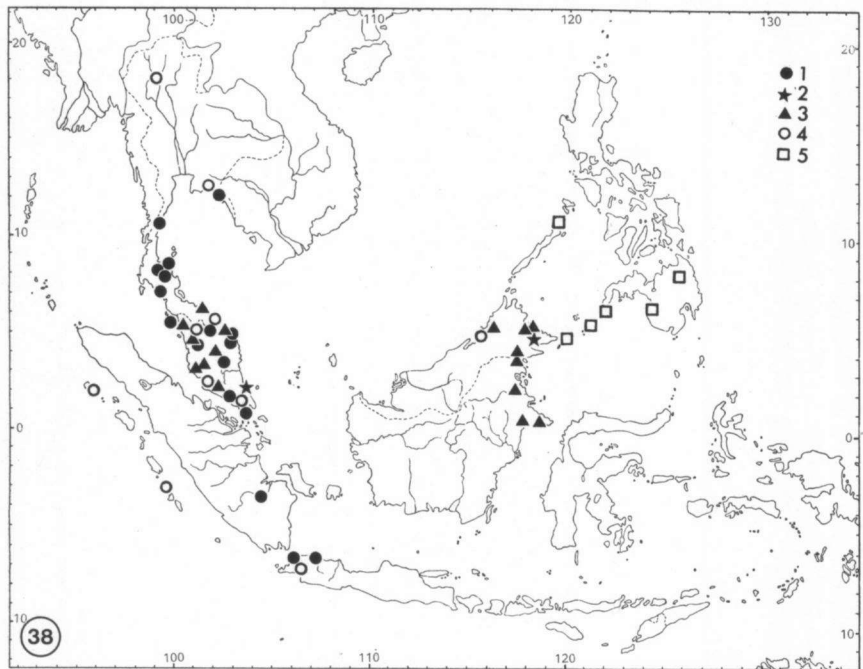
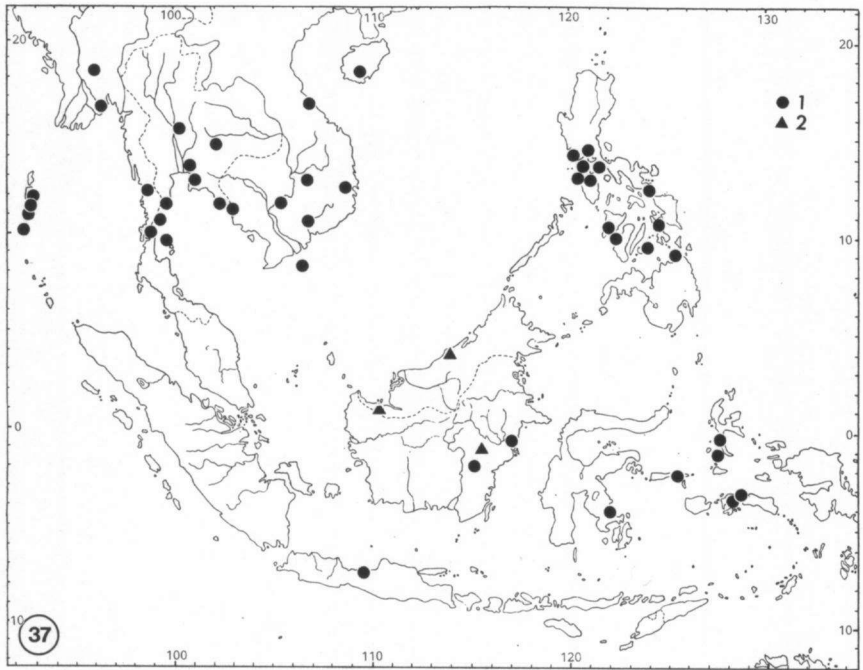


Fig. 37. Distribution of *A. luzonensis* (1) *A. borneensis* (2). — Fig. 38. Distribution of *A. javanica* var. *javanica* (1), var. *dipetala* (2), var. *tripetala* (3), and var. *indet.* (4) and *A. radiata* (5).

## 15. Excluded Names

*Anaxagorea meyeriana* Zoll., *Linnaea* 29: 323. 1857—1858. — Type: *Zollinger Hb. 710*. Indonesia. Java: Tjikadu near the border of Tjikoya, 9 Oct 1842, fl (type collection not located).

The collection mentioned above could not be traced. However, from the brief diagnosis: "Plantae totius imprimis foliorum villositate densissima a praecedente [*A. javanica* Blume] differt", it becomes sufficiently clear that this taxon could hardly ("villositate densissima"! ) belong to *Anaxagorea*.

*Anaxagorea sumatrana* Miq., *Fl. Ned. Ind. Eerste bijv.* 382. 1861. — Type: *Teysmann HB 4383*. Indonesia. Sumatra: Lampong, near Tega-nennis, fl (holotype, U),

= *Cyathostemma sumatrana* (Miq.) Boerl., *Icon. bogor.* 1: 171. t. 58. 1899.

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For this study, material of the following herbaria was investigated: A, B, BM, BR, C, CAY, COL, CR, DUKE, E, ECON, F, FHO, G, GB, GOET, HBG, IJ, INPA, K, L, LE, LIL, M, MG, MICH, MO, MY, NY OXF, P, RB, S, SP, TRIN, U, UC, UG (consistently used for BRG), US, VEN, W, WAG, WIS, WU, Z.

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Address of the authors:

P. J. M. MAAS & L. Y. Th. WESTRA, Institute of Systematic Botany, University of Utrecht, Heidelberglaan 2, NL-3508 TC Utrecht, The Netherlands.

### Numerical list of taxa

- |  |   |
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| 1. <i>Anaxagorea acuminata</i> (Dunal)<br>A. DC. | 15. <i>A. panamensis</i> Standley                 |
| 2. <i>A. allenii</i> R.E. Fries                  | 16. <i>A. petiolata</i> R.E. Fries                |
| 3. <i>A. angustifolia</i> Timmerman              | 17. <i>A. phaeocarpa</i> Martius                  |
| 4. <i>A. brachycarpa</i> R.E. Fries              | 18. <i>A. prinoides</i> (Dunal) A. DC.            |
| 5. <i>A. brevipedicellata</i> Timmerman          | 19. <i>A. rufa</i> Timmerman                      |
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| 7. <i>A. crassipetala</i> Hemsley                | 21. <i>A. spec. A</i>                             |
| 8. <i>A. dolichocarpa</i> Sprague & Sandwith     | 22. <i>A. spec. B</i>                             |
| 9. <i>A. floribunda</i> Timmerman                | 23. <i>A. borneensis</i> (Beccari) James Sinclair |
| 10. <i>A. gigantophylla</i> R.E. Fries           | 24. <i>A. javanica</i> Blume                      |
| 11. <i>A. guatemalensis</i> Standley             | a. var. <i>javanica</i>                           |
| 12. <i>A. macrantha</i> R.E. Fries               | b. var. <i>tripetala</i> Corner                   |
| 13. <i>A. manausensis</i> Timmerman              | c. var. <i>dipetala</i> Corner                    |
| 14. <i>A. pachypetala</i> (Diels) R.E. Fries     | 25. <i>A. luzonensis</i> A. Gray                  |
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Note 1: Co-collectors who, at one time or another, cooperated in a given collector's number series, are mostly not mentioned separately. Instead, in such cases the principal collector with the addition *et al.* is listed. Thus, for instance, entries like *Maguire et al.* or *Steyermark et al.* may include both collections made by *Maguire* or *Steyermark* alone and collections together with one or more other collectors.

Note 2: This index also includes a few collections not seen in the course of the taxonomical study, but preparations of which were used in anatomical or karyological investigations. These are listed together with a reference to the respective chapter.

Note 3: The figures in parentheses refer to the number assigned to each taxon, which are arranged numerically in the preceding list.

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