

Taxonomic synopsis of *Anomospermum* (Menispermaceae) in the Brazilian Amazon

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ABSTRACT

Anomospermum comprises nine species and five subspecies distributed from Central to South America. This work consists of a synoptic treatment for the genus *Anomospermum* in the Brazilian Amazon and involved the analysis of field collections from 21 expeditions (between January 2020 and December 2022), types and botanical specimens from 32 Brazilian and foreign herbaria. In Brazil, Amazonia is the main center of diversity for the genus. The genus is represented in the Brazilian Amazon by eight species, two of them with three subspecies. Amazonas state was the most representative with seven *taxa*. Two new occurrences were found, one for Pará state (*A. chloranthum* subsp. *chloranthum*) and another for Amapá state (*A. matogrossense*). *Anomospermum reticulatum* subsp. *reticulatum* is the most common and widely distributed species of the genus in the Brazilian Amazon region. An identification key for *taxa* of the Brazilian Amazon, descriptions, illustrations, distribution data, and additional comments for each species are provided.

KEYWORDS: Anomospermeae, botany, Menispermaceae, Ranunculales, taxonomy

Sinopse taxonômica de *Anomospermum* (Menispermaceae) na Amazônia brasileira

RESUMO

Anomospermum é composto por nove espécies e cinco subespécies, distribuídas desde a América Central até a América do Sul. Este trabalho consiste no tratamento sinóptico do gênero *Anomospermum* na Amazônia brasileira e envolveu a análise de coleções de campo de 21 expedições (entre janeiro 2020 e dezembro 2022), tipos e espécimes botânicos de 32 herbários brasileiros e estrangeiros. No Brasil, a Amazônia é o principal centro de diversidade do gênero. O gênero está representado na Amazônia brasileira por oito espécies, duas delas com três subespécies. O estado do Amazonas foi o mais representativo, com sete *taxa*. Duas novas ocorrências foram encontradas, uma para o estado do Pará (*A. chloranthum* subsp. *chloranthum*) e outra para o estado do Amapá (*A. matogrossense*). *Anomospermum reticulatum* subsp. *reticulatum* é a espécie mais comum e amplamente distribuída na região amazônica. São apresentadas uma chave de identificação para os *taxa* da Amazônia brasileira, descrições e ilustrações das espécies, bem como dados adicionais sobre distribuição geográfica e comentários sobre as mesmas.

PALAVRAS-CHAVE: Anomospermeae, botânica, Menispermaceae, Ranunculales, taxonomia

INTRODUCTION

Anomospermum is a neotropical genus of Menispermaceae with nine species and five subspecies, distributed from Nicaragua to Brazil and Bolivia, including Venezuela, French Guiana, Guyana, Colombia, Ecuador, and Peru (MBG 2023; Ortiz 2022). The genus was described by Miers in 1851 based on fruit and seed characters, recognized by the endocarp and endosperm in falciform shape, condyle horizontal to the longitudinal axis of the seed (ventral intrusion), and curved embryo in the distal region (Sousa 2016). The genus is positioned in the tribe Anomospermeae Miers, within subfamily Menispermaceae Wang & Chen (Ortiz *et al.*

2016; Sousa 2016). The tribe Anomospermeae comprises 13 genera and 80 species distributed in South and Central America, Indo-Malasia, New Caledonia, Australia, and East Asia (Ortiz *et al.* 2016).

In Brazil, the genus is represented by eight species (one endemic: *A. matogrossense*) and five subspecies, which are distributed in the north (all states), northeast (Bahia), mid-west (Mato Grosso and Mato Grosso do Sul), southeast (Espírito Santo, Rio de Janeiro and São Paulo), and south (Paraná) of the country, and occur in the Amazon, Cerrado, and Atlantic Forest phytogeographic domains (Teixeira and Amorim 2012; BFG 2022; CRIA 2023). Species of the genus

can occur together in cerrado savanna (*sensu lato*), gallery or riverine forest, floodplain forest, *terra firme* forest, and sandy coastal vegetation (BFG 2022).

Their representatives are popularly known in northern Brazil as *cipó-gogó*, *gogó-de-guariba* and *olho-de-guariba*, among other names (Sousa 2016). Some species of the genus, such as *A. grandifolium* Eichler, are used in the preparation of curare, mainly in western Amazonia (Bisset 1992). Curare is a paralyzing poison traditionally used by some indigenous peoples of tropical forests on arrows and darts to hunt (Ortiz *et al.* 2007).

Within Brazil, Amazonia is considered the center of species diversity for the genus (Sousa 2016). Studies on *Anomospermum* include taxonomic treatments of local floras and protected areas (Sothers *et al.* 1999; Teixeira and Amorim 2012), which generally include only a few species (Sousa 2016). Leaf blade shape, type of indument, venation and drupes are the main characters used to separate *Anomospermum* species in Brazil (Sousa 2016). Yet, the morphological delimitation in this genus is very complex, resulting in confusion among species and with other genera, with the genus commonly being misidentified as *Orthomene*.

The objective of this study was to produce a taxonomic treatment of *Anomospermum* in the Brazilian Amazon based on an extensive collection effort, to better delimit the species and advance what is known about the genus in the Neotropics.

MATERIAL AND METHODS

The study was based on type material and 150 additional specimens of *Anomospermum* in the following herbaria: BM, G, HERBAM, HRB, M, MG, MIRR, MO, IAN, INPA, K, L, NY, R, RB, RON, S, SLUI, UB, UEC and UFMT (acronyms according to Thiers 2024, continuously updated). We also conducted field trips between January 2020 and December 2022 (21 expeditions) in order to collect fertile specimens in the Brazilian Amazon (states of Acre, Amapá, Amazonas, Maranhão, Mato Grosso, Pará, Rondônia, Roraima and Tocantins), both in the rainy and dry seasons.

The samples were examined at the Taxonomy Laboratory (Labtax) at Museu Paraense Emílio Goeldi (MPEG), using the classic methods used in plant taxonomy, such as dissection, measurement, illustration of vegetative and reproductive parts, description and comments. Morphological terms followed Hickey (1973) for venation, Weberling (1992) for flowers, Barroso *et al.* (1999) for fruit and Harris and Harris (2001) for leaves. Species identification is based on examination of types, keys, and the literature. The species descriptions are based on the material studied. The illustrations were made based on herborized material, the details of which were examined with a Zeiss stereomicroscope equipped with a low-light camera, followed by complementation in ink. For the specimens cited,

the following abbreviations are used: fl. (flower), fr. (fruit), n.v. (not viewed), s.n. (without collection number).

RESULTS

Anomospermum Miers, Annals and Magazine of Natural History, ser. 2, 7: 36, 39.1851. **Type species:** *Anomospermum nitidum* Miers

Liana, 0.2–3.8 cm diam. Leaves alternate, basifixed; venation basal and/or suprabasal; primary vein(s) 1 slightly carinate or 3–5 convex on the abaxial surface; petiole cylindrical, with or without swollen pulvinus. Inflorescences in panicles, simple racemes, thyse or solitary flower, axillary or supraxillary, cauliflorous. Flowers unisexual in dioecious plants, dichlamydeous; sepals 6–9, biseriate or triseriate; petals 6, larger than stamens, completely involute, forming a pseudodisc around each stamen. Staminate flowers with stamens free or connate at basal insertion; anther dehiscence collateral, longitudinal or transverse. Pistillate flowers with one ovule per carpel; stigma apical. Drupes solitary, in pairs or grouped in threes in an infructescences; style scar subapical; epicarp coriaceous; mesocarp mucilaginous; endocarp with falciform shape, crustaceous, woody or bone, externally marked on each side by a falciform shape groove, joined by a network of thin ribs perpendicular to its length, longitudinally foveolate or not; endosperm ruminant, falciform shape; condyle lamellar, horizontal to the longitudinal axis of the seed; embryo curved in the distal region.

Remarks: *Anomospermum* is represented by nine species and five subspecies, distributed in Central America (Nicaragua, Costa Rica and Panama) and South America: Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru and Venezuela (Ortiz 2022; MBG 2023). In Brazil, the genus is represented by eight species and five subspecies distributed in the northern region and in some states of the mid-west region (Mato Grosso and Mato Grosso do Sul) and southeastern region, in the states of Rio de Janeiro and São Paulo (Teixeira and Amorim 2012; BFG 2022).

Identification key to *Anomospermum* species in the Brazilian Amazon

1. Leaves with primary vein(s) 1 or 3
2. Leaf blade oblong or oblanceolate; primary vein 1–peninervia; venation brochidodromous and/or eucamptodromous *A. andersonii*
- 2'. Leaf blade elliptic, lanceolate, obovate, orbicular, ovate or suborbicular; primary veins 3–palmatinerved or plinerved; venation basal and/or suprabasal actinodromous
3. Venation basal actinodromous, primary veins palmatinerved
4. Petiole strigose; abaxial surface of leaf blade strigose; tertiary veins with areolae 0.3–0.7 mm diam.; petals 0.6–2.9 mm

- wide; drupes obovoid or globose
..... *A. reticulatum* subsp. *reticulatum*
- 4'. Petiole glabrous; abaxial surface of leaf blade sparsely pubescent only on the proximal region of the midrib; tertiary veins with areolae 1–2 mm diam.; petals 0.3–0.5 mm wide; drupes ellipsoid or oblongoid
..... *A. reticulatum* subsp. *dielsianum*
- 3'. Venation suprabasal actinodromous, primary veins plinerved
5. Rhytidome yellowish; pulvini apical and basal not swollen; leaf blade ovate, apex acute or attenuate
..... *A. matogrossense*
- 5'. Rhytidome greenish brown; pulvini apical and basal conspicuously swollen; leaf blade elliptic, obovate, orbicular or suborbicular, apex acuminate
..... *A. chlorantum* subsp. *chlorantum*
- 1'. Leaves with primary veins 5
6. Bracts deltoid, subulate, lanceolate or orbicular; petals cuculate, spatulate, oblanceolate or obovate; endocarp bone, externally foveolate
7. Rhytidome pulverulent; leaf blade concolor, adaxial surface glabrous; inflorescences in thyse; floral rachis with velutinous tufts; bracts subulate, lanceolate or orbicular; sepals 6, biseriate; petals spatulate or oblanceolate, densely sericeous
..... *A. solimoesanum*
- 7'. Rhytidome not pulverulent; leaf blade discolor, sericeous on the primary veins of the adaxial surface; inflorescences in simple racemes or panicles; floral rachis puberulent; bracts deltoid; sepals 9, triseriate; petals cuculate or obovate, glabrous
..... *A. steyermarkii*
- 6'. Bracts elliptic or oval; petals obdeltoid or oblong; endocarp woody, not foveolate externally
8. Rhytidome glabrous, with sparse and inconspicuous lenticels; leaf blade concolor, glabrous on both surfaces, apex acute or acuminate; internal sepals sericeous internally; anthers transversely dehiscent; drupes sparsely strigose
..... *A. grandifolium*
- 8'. Rhytidome sericeous, with dense and prominent lenticels; leaf blade discolor, sparsely sericeous on the primary veins of the adaxial surface and densely sericeous on the abaxial surface, apex cuspidate; internal sepals glabrous internally; anthers longitudinally dehiscent; drupes sericeous *A. bolivianum*

Anomospermum andersonii Krukoff, *Phytologia*, 41: 250–251, 1979.

Type: BRAZIL. Pará. Bacia do alto rio Tapajós, rio Cururú. Acima de Prataí, floresta ripária, 12 Feb. 1974, fr., W.R. Anderson 10861 (holotype: NY320480!; isotype: IAN147272!).

Figure 1a–c

Liana, 0.2–0.7 cm diam.; rhytidome brown, smooth, glabrous. Petiole 0.5–9 × 0.1–0.3 cm, glabrous, with only the swollen apical pulvini. Leaf blade 7.1–30.2 × 2–9.6 cm, oblong or oblanceolate, chartaceous, concolor, flat, glabrous on both surfaces; apex acuminate or attenuate; base entire, cuneate or obtuse; margin entire, rectilinear, not ciliate. Venation brochidodromous and/or eucamptodromous; primary vein 1–peninervia, crenate on the abaxial surface; secondary veins 6–11, prominent on both surfaces; tertiary veins reticulate, inconspicuous on adaxial surface. Inflorescences and flowers not seen. Drupes 3.7–4.5 × 1.9–2.5 cm, oblongoid, greenish, glabrous, apex and base obtuse; endocarp woody, not externally foveolate.

Material examined: See Supplementary Material (Appendix S1).

Distribution and habitat: The species is distributed in Peru, Bolivia and Brazil (Krukoff 1979; MBG 2023). In the Brazilian Amazon, the subspecies is distributed in the states of Amazonas and Pará (BFG 2022). According to BFG (2022), the species occurs only in terra firme forest, but in the analyzed samples it was also found to occur in riparian forest.

Remarks: The species treated here proved to be quite atypical and without affinity with the other taxa of *Anomospermum* occurring in Brazil, being clearly recognized for being the only one of the genus to have oblong or oblanceolate leaves (about three to five times longer than wide), peninervias and eucamptodromous to/or brochidodromous venation (Figure 1a).

Anomospermum reticulatum (Mart.) Eichler subsp. *reticulatum*, *Flora* 47(25): 388. 1864. *Cocculus reticulatus* Mart., *Flora* 24(2, Beibl. 2): 44. 1841.

Type: BRAZIL. Amazonas. Rio Negro, Silvís Japurensibus, 01 Dec. 1819, fl., C.F.P. Von Martius 3027 (holotype: M–0239783 [digital image]!; isotypes: NY 00320544!, NY 00320545!).

Figure 1d–l

Liana, 2–3 cm diam.; rhytidome brown or greyish, fissured, strigose. Petiole 9–48 × 0.5–1.9 mm, strigose. Leaf blade 4.1–12 × 1.5–5.2 cm, elliptic, lanceolate or obovate, chartaceous to subcoriaceous, flat, adaxial surface glabrescent, abaxial surface strigose; apex acuminate, attenuate or acute; base cuneate, obtuse or rounded. Venation basal actinodromous, primary veins 3–palmate inerved; secondary veins 3–6, prominent on the abaxial surface; tertiary veins forming polygonal areolae 0.3–0.7 mm diam., prominent on adaxial surface. Inflorescences in botryum, simple racemes or panicles, supraxillary. Bracts 0.5–1.1 × 0.6–1 mm, oval or deltoid, strigose. Staminate flowers with yellowish perianth; sepals 6, verticillate, biseriate, 0.5–4.4 × 0.5–4.4 mm; external sepals deltoid or oval, strigose; internal sepals elliptic or orbicular, only one cuculate, strigose; petals 0.6–2.7 × 0.6–2.9 mm, involute, obdeltoid or oblong, glabrous; stamens free or connate, glabrous, anthers longitudinally or collaterally dehiscent.

Pistillate flowers with yellowish perianth; sepals 6, verticillate, biseriate, 0.5–4.8 × 0.5–4.8 mm; external sepals deltoid or oval, strigose; internal sepals elliptic or orbicular, only one cuculate, glabrous; petals 0.6–2.9 × 0.6–2.9 mm, obdeltoid or oblong, glabrous; staminodes 0.9–2.4 mm long, linear, glabrous; ovary 1–2.4 mm long, ellipsoid, glabrous. Drupes 2–4.6 × 1.1–3.4 cm, obovoid or globose, yellow to orangish, glabrous or pubescent; apex obtuse to rounded, base obtuse or asymmetric; endocarp crustose or woody, externally foveolate or not.

Material examined: See Supplementary Material (Appendix S1).

Distribution and habitat: A widely distributed subspecies, occurring from Central America (Nicaragua, Costa Rica, and Panama) to South America (Colombia, Venezuela, Ecuador, Peru, Bolivia, and Brazil) (Barneby and Krukoff 1971; MBG 2023; CRIA 2023). In the Brazilian Amazon, the subspecies is

distributed in Acre, Amazonas, Pará, Rondônia, Roraima and Mato Grosso states (MBG 2023; CRIA 2023), and occurs in terra firme, floodplain, riparian, seasonal and dense ombrophilous forests (BFG 2022).

Remarks: *Anomospermum reticulatum* subsp. *reticulatum* differs from *A. reticulatum* subsp. *dielsianum* mainly by the size of the areoles of the tertiary veins (0.3–0.7 mm diameter), strigose petioles, petals 0.6–2.9 mm wide and obovoid or globose fruits (vs. areoles 1–1.5 mm diameter, glabrous petiole, petals 0.3–0.5 mm wide and ellipsoid or oblongoid fruits) (Figures 1d–l; 2a–f).

Anomospermum reticulatum* subsp. *dielsianum (Moldenke) Krukoff & Barneby, *Memoirs of The New York Botanical Garden* 22(2): 74. 1971.

Figure 2a–f

Anomospermum dielsianum Moldenke, *Brittonia* 3(1): 37–38. 1938.

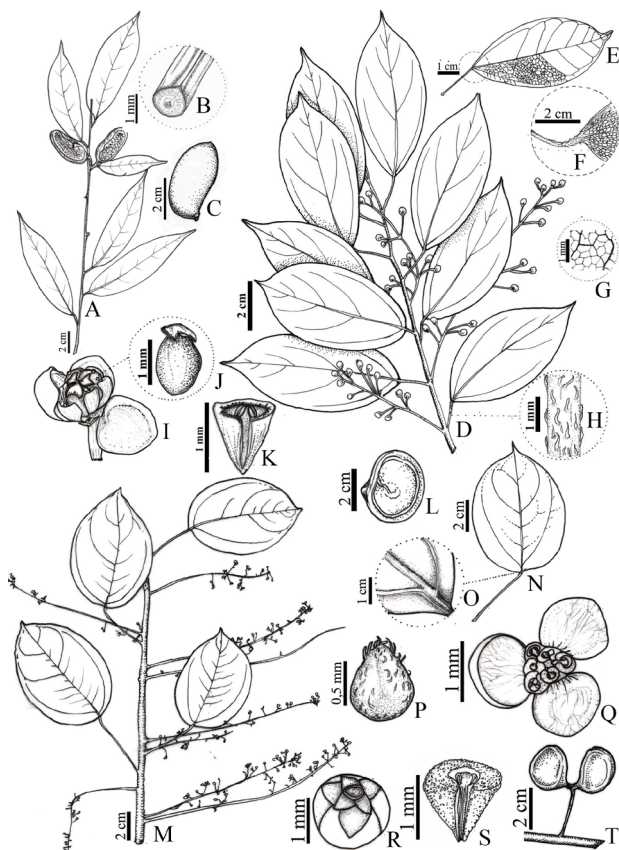


Figure 1. *Anomospermum andersonii* Krukoff (Anderson 10861 – NY): **A** – fruiting branch; **B** – detail of carenate main rib; **C** – drupe. *Anomospermum reticulatum* subsp. *reticulatum* (Amaral et al. 450 – INPA, Prance et al. 6580 – NY, Rodrigues & Lima 2488 – INPA): **D** – flowering branch; **E** – leaf; **F** – detail of leaf base showing the basal actinodromous venation; **G** – areoles of the tertiary veins; **H** – detail of strigose petiole; **I** – pistillate flower; **J** – carpel; **K** – involute petal and stamen; **L** – drupe in longitudinal section showing the condyle lamellar. *Anomospermum chloranthum* subsp. *chloranthum* (Daly et al. 5097 – NY, Monteiro & J. Ramos 789 – INPA): **M** – flowering branch; **N** – leaf; **O** – detail of leaf base showing the suprabasal actinodromous venation; **P** – bract; **Q** – staminate flower; **R** – flower bud; **S** – involute petal and stamen; **T** – drupes. Credit: Julio Sousa and Carlos Alvarez.

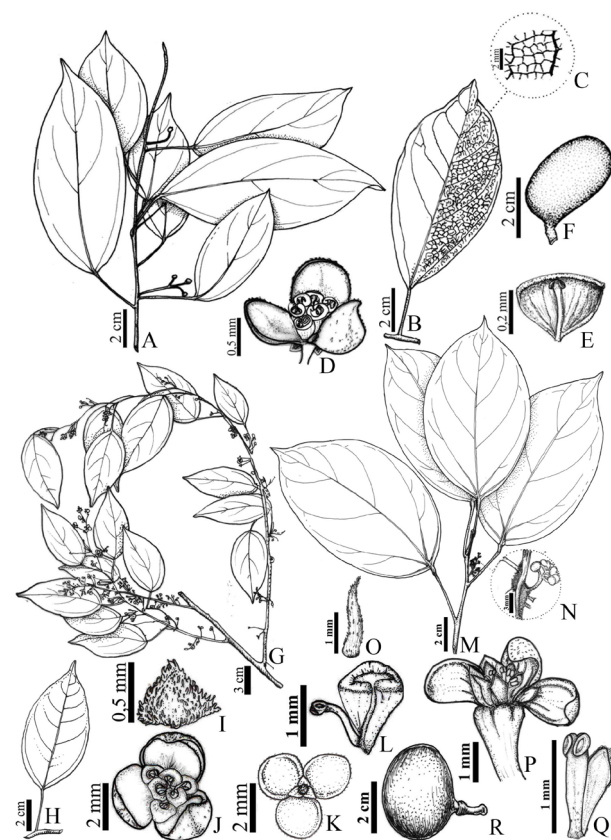


Figure 2. *Anomospermum reticulatum* subsp. *dielsianum* (Prance et al. 12562 – MG, Fróes 12467 – NY): **A** – flowering branch; **B** – leaf; **C** – areoles of the tertiary veins; **D** – staminate flower; **E** – petal and stamen; **F** – drupe. *Anomospermum matogrossense* (Maguire et al. 56807 – NY): **G** – flowering branch; **H** – leaf; **I** – bract; **J** – staminate flower; **K** – biseriate sepals; **L** – involute petal and stamen. *Anomospermum solimoesanum* (Prance et al. 5366 – MG, Ribeiro et al. 1619 – INPA): **M** – flowering branch; **N** – detail of floral rachis with velutinous tufts; **O** – bract; **P** – staminate flower; **Q** – petal and stamen; **R** – drupe. Credit: Julio Sousa and Carlos Alvarez.

Type: BRAZIL. Amazonas, São Paulo de Olivença, bacia do rio Solimões, 26 Oct. to 11 Dec. 1936, fl., *B.A. Krukoff 9045* (holotype: NY 320488!; isotype: 320489!)

Liana, 1.9–3 cm diam.; rhytidome brown, fissured, glabrous. Petiole 1.7–3 × 0.8–2.5 mm, glabrous. Leaf blade 8.8–10.9 × 3.9–5.3 cm, elliptic or obovate, coriaceous, flat, adaxial surface glabrous, pubescent only in the proximal region of the midrib on the abaxial surface; apex acuminate or attenuate; base cuneate. Venation basal actinodromous, primary veins 3–palmatinerved; secondary veins 3–5, prominent on the abaxial surface; tertiary veins reticulate, forming polygonal areolae 1–2 mm diam., prominent on adaxial surface. Inflorescences in simple racemes, panicles or solitary flower, supraxillary. Bracts 0.4–1.2 × 0.5–1 mm, oval or deltoid, sparsely strigose or sericeous. Staminate flowers with greenish to yellowish perianth; sepals 6, verticillate, biseriate, 0.3–4.5 × 0.2–4.5 mm; external sepals deltoid or oval, strigose; internal sepals orbicular or elliptic, only one cuculate, strigose mainly in the dorsal region and on the margins; petals 0.7–1.5 × 0.3–0.5 mm, obdeltoid or oblong, glabrous; stamens free or connate, glabrous, anthers longitudinally dehiscent. Pistillate flowers absent. Drupes 2.1–3.5 × 1.6–2.1 cm, ellipsoid or oblongoid, yellow, glabrous; apex obtuse to rounded, base obtuse or asymmetric; endocarp woody, not externally foveolate.

Material examined: See Supplementary Material (Appendix S1).

Distribution: The subspecies is distributed in Colombia, Peru and Brazil, where it is registered in the states of Acre, Amazonas and Rondônia (Barneby and Krukoff 1971; MBG 2023; BFG 2022).

Remarks: *Anomospermum reticulatum* subsp. *dielsianum* is common in clayey soils of primary and secondary forests. Check the description above of *Anomospermum reticulatum* subsp. *reticulatum* for further differences (Figures 1d–l; 2a–f).

Anomospermum matogrossense Krukoff & Barneby, *Memoirs of The New York Botanical Garden* 20(2): 33. 1970.

Type: BRAZIL. Mato Grosso. 20 km a leste de Vilhena, floresta de terra firme, 24 Sep. 1963, fl., *B. Maguire et al. 56807* (isotypes: NY 320496!, IAN 126559!).

Figure 2g–l

Liana, 1.1–2 cm diam.; rhytidome yellowish, fissured, glabrous. Petiole 11–24 × 0.5–1.5 mm, strigose; pulvini apical and basal not swollen. Leaf blade 4–12.6 × 2.5–6 cm, ovate, chartaceous, flat, strigose only on the midrib of the adaxial surface, glabrous or sparsely strigose on the abaxial surface; apex acute or attenuate; base cuneate. Venation suprabasal actinodromous, primary veins 3–plinerved; secondary veins 3–5, flat on the abaxial surface; tertiary veins scalariform, inconspicuous on the adaxial surface. Inflorescences in simple racemes or solitary flower, supraxillary, cauliflorous. Bracts 0.5–0.9 × 0.5–1 mm, oval or deltoid, pubescent.

Staminate flowers with greenish to yellowish perianth; sepals 6, verticillate, biseriate, 0.8–4.5 × 0.7–3.5 mm; external sepals deltoid or oval, strigose; internal sepals suborbicular or elliptic, not cuculate, strigose; petals 0.5–2.5 × 0.5–1.8 mm, obdeltoid or obovate, glabrous; stamens free, glabrous, anthers longitudinally dehiscent. Pistillate flowers and fruits not seen.

Material examined: See Supplementary Material (Appendix S1).

Distribution and habitat: *Anomospermum matogrossense* is endemic to Brazil, distributed in Pará and Mato Grosso states (MBG 2023; BFG 2022), in terra firme forest, contrasting with BFG (2022), which also indicates its occurrence in riparian or gallery forest, lowland forest and seasonal perennial forest.

Remarks: In Brazil, the species is easily recognized in the field, as it is the only one of the genus which has a yellowish rhytidome (Figure 2g–l).

Anomospermum chloranthum Diels subsp. *chloranthum*, *Notizblatt des Königlichen botanischen Gartens und Museums zu Berlin* 6(54): 132–133. 1914.

Type: —BRAZIL. Acre. Bacia do Rio Purus, seringal São Francisco, Aug. 1911, fl., *Ule 9388* (holotype B–100248752 [digital image]!; isotypes: MO 1014697!, K–000485632 [digital image]!, G–00356370 [digital image]!, L–0038477 [digital image]!). Figure 1m–t

Liana, 0.9–22 cm diam.; rhytidome greenish brown, fissured, glabrous; sapwood yellowish, with white streaks. Petiole 16–59 × 0.5–2 mm, glabrous, with conspicuously swollen apical and basal pulvini. Leaf blade 4.4–11.2 × 2.1–5.9 cm, elliptic, obovate, orbicular or suborbicular, chartaceous to subchartaceous, concolor, flat, glabrous on adaxial surface, glabrous to sparsely strigose on the primary veins of abaxial surface; apex acuminate; base cuneate, obtuse or rounded; margin entire, rectilinear, not ciliate. Venation suprabasal actinodromous; primary veins 3–plinerved, convex on the abaxial surface; secondary veins 2–4, superficial or prominent on abaxial surface; tertiary veins reticulate (areoles 0.1–0.4 mm diam.), superficial on adaxial surface. Inflorescences simple racemes or panicles, axillary or supra-axillary, cauliflorous. Bracts 0.5–1 × 0.7–0.9 mm, deltoid, elliptic to oval, strigose. Staminate flowers with orangish perianth; sepals 6–9, biseriate or triseriate, 0.4–4.5 × 0.4–3.8 mm; external sepals deltoid, oval or elliptic, sparsely strigose; internal sepals deltoid, elliptic, oval or suborbicular, not cuculate, glabrous; petals 0.8–2.5 × 1.8–3 mm, obdeltoid or obovate, densely papillose; stamens free, papillose, anthers with longitudinal or collateral dehiscence. Pistillate flowers not seen. Drupes 1.8–3.4 × 1.3–3 cm, subglobose, yellow to orangish, glabrous, apex obtuse to rounded, base rounded, obtuse or asymmetric; endocarp crustose or woody, not externally foveolate.

Material examined: See Supplementary Material (Appendix S1).

Distribution and habitat: The subspecies is distributed in Colombia, Venezuela, French Guiana, Ecuador, Peru, Bolivia, and Brazil, where it was recorded in the states of Acre and Amazonas (MBG 2023; BFG 2022). This species is here reported for the first time for the state of Pará. According to BFG (2022), *A. chloranthums* subsp. *chloranthum* occurs in terra firme, and floodplain forests in the Brazilian Amazon.

Remarks: Regarding the cogenetic *taxa*, only *A. chloranthum* subsp. *chloranthum* and *A. steyermarkii* have nine sepals, but they are easily distinguishable, since the former subspecies has 3–plinerved main veins, reticulate tertiary veins, glabrous internal sepals and papillose stamens, differing from *A. steyermarkii*, which has 5–plinerved or palmati-plinerved main veins, scalariform tertiary veins, sparsely puberule internal sepals and glabrous stamens (Figures 1m–t; 3a–i).

Anomospermum solimoesanum (Moldenke) Krukoff & Barneby, *Memoirs of The New York Botanical Garden* 22(2): 65–66. 1971.

Figure 2m–r

Hyperbaena solimoesana Moldenke, *Phytologia* 1: 277. 1938.

Type: BRAZIL. Amazonas. São Paulo de Olivença, bacia do rio Solimões, 26 Oct.–11 Dec. 1936, floresta de terra firme, fl., *B.A. Krukoff* 8924 (isotype: NY 320587!)

Liana, 1.9–3.7 cm diam.; rhytidome reddish-brown, fissured, pulverulent, glabrous. Petiole 23–87 × 0.5–2.5 mm, glabrous. Leaf blade 7–17.9 × 3.9–7.1 cm, oval-lanceolate to elliptic, chartaceous to subcoriaceous, concolor, flat, adaxial surface glabrous, abaxial surface glabrous or sparsely strigose; apex cuspidate; base cuneate or obtuse. Venation mixed basal to suprabasal actinodromous, primary veins 3–palmati-plinerved; secondary veins 3–5, flat on the abaxial surface; tertiary veins scalariform, inconspicuous on the adaxial surface. Inflorescences in thyrses, supraxillary, cauliflorous, with velutinous tufts on the floral rachis. Bracts 1–2.8 × 0.5–1.2 mm, subulate, lanceolate or orbicular, strigose. Staminate flowers with yellowish perianth; sepals 6, biseriate, 0.5–2.5 × 0.3–1.5 mm; external sepals oblong, lanceolate or narrow-elliptic, sericeous; internal sepals orbicular or elliptic, not cuculate, sericeous; petals 0.5–1.5 × 0.25–0.7 mm, spatulate or oblanceolate, densely sericeous; stamens free, strigose at the base of the filament, anthers longitudinally dehiscent. Pistillate flowers with yellowish perianth; sepals 6, biseriate, 0.7–2.8 × 0.4–1.5 mm; external sepals oblong, lanceolate or elliptic, sericeous; internal sepals elliptic or orbicular, not cuculate, sericeous; petals 0.5–1.5 × 0.3–1 mm, spatulate or oblanceolate, densely sericeous; staminodes 0.5–2.5 mm long, linear, glabrous; ovary 0.4–2.5 mm long, ellipsoid or ovoid, glabrous to sericeous. Drupes 2.9–3.6 × 2.2–2.6 cm, ellipsoid or subglobose, yellow, glabrous; apex obtuse to rounded, base obtuse or asymmetric; endocarp bone, externally foveolate.

Material examined: See Supplementary Material (Appendix S1).

Distribution and habitat: The species is distributed in Ecuador and in the Brazilian states of Amazonas and Rondônia, occurring in terra firme, and floodplain forests

(MBG 2023; BFG 2022), however, in the present study, the species was recorded only in terra firme forest.

Remarks: Among the cogenetic *taxa* studied, *A. solimoesanum* is distinguished by being the only one to present inflorescence in thyrses, floral rachis with velutinous tufts, subulate, lanceolate or orbicular bracts and spatulate or oblanceolate petals (Figure 2m–r).

Anomospermum steyermarkii Krukoff & Barneby, *Memoirs of The New York Botanical Garden* 20(2): 30–31. 1970.

Type: BRAZIL. Amazonas. Bacia do rio Negro, 02 Dec. 1945, fl., *R.L. Fróes* 21466 (isotypes: IAN 16967!, MO 100270222!, US–2439092 [digital image]!).

Figure 3a–i

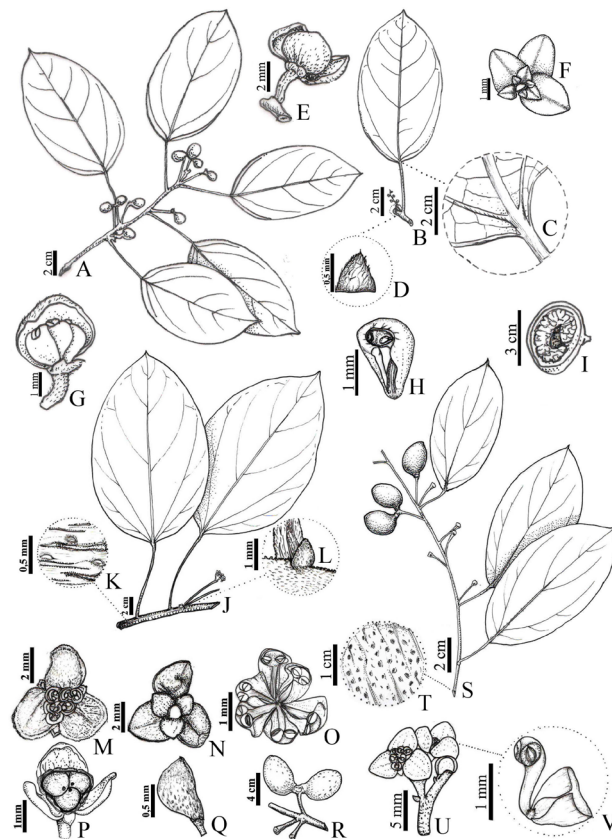


Figure 3. *Anomospermum steyermarkii* (Cid. et al. 7590 – NY, Fróes 21466 – NY, Prance et al. 10809 – NY): **A** – fruiting branch; **B** – flowering branch; **C** – detail of leaf base showing the suprabasal actinodromous venation; **D** – bract; **E** – staminate flower; **F** – triseriate sepals; **G** – dissected staminate flower showing the androecium; **H** – involute petal and stamen; **I** – drupe in longitudinal section showing the ruminated endosperm. *Anomospermum grandifolium* (Ducke 5358 – NY, Amaral et al. 281 – MG, Silveira et al. 558 – INPA): **J** – flowering branch; **K** – rhytidome with sparse lenticels; **L** – bract; **M** – staminate flower; **N** – biseriate sepals; **O** – stamens wrapped in petals; **P** – pistillate flower; **Q** – carpel; **R** – drupes. *Anomospermum bolivianum* (Prance et al. 18205 – MG, Ramos 1023 – INPA, Sperling et al. 5972 – NY): **S** – fruiting branch; **T** – rhytidome with dense lenticels; **U** – staminate flower; **V** – petal and stamen. Credit: Julio Sousa and Carlos Alvarez.

Liana, 1.1–1.9 cm diam.; rhytidome brown, fissured, not pulverulent, puberulent. Petiole 24–72 × 0.8–1.5 mm, puberulent. Leaf blade 9.7–13 × 4.5–8 cm, elliptic or ovate, coriaceous, discolor, flat, sericeous on the primary veins of the adaxial surface and on the entire abaxial surface; apex cuspidate or acuminate; base cuneate, obtuse or rounded. Venation mixed basal to suprabasal actinodromous or rare suprabasal actinodromous, primary veins 5– plinerved or palmati-plinerved; secondary veins 3–4, flat to prominent on the abaxial surface; tertiary veins scalariform, inconspicuous on the adaxial surface. Inflorescences in simple racemes or panicles, supraxillary, cauliflorous, puberulent on the floral rachis. Bracts 0.4–0.8 × 0.5–0.7 mm, deltoid, sparsely puberule. Staminate flowers with orangish perianth; sepals 9, triseriate, 0.4–3.8 × 0.4–3.4 mm; external sepals deltoid or oval, sparsely puberule; internal sepals deltoid or oval, not cuculate, sparsely puberule; petals 1.5–2 × 2–3 mm, cuculate or obovate, glabrous; stamens free, glabrous, anthers longitudinally dehiscent. Pistillate flowers with orangish perianth; sepals 9, triseriate, 0.5–4 × 0.4–3.6 mm; external sepals deltoid or oval, sparsely puberule; internal sepals deltoid or oval, not cuculate, sparsely puberule; petals 1.4–2.5 × 2–3 mm, cuculate or obovate, glabrous; staminodes 0.5–2.5 mm long, linear, glabrous; ovary 0.5–2.5 mm long, ellipsoid, glabrous. Drupes 3.5–4.1 × 2.7–3.4 cm, subglobose or obovate, orangish, glabrous; apex obtuse to rounded, base obtuse or rounded; endocarp bone, externally foveolate.

Material examined: See Supplementary Material (Appendix S1).

Distribution and habitat: *Anomospermum steyermarkii* is distributed in Venezuela, French Guiana and Brazil, where it is registered in Amapá, Amazonas, Rondônia and Roraima states (Barneby and Krukoff 1971; MBG 2023; BFG 2022). In the Brazilian Amazon, the species is restricted to terra firme forest, as also observed by Barneby (2002).

Remarks: See the description above of *A. chloranthum* subsp. *chloranthum* for comparative morphological differences (Figures 1m–t; 3a–i).

Anomospermum grandifolium Eichler; Flora 47: 388. 1864.

Type: BRAZIL. Amazonas. Entrada do rio Negro, adjacente ao rio Solimões, fl., *Spruce 1538* (syntypes: MO 103308569! MO 3295977!).

Figure 3j–r

Liana, 2–3.8 cm diam.; rhytidome brown, deeply fissured, with sparse and inconspicuous lenticels, glabrous. Petiole 4.2–15.2 × 0.1–0.3 cm, glabrous. Leaf blade 8.2–26.6 × 5.1–18.6 cm, ovate, chartaceous, concolor, flat, glabrous on both surfaces; apex acute or acuminate; base truncate, obtuse or rounded. Venation mixed basal to suprabasal actinodromous or only basal actinodromous, primary veins 5–palmatinerved or palmati-plinerved; secondary veins 2–5, prominent on the abaxial surface; tertiary veins scalariform, inconspicuous on

the adaxial surface. Inflorescences in panicles, supraxillary, cauliflorous. Bracts 1–2 × 0.7–1.8 mm, elliptic or oval, pubescent. Staminate flowers with greenish to yellowish perianth; sepals 6, biseriate, 0.8–4 × 0.7–3 mm; external sepals deltoid or oval, strigose to sericeous; internal sepals oval, not cuculate, sparsely sericeous internally and externally; petals 0.7–2.8 × 1–2.5 mm, obdeltoid or oblong, glabrous; stamens free or connate, glabrous, anthers transversely dehiscent. Pistillate flowers with yellowish perianth; sepals 6, biseriate, 1–4 × 0.8–3 mm; external sepals deltoid or oval, strigose to sericeous; internal sepals oval, sericeous; petals 0.5–3 × 0.5–2.8 mm, obdeltoid, glabrous; staminodes 0.5–2.5 mm long, linear, glabrous; ovary 0.5–2.5 mm long, ellipsoid or ovoid, glabrous. Drupes 2.3–5.3 × 1.2–4 cm, obovate or subglobose, yellow, sparsely strigose; apex obtuse to rounded, base obtuse or asymmetric; endocarp woody, not foveolate externally.

Material examined: See Supplementary Material (Appendix S1).

Distribution and habitat: *Anomospermum grandifolium* is distributed in Colombia, Venezuela, Guyana, Ecuador, Peru, Bolivia and Brazil, where it occurs in the states of Acre, Amazonas, Rondônia, Pará and Mato Grosso (MBG 2023; BFG 2022). In the present study, we found a new record for Amapá state. According to BFG (2022), *A. grandifolium* can occur in upland and floodplain forests, however, in the material examined for the Brazilian Amazon, no record of this species was found in floodplain forests.

Remarks: Among the *Anomospermum* taxa analyzed in this work, *A. grandifolium* was the only one that presented anthers with transverse dehiscence, which is a consistent character to separate it from the other species, mainly from *A. solimoesanum*, from which it is quite confused. This difficulty in separating these two species had been highlighted by Barneby and Krukoff (1971) when reporting the vegetative and fruit similarity between the two, but it also highlights the ease of differentiating them through the staminate inflorescence, which is totally different between them (Figure 3j–r).

Anomospermum bolivianum Krukoff & Moldenke ex Moldenke, Lilloa 5: 234. 1940.

Type: BOLÍVIA. Departamento de La Paz, provincia de Larecaja, Tuiuri, *Krukoff 10773* (isotype: 320481 NY!).

Figure 3s–v

Liana, 2–3.6 cm diam.; rhytidome brown, fissured, with dense and prominent lenticels, sericeous, pulverulent. Petiole 4.9–11.2 × 0.1–0.25 cm, sericeous. Leaf blade 8.1–23.6 × 4–12.2 cm, elliptic, obovate or ovate, chartaceous, discolor, flat, sparsely sericeous on the primary veins of the adaxial surface and densely sericeous on the abaxial surface; apex cuspidate; base cuneate or obtuse. Venation mixed basal to suprabasal actinodromous, primary veins 5– palmati-plinerved; secondary veins 2–4, prominent on the abaxial surface; tertiary veins scalariform, inconspicuous on the adaxial surface. Inflorescences in panicles,

supraxillary, cauliflorous. Bracts $1-2 \times 0.7-1.9$ mm, elliptic or oval, pubescent. Staminate flowers with yellowish perianth; sepals 6, biseriate, $0.8-4 \times 0.7-3$ mm; external sepals deltoid or oval, strigose to sericeous; internal sepals oval or rare suborbicular, not cuculate, sericeous externally and glabrous internally; petals $0.7-2.8 \times 1-2.5$ mm, obdeltoid or rare oblong, glabrous; stamens free or connate, glabrous, anthers longitudinally dehiscent. Pistillate flowers with yellowish perianth; sepals 6, biseriate, $1-4 \times 0.7-3$ mm; external sepals deltoid or oval, strigose to sericeous; internal sepals oval, sericeous; petals $0.5-3 \times 0.5-2.9$ mm, obdeltoid, glabrous; staminodes $0.5-2.5$ mm long, linear, glabrous; ovary $0.5-2.5$ mm long, ellipsoid, glabrous. Drupes $2.9-3.6 \times 2.2-2.6$ cm, obovate or subglobose, yellow to orangish, sericeous; apex obtuse to rounded, base obtuse or asymmetric; endocarp woody, not foveolate externally.

Material examined: See Supplementary Material (Appendix S1).

Distribution and habitat: *Anomospermum bolivianum* is distributed in Ecuador, Peru, Bolivia and Brazil (Sousa 2016; MBG 2023; BFG 2022). In the Brazilian Amazon, the species is distributed in Pará and Mato Grosso states (Sousa 2016; BFG 2022). According to BFG (2022), the species can occur in terra firme, floodplain and lowland forests, however Brazilian samples were found to occur only in terra firme forest and dense submontane ombrophilous forest.

Remarks: *Anomospermum bolivianum* can be identified even in sterile state as the sericeous rhytidome with dense and prominent lenticels are key characters to separate it from the other taxa of *Anomospermum*. When fertile, the species is easily identified, as it is the only one of the genus that has the sericeous fruit (Figure 3s-v).

DISCUSSION

Anomospermum differs from other genera of Anomospermeae by presenting the endocarp curved in falciform shape, the condyle horizontal to the longitudinal axis of the seed and the embryo curved in the distal region. Fruit characters were also used by Barneby and Krukoff (1971) to split the genus from *Orthomene* Barneby & Krukoff because it is difficult to separate these taxa using vegetative characters and staminate flowers. The latter authors clearly showed that the drupe of *Anomospermum* differs from those of *Orthomene* due to its markedly asymmetric pedicel insertion, subapical style scar, endocarp curved in falciform shape, curved embryo, and condyle located horizontally along the axis of the seed, while *Orthomene* has sub-asymmetric insertion on the pedicel, apical style scar, ellipsoid endocarp, straight embryo, and condyle located vertically along the axis of the seed (Sousa et al. 2019).

Anomospermum andersonii was collected for the first time in Amazonas in 1936 by Krukoff, who, together with Barneby, analyzed five sterile samples (Krukoff 1979), but it was only confirmed in 1979 by Krukoff, when the latter author treated fertile samples (fruit) for the first time, which had been collected by Anderson (1974) in Pará (Brazil). *Anomospermum*

solimoesanum was first described by Moldenke (1938) as *Hyperbaena solimoesana*, collected by Krukoff in São Paulo de Olivença in Amazonas state, Brazil (Barneby and Krukoff 1971). The latter authors transferred *H. solimoesana* to *Anomospermum*, establishing the combination *Anomospermum solimoesanum* (Moldenke) Krukoff & Barneby based on the characters of the fruits and flowers.

According to Krukoff and Barneby (1970), *A. steyermarkii* is similar to *A. matogrossense*, but describe the former species with a larger leaf blade with dimensions of $10-15 \times 7-10.5$ cm, 5-plinerved venation, puberulent abaxial surface and presence of nine sepals, while they cited a leaf blade size of $5-11 \times 2-6$ cm, with 3-plinerved venation, glabrous abaxial surface and presence of six sepals for *A. matogrossense*. In the material of *A. steyermarkii* analyzed in our taxonomic treatment, leaf blade size was smaller, with 9.7 cm in length and 4.5 cm in width, and we also observed leaves with a sericeous abaxial surface. In the samples of *A. matogrossense* analyzed by us, most of the observed vegetative characters were in agreement with Krukoff and Barneby (1970), differing only in the leaf apex, as we also observed an attenuated apex in addition to the acute apex described by the latter authors.

In the samples of *A. grandifolium* from Mesoamerica, Colombia, Ecuador, Peru and Bolivia treated by Ortiz (2011), the leaf blade was described with 3–5 palminerved to plinerved venation and two to three pairs of secondary veins. In our sample from Brazil, only leaves with 5 palminerved or palmatiplinerved mixed venation were observed, and the secondary veins ranged from two to five pairs.

Based on the variation in the internal and external structures of the endocarp, leaf characters and the geographic distribution, Barneby and Krukoff (1971) established five allopatric subspecies to *A. chloranthum* Diels: *A. chloranthum* subsp. *confusum*, *A. chloranthum* subsp. *asplundii*, *A. chloranthum* subsp. *isthmicola*, *A. chloranthum* subsp. *occidentale* and *A. chloranthum* subsp. *pacificum*. Yet the authors also emphasized the large number of incomplete specimens analyzed (with only one reproductive phase) and the wide range of vegetative variation found. Sousa (2016) analyzed samples of the species from the Amazon basin and separated them based on the characteristics of the leaf surface (venation and areole size) and fruits. In *A. chloranthum* subsp. *chloranthum* the venation is thickly reticulate and the endocarp is externally sculpted into two rows, while in *A. reticulatum* subsp. *reticulatum*, the areoles are polygonal and endocarp is externally sculpted into a row. According to Barneby and Krukoff (1971), the venation is used to differentiate *A. reticulatum* subsp. *dielsianum* from the other subspecies, mainly due to the size of the areolas of the tertiary veins, which vary from 1 to 1.5 mm in diameter. In our sample, the areolas reached up to 2 mm in diameter and *A. reticulatum* subsp. *dielsianum* could also be separated by the size of the petals ($0.3-0.5$ mm wide) and by the ellipsoid or oblongoid fruits.

CONCLUSIONS

Based on the analysis of the types and additional material of *Anomospermum* occurring in the Brazilian Amazon, we conclude that leaf and fruit characters differed significantly and were the main features that separate the species. Based on the analyzed collections, the best collected species in the Amazon biome are *Anomospermum reticulatum* subsp. *reticulatum*, *A. reticulatum* subsp. *dielsianum*, *A. grandifolium* and *A. bolivianum*. The discovery of new occurrences indicates that the diversity of *Anomospermum* is greater than that currently known in the Amazonia. According to our data, *Anomospermum reticulatum* subsp. *reticulatum* has the widest distribution in the Brazilian Amazon, occurring in almost all states of the region. The highest diversity center of *Anomospermum* in the region to date is the state of Amazonas, and terra firme forest is the habitat where species of the genus occur most frequently.

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SUPPLEMENTARY MATERIAL

Sousa & Gurgel. Taxonomic synopsis of *Anomospermum* (Menispermaceae) in the Brazilian Amazon.

Appendix S1. List of specimens examined for each species of *Anomospermum* treated in this synopsis.

Anomospermum andersonii Krukoff

Material examined:—BRAZIL. Amazonas: São Paulo de Olivença, floresta de terra firme, Jan. 1936, st., *B.A. Krukoff* 7565 (NY); São Paulo de Olivença, floresta de terra firme, 24 Jun. 1941, st., *R.L. Fróes* 12151 (NY). Pará: bacia do alto rio Tapajós, rio Cururu, acima de Pratati, floresta ripária, 12 Feb. 1974, fr., *Anderson, W.R.* 10861 (IAN, NY).

Anomospermum bolivianum Krukoff & Moldenke ex Moldenke

Material examined:—BRAZIL. Mato Grosso: Aripuanã, estrada de Humboldt ao aeroporto, floresta de terra firme, 08 Oct. 1973, fl. & fr., *G.T. Prance et al.* 18205 (NY, INPA, R, MO, MG); rio Aripuanã, margem da pista de pouso de Humboldt, floresta de terra firme, 10 Oct. 1973, fl. & fr., *G.T. Prance et al.* 18379 (NY, INPA, R, MO, MG, UFMT); Paranaíta, floresta de terra firme, 11 Oct. 2011, fr., *C.R.A. Soares et al.* 334146 (HERBAM); Paranaíta, floresta ombrofila densa submontana, 19 Oct. 2011, fr., *C.R.A. Soares et al.* 554365 (HERBAM). Pará: alto Tapajós, Vila Nova, próximo a cachoeira do Chacorão, floresta de terra firme, 24 Jan. 1952, fl. & fr., *J.M. Pires* 4023 (IAN); Monte Dourado, floresta de terra firme, 17 Oct. 1968, fr., *N.T. Silva* 1234 (IAN, NY); Belém, IPEAN, floresta de terra firme, 06 Jan. 1971, fl., *N.T. Silva* 3431 (IAN); Jacundá, próximo ao rio Tocantins, floresta de terra firme, 16 May 1978, fr., *M.G. Silva & R.P. Bahia* 3609 (MG, NY); cerca de 70 km de Tucuruí, na antiga BR 422, floresta de terra firme, 18-20 Nov. 1981, fr., *D.C. Daly et al.* 1412 (IAN, INPA, MG, NY); Serra dos Carajás, próximo ao AMZA, floresta de terra firme, 08 Jun. 1982, fl., *C.R. Sperling et al.* 5972 (NY); Tucuruí, PA-263, 07 Nov. 1983, fl., *J. Ramos* 1023 (INPA); Jacareacanga, floresta de terra firme, 24 Nov. 2011, fr., *C.R.A. Soares et al.* 474538 (HERBAM).

Anomospermum chloranthum Diels subsp. *chloranthum*

Material examined:—BRAZIL. Amazonas: Bacia do Rio Solimões, Tonantins, floresta de terra firme, 07 Aug. 1941, st., *R.L. Fróes* 12168 (NY); Tonantins, próximo à bacia do rio Solimões, floresta de terra firme, 11 Aug. 1941, st., *R.L. Fróes* 12180 (NY); Borba, rodovia Transamazônica, ao longo da margem do rio, floresta ripária, 09 May 1985, fr., *A. Henderson et al.* 426 (HRB, MG, NY); Manaus, estrada Manaus-Porto Velho, BR 319, km 540, floresta de terra firme, 19 Apr. 1976, fr., *O.P. Monteiro & J. Ramos* 789 (INPA, NY). Pará: Santarém, km 70 da estrada do Palhão, ramal do Caetité, floresta de terra firme, 16 Sep. 1969, fl., *M.G. da Silva & R. Souza* 2619 (MG).

Additional specimens examined:—PERU. Loreto: bacia do rio Ucayali, várzea, 16 Apr. 1987, fl., *D.C. Daly et al.* 5097 (MG, NY).

Anomospermum grandifolium Eichler

Material examined:—BRAZIL. Acre: Juruá Mirim, margem do rio Juruá, Jun. 1901, fl., *E. Ule* 5526 (MG); rio Acre, Aug. 1911, fl., *E. Ule* 9389 (MG); Cruzeiro do Sul, reserva extrativista do alto Juruá, floresta de terra firme, 10 Mar. 1992, fr., *D.C. Daly et al.* 7316 (INPA, NY); Sena Madureira, próximo a fazenda Nova Olinda, floresta de terra firme, 21 Oct. 1993, fr., *M. Silveira et al.* 558 (NY); Manoel Urbano, margem direita do rio Purus, perto do seringal Nova Olinda, 25 Nov. 1996, fr., *M. Silveira et al.* 1569 (NY); Assis Brasil, próximo ao seringal São Francisco, floresta de terra firme, 2 Mar. 1998, fr., *D.C. Daly et al.* 9830 (NY). Amapá: rio Oiapoque, ao sudoeste do rio Ingarari, floresta ripária, 18 Sep. 1960, fl., *H.S. Irwin et al.* 48358 (NY). Amazonas: São Paulo de Olivença, rio Jandiatuba, 13 Jan. 1949, fr., *R.L. Fróes* 23920 (IAN); Camatian, margem do riacho, floresta de várzea, 23 Jan. 1949, fl. & fr., *R.L. Fróes* 23957 (IAN); Camatian, floresta alta de terra firme, 25 Jan. 1949, fr., *R.L. Fróes* 24000 (IAN); Maraã, rio Japurá, margem direita, floresta de várzea, 01 Nov. 1982, fl. & fr., *I.L. Amaral et al.* 281 (INPA, MG, RB, UB); Guajará, rio Juruá, margem do igarapé Curu, próximo à comunidade Primavera, floresta ripária, 17 Mar. 2011, fr., *M.G. Bovini et al.* 3310 (RB). Mato Grosso: Aripuanã, Centro Científico de Aripuanã, 05 Sep. 1976, fl., *J.B. Andrade* 3342 (UEC). Pará: Óbidos, 03 Nov. 1919, fl., *A. Ducke* 5358 (NY, RB); rio Maicuru, próximo à pista de pouso, floresta de terra firme, 21 Jul. 1981, fr., *J.J. Strudwick et al.* 3377 (MG, NY). Rondônia: Porto Velho, margem direita do rio Madeira, 29 Aug. 1997, st., *J.P. Matos* 2908 (RON).

Anomospermum matogrossense Krukoff & Barneby

Material examined:—BRAZIL. Pará: Portel, região de Anapú, floresta de terra firme, 11 Aug. 1956, fl., *R.L. Fróes* 32948 (IAN).

Anomospermum reticulatum (Mart.) Eichler subsp. *reticulatum*

Material examined:—BRAZIL. Acre: Bujari, margem do Riozinho do Andirá, floresta ripária, 26 Dec. 2009, fr., *H. Medeiros et al.* 294 (RB); Plácido de Castro, margem do rio Abunã, floresta de várzea, 20 Mar. 2011, fr., *E.S. Leal et al.* 329 (RB); Sena Madureira, floresta de várzea, 13 Feb. 1995, fr., *D.G. Silva et al.* 31 (NY); Senador Guimard, rio Iquiri, próximo à rodovia BR-364, 05 Mar. 1997, fr., *D.C. Daly et al.* 9227 (NY, RB); idem, margem do rio Iquiri, próximo à rodovia BR-364, floresta de várzea, 19 Mar. 2011, fr., *E.S. Leal et al.* 313 (RB). Amazonas: Manaus, 01 Sep. 1945, fr., *A. Ducke* 1966 (IAN, NY); Japurá, Vila Bitencourt, margem direita do Rio Japurá, floresta de várzea, 14 Nov. 1982, fl., *I.L. Amaral et al.* 450 (INPA, MG, NY, UB); Uarini, Bacia do Rio Juruá, margem do lago Mamirauá, floresta de várzea, 16 Dec. 1993, fr., *N.A. Rosa et al.* 5644 (MG, SLUI); margem direita do rio Negro, próximo ao lago Janauari,

05. May. 1961, fr., *W. Rodrigues & J. Lima 2488* (INPA, MG). Mato Grosso: rio Juruena, margem do igarapé Chuini, 15 Jul. 1977, fl., *M.G. Silva et al. 3353* (IAN, INPA, MG, NY, RB); rio Suiá Miçu, floresta ripária, 20 Nov. 1968, fr., *R.M. Harley & R. Souza 11132* (NY). Pará: Oriximiná, margem esquerda do rio Trombetas, floresta de várzea, 09 Jul. 1980, fr., *C. A. Cid et al. 1402* (MG); Oriximiná, margem direita do lago Batata, ao norte do porto Trombetas, floresta de igapó, 24 Jul. 1980, fr., *C. A. Cid et al. 1770* (INPA, MG); planalto de Santarém, 02 Feb. 1955, fr., *R.L. Fróes 31522* (NY); rio Cuminá-mirim, Pedras, floresta de várzea, 24 May 1957, fr., *W.A. Egler 211* (MG); rio Tajapurú, margem do igarapé Pixuna, 19 Jul. 1948, fl., *G. A. Black 2963* (IAN); São Caetano de Odivelas, rio Branco, Nov. 1908, fl., *E. Ule 7702* (MG). Rondônia: distrito Jaci-Paraná, 01 Feb. 2010, fr., *V.X. Silveira 36* (RON, RB); distrito Jaci-Paraná, 25 Mar. 2010, fr., *C.B.A. Lima 59* (RON, RB); margem do rio Ji-Paraná (= rio Machado), 13 Aug. 1975, fl., *M.R. Cordeiro 531* (IAN, NY); rio Ji-Paraná, floresta de igapó, Feb. 1981, fr., *M. Goulding 44* (MG); rio Ji-Paraná, abaixo do rio Urupá, 22 Oct. 1979, fr., *J.L. Zarucchi et al. 2776* (INPA, RB); rio Ribeirão, confluência com o rio Madeira, 27 Jul. 1968, fl., *G.T. Prance et al. 6580* (MG, NY). Roraima: Caracará, margem esquerdo do Rio Branco, floresta de igapó, 23 Mar. 2012, fr., *G. Martinelli et al. 17435* (MG, MIRR, RB); Rio Univini, 25 Apr. 1974, fr., *J.M. Pires et al. s.n.* (IAN, MG, NY, RB).

Anomospermum reticulatum subsp. *dielsianum* (Moldenke) Krukoff & Barneby

Material examined:—BRAZIL. Acre: Cruzeiro do Sul, rio Moa, 8 km acima de Cachoeira Grande, floresta de terra firme, 27 Apr. 1971, fr., *G.T. Prance et al. 12562* (MG, NY);

Cruzeiro do Sul, serra do Moa, floresta de terra firme, 01 May 1971, fr., *P.J.M. Maas et al. 12708* (MG); Marechal Thaumaturgo, próximo ao rio Juruá, floresta primária de terra firme, 08 Dec. 2000, st., *D.C. Daly et al. 10506* (NY). Amazonas: bacia do rio Negro, floresta de várzea, 14 Jan. 1942, fl., *R.L. Fróes 12467* (NY); Japurá, rio Japurá, afluentes do rio Solimões, floresta secundária de terra firme, 09 Nov. 1982, fr., *C.A. Cid & J. Lima 3548* (INPA, MG, RB). Rondônia: Guajará-Mirim, Margem direita do rio Pacaás Novos, entre a primeira e a segunda cachoeira, floresta de terra firme, 18 Mar. 1978, fr., *J.U.M. Santos et al. 191* (MG).

Anomospermum solimoesanum (Moldenke) Krukoff & Barneby

Material examined:—BRAZIL. Amazonas: comunidade de Macubeta, próxima ao rio Marié, floresta de terra firme, 31 Jan. 1942, fl., *R. L. Fróes 12436* (NY); Manaus-Itacoatiara, Reserva Florestal Adolpho Ducke, floresta de vertente, 29 Apr. 1995, fr., *J.E.L.S. Ribeiro et al. 1619* (IAN, INPA, RB). Rondônia: rio Jaci Paraná, floresta de terra firme, 30 Jun. 1968, fl., *G.T. Prance et al. 5366* (INPA, MG).

Anomospermum steyermarkii Krukoff & Barneby

Material examined:—BRAZIL. Amapá: rio Amapari, cerca de 4 km da serra do Navio, Floresta de terra firme, 29 Jul. 1961, fr., *J.M. Pires et al. s.n.* (NY). Amazonas: Presidente Figueiredo, estrada da usina hidrelétrica de Balbina, próximo ao aeroporto, floresta de terra firme, 16 Jul. 1986, fr., *C.A. Cid. et al. 7590* (NY). Roraima: Amajari, próximo ao Auari, floresta de terra firme, 11 Feb. 1969, fr., *G.T. Prance et al. 9826* (INPA); rio Uraricoera, floresta de terra firme, 01 Mar. 1971., fl. & fr., *G.T. Prance et al. 10809* (INPA, MG, NY).