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## A New South Brazilian Species of *Actinostemon* (Euphorbiaceae)

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**Abstract**—A new species of *Actinostemon* is described and illustrated. *Actinostemon roselii* is mentioned only for the states of Paraná and Santa Catarina (Brazil), where it grows in riparian tropical rainforests. This species can be recognized by its conspicuous and depressed ovate bracts of the staminate cymule, foliar buds globose, staminate cymule with three or four flowers, and staminate and pistillate flowers monochlamydeous. Comments about its distribution and ecology are provided, as well as a key to identify the Brazilian species of *Actinostemon*. Based on IUCN criteria, *A. roselii* can be considered a data deficient (DD) species.

**Keywords**—*Actinostemon roselii*, Atlantic domain, Hippomaneae, IUCN, taxonomy.

*Actinostemon* Mart. ex Klotzsch, together with *Gymnanthes* Sw., has the most complex taxonomy of the Hippomaneae tribe due to poorly understood intra- and intergeneric limits. Additionally, the recognition of the species is hindered by several nomenclatural and typing problems and by homogeneity of morphological characters, especially floral features (Esser 2001, 2012; Oliveira 2014). The genus encompasses approximately 15 Neotropical species and its center of diversity is in Brazil (Esser 2012).

It is characterized by monoecious species; shrubs to small trees; leaf margins always entire and glands scattered on the abaxial surface; inflorescences racemose-cymose, thyrsoïd or rarely paniculiform, bisexual or unisexual, preceded by conspicuous basal cataphylls which are imbricate and generally striate; staminate cymules subtended by a bract which is biglandular or not; staminate and pistillate sepals reduced or absent; and carunculate seeds (Esser 2012; Eymael 2012).

As part of the ongoing review of *Gymnanthes*, the first author of this work has examined 20 collections of the new species herein described from Brazilian (ALCB, CGMS, CRI, FLOR, FUEL, FURB, HBR, ICN, MBM, and RB) and international herbaria (K, M, and Z) (acronyms according to Thiers [continuously updated]). Most specimens were identified as *Actinostemon concolor* (Spreng.) Müll. Arg., the most morphologically similar species. In this study, we discuss geographical distribution, morphological relationships, conservation status, and provide an identification key to *Actinostemon* species occurring in Brazil based on the monograph by Eymael (2012).

### TAXONOMIC TREATMENT

***Actinostemon roselii*** L. Oliveira, A. L. Melo & M. F. Sales, sp. nov.—TYPE: BRAZIL. Paraná: Tibagi, Canyon Guartelá, 12 Sep 1996 (fl), C. Giraldo s. n. (holotype: FUEL 21203!; isotype: K 001096643!).

Close to *Actinostemon concolor* (Spreng.) Müll. Arg. due to leaves distributed along the branches, blade elliptic, and fruits without appendices, however, it is markedly characterized by the size of the bracts which precede the staminate cymules (2–2.5 × 3–3.5 mm), foliar buds globose, and presence of sepals in staminate and pistillate flowers.

Shrubs to small trees 2–8 m tall, monoecious, glabrous. Branches cylindrical, lenticels ellipsoid, yellow to blackish. Foliar buds 1–2 × 1–2 mm, globose; cataphylls covering the buds, more than 1 pair (1.3–2 × 1–1.5 mm), obovate, imbricate, rigid, with brittle margins, subpersistent. Stipules caducous. Petiole 0.4–1.2 cm long, slender, cylindrical, canaliculate in the upper part, dark brown to blackish in the voucher specimens examined. Leaves alternate, regularly distributed along the branches; leaf blade 3.5–8.5 × 1.8–4.5 cm, chartaceous to slightly coriaceous, discolorous, elliptic, elliptic-spatulate, sometimes obovate, base attenuate, apex acute, sometimes rounded, margin entire, revolute; glands globose to ellipsoid, yellowish to blackish, in variable number in the blade matrix, sometimes near the base; venation strongly brochidodromous, secondary veins subpatent, slightly turned to the apex. Inflorescence 1.0–2.5 cm long, thyrsoïd, axillary, congested, unisexual staminate or bisexual with 1–2 pistillate flowers proximal, staminate cymules with 3–4(–5) flowers distal; peduncle short, ca. 1–2 mm long, with cataphylls (1–1.5 × 0.8–1.2 mm) slightly obovate to rounded, imbricate, with no evident veins. Staminate cymule and pistillate flower subtended by a bract. Staminate bracts 2–2.5 × 3–3.5 mm, conspicuous, sessile, membranaceous, yellow-brownish, depressed ovate, slightly cucullate, apex rounded, rarely acute, reddish, base truncate, striate, margin entire, sometimes lacerate; gland 1 pair per bract, basilateral, 0.5–1.2 mm long, ear-shaped, creased, sessile. Staminate flowers distinctly pedicellate, 1.2–4.3 mm long, generally of unequal size; sepals 1–3, < 0.5 mm long, disposed along the pedicel at different points of insertion, membranaceous, hyaline, sometimes achlamydeous; stamens (2–)3–4(–5), filaments 1–2 mm long, completely free; anthers dorsifixed, extrorse, rimose. Pistillate bracts 1–2, ca. 1.2–2 × 1.5–2 mm, deltoid to triangular, membranaceous, margin entire to slightly erose, sometimes sinuate, hyaline; gland 1 pair per bract, basilateral, sessile, sometimes absent. Pistillate flowers, when in bisexual cymules, flanked by 2 staminate flowers, or sometimes solitary at the base of the staminate inflorescence; pedicel 3–3.2 mm long; sepals 3, ca. 1 mm long, united, valvate, without glands, membranaceous, triangular, apex acute, margin entire; ovary 1 × 1 mm, ovoid; styles 1.5–2 mm long, curved, style column 0.5–1.5 mm long, stigma surface rugulose. Capsule 5–6 × 5–8 mm, globose, smooth,

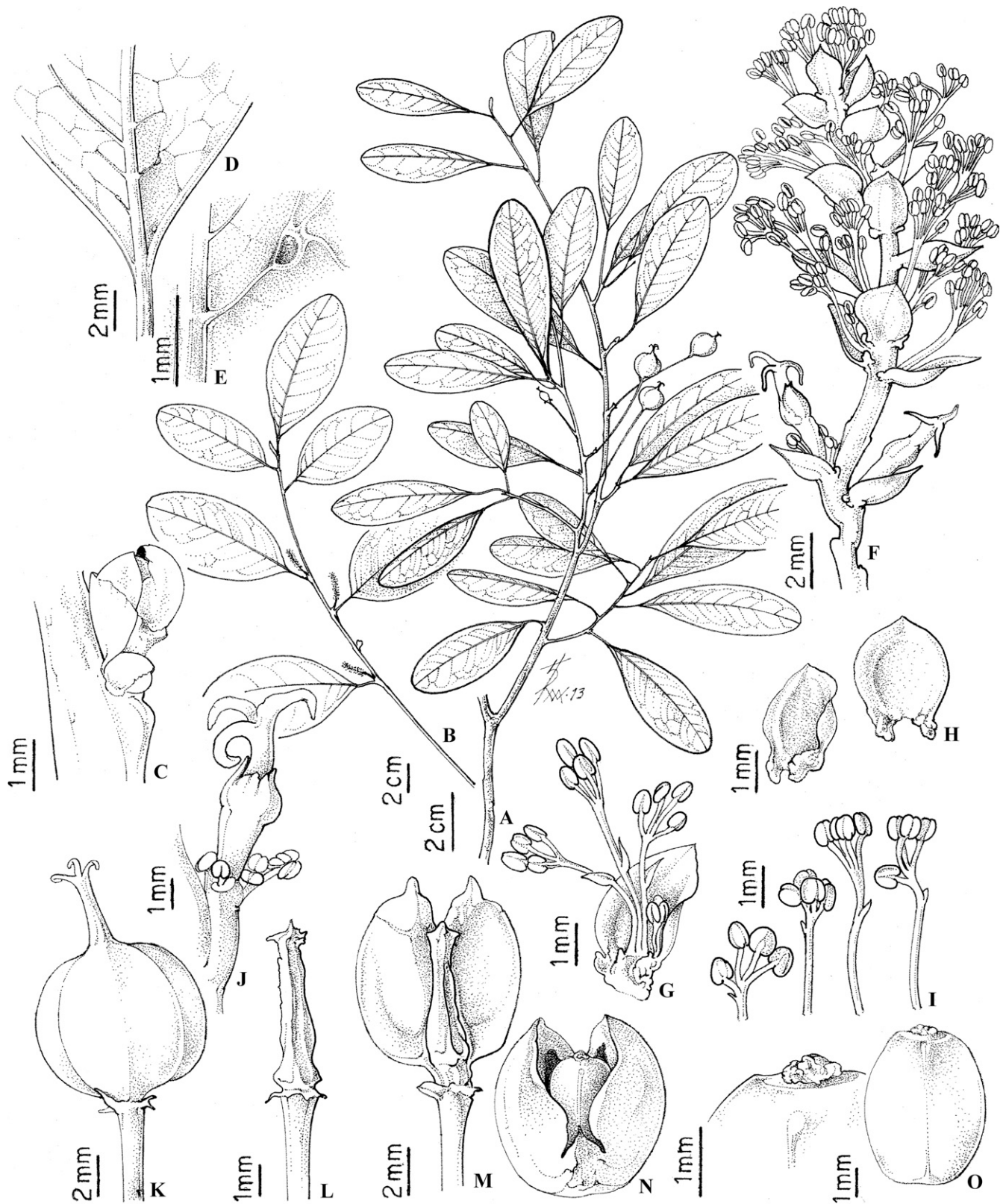


FIG. 1. *Actinostemon rosellii* L. Oliveira, A. L. Melo & M. F. Sales. A. Habit. B. Flowering branch. C. Detail of foliar bud. D. Foliar glands on the lower surface. E. Detail of the glands. F. Bisexual inflorescence. G. Staminate cymule. H. Staminate bracts. I. Staminate flowers. J. Bisexual cymule evidencing the pistillate flower. K. Fruit. L. Columella. M. Detail of the columella with mericarp. N. Detail of the mericarp showing the seeds. O. Carunculate seed.



sepals and style column persistent; pedicel 2.7–3.8 cm long, accrescent; columella 4–8 mm long, claviform. Seeds 3–4.2 × 2–2.2 mm, ellipsoid, smooth surface, sometimes slightly granular, carunculate, dark brown, sometimes with blackish spots. Figure 1.

**Additional Specimens Examined**—BRAZIL. Paraná: Tibagi, Cãnion Guartelá, 24°30'52.66" S, 50°24'40.11" W, 13 Dec 1996 (fr), *Silva et al. 1817* (ALCB, CGMS, MBM); same loc., 12 Sep 1996 (fl), *Giraldi s. n.* (FUEL 21203, K). Santa Catariana: Angelina, Rancho das Tábuas, entorno do fragmento, 27°37'49" S, 49°2'58" W, 590 m, 1 Feb 2010 (fr), *Stival-Santos et al. 1629* (FURB, RB); Imaruí, Serraria Alcides Alves, Águas Mornas, 28°20'42.10" S, 48°48'58.87" W, 50 m, 16 Jan 1973 (fr), *Klein & Bresolin 10736* (FLOR); Alto Rio D'Uma, 50 m, 21 Sep 1973 (fl), *Bresolin 856* (FLOR, ICN); Jacinto Machado, Sanga da Areia, 28°59'56.38" S, 49°45'48.00" W, 5 m, 31 Oct 1959 (fr), *Reitz & Klein 9318* (HBR, M, Z); Lauro Müller, Vargem Grande, 28°23'46.11" S, 49°23'45.11" W, 400 m, 17 Dec 1958 (fr), *Reitz & Klein 8091* (FLOR); Orleans, margin do Rio Novo, 28°21'25.67" S, 49°20'6.74" W, 10 Jan 1992, *Martinello & Aguiar s. n.* (CRI 1718); same loc., 28 Nov 1991 (fr), *Zanette & Aguiar 1698* (CRI); same loc., 24 Oct 1991 (fl, fr), *Zanette et al. 1697* (CRI); same loc., próxima a Granja Mazon, rio Novo, 14 Nov 1990 (fr), *Zanette & Aguiar 991* (CRI); same loc., 12 Apr 1991 (fl), *Zanette et al. 1197* (CRI); same loc., 13 Mar 1992, *Zanette et al. 1699* (FLOR); same loc., 12 Sep 1991, *Falkenberg & Zanete 5546* (FLOR); Santo Amaro da Imperatriz, trilha de turismo ecológico do Hotel Caldas da Imperatriz, 27°41'18.06" S, 48°46'38.44" W, 200 m, 28 Nov 1989 (fr), *Falkenberg & Alburque 4868* (FLOR); Siderópolis, sítio Sete Lombas, 28°35'59.04" S, 49°25'37.69" W, 112 m, 12 Sep 2007 (fl), *Rodrigues s. n.* (CRI 7921).

**Taxonomic Notes**—*Actinostemon* was established by Klotzsch (1841) based on Brazilian material the author named *Actinostemon grandifolius* [= *A. klotzschii* (Didr.) Pax]. Didrichsen (1857), Grisebach (1857), and Klotzsch (1852) expanded the circumscription of the genus by describing new species. Müller (1863, 1866, 1873) proposed several new binomials, trinomials, and even polynomials for the concept of *Actinostemon*. Pax and Hoffmann (1912) and Jablonski (1967) significantly restricted the circumscription proposed by Müller (1866) accepting 29 and 26 species, respectively. Posteriorly, in his awkward revision, Jablonski (1969) reduced to 13 the number of *Actinostemon* species. Nevertheless, Esser (2012) affirmed that the revisions performed by Pax and Hoffmann (1912) and Jablonski (1969) do not reflect the real circumscription of *Actinostemon*, since important type collections were not studied and few specimens were analyzed. According to Esser (2012), *Actinostemon* comprises about 15 species, whereas in the World Checklist of Euphorbiaceae (Govaerts et al. 2014) the genus presents 19 species. Regarding the Brazilian flora, Oliveira et al. (2013) synonymized *Actinostemon unciformis* Jabl. with *Gymnanthes klotzschiana* Müll. Arg., reducing the circumscription of the genus. In the Brazilian flora list (Cordeiro et al. 2014), 16 species of *Actinostemon* are mentioned. However, the revision of this genus for the country (Eymael 2012) indicates that *Actinostemon* presents only seven species.

The boundaries of *Actinostemon* species have only been examined in local floras or regional treatments. The discrepancies in the circumscription of *Actinostemon* point to the need for a new monographic revision of the entire genus, since the number of species recognized by several authors has varied.

*Actinostemon rosellii* is the first species described in this genus after the study carried out by Jablonski (1969). This species is clearly differentiated from other species of *Actinostemon* mainly by the size (2–2.5 × 3–3.5 mm) and shape (depressed-ovate) of the bract of staminate cymules, its most distinctive characteristic. These remarkable bracts are markedly wider than other species of the genus, which are lanceolate to linear, sometimes triangular (0.5–6 × 0.5–1 mm). Other characteristics that distinguish the species are the shape and texture of the basilateral glands of the bracts of staminate cymules, which are sessile, ear-shaped, and creased. In other species of this genus these glands are stipitate, rarely sessile, lanceolate, and smooth. Additionally, in *A. rosellii* the cataphylls that cover the buds and persist at the base of the inflorescence are much less developed than in the other species. An identification key is herein presented aiming to facilitate the recognition of the species of *Actinostemon* occurring in Brazil.

*Actinostemon rosellii* is morphologically similar to *A. concolor*, which is corroborated by the disposition and shape of foliar glands, capsule globoid, pedicel accrescent, and persistent calyx and stigma in the fruits. Although they are sympatric species, they can be differentiated by the other aforementioned characteristics and also by the following traits: foliar buds globoid (vs. ellipsoid in *A. concolor*), covered by cucullate cataphylls (vs. cataphylls of varied shapes, oval to spatulate), bract of staminate cymule depressed-ovate, slightly cucullate (vs. lanceolate bract), glands of bracts of staminate cymules ear-shaped, creased, and sessile (vs. globoid, smooth, and stipitate), staminate flowers with (2) 3–4 (5) stamens (vs. 2–10 stamens), and presence of sepals in staminate and pistillate flowers (vs. achlamydeous flowers).

**Distribution and Habitat**—*Actinostemon rosellii* is restricted to the southern region of Brazil, in the states of Paraná (800–1,000 m elevation) and Santa Catarina (50–590 m elevation) (Fig. 2). It occurs in the domains of the Atlantic Forest, in areas of ombrophilous forest and ecotonal areas between ombrophilous dense forest and mixed ombrophilous forest, frequently next to water bodies (riparian forests), in open places, with the constant presence of *Gymnanthes klotzschiana*. In Parque Estadual do Guartelá (Paraná), this species occurs in areas of isolated woods (locally called capão) near the top of the slope, in deeper soils, characteristic of montane mixed ombrophilous forest. These areas of isolated woods (capão) are generally connected to or involving riparian forests (IAP 2002).

**Phenology**—The species flowers from September to October and bears fruits from October to February.

**Etymology**—The species epithet honors Dr. Roseli Barros, a Brazilian botanist at Universidade Federal do Piauí, who introduced the first author to the science of plant taxonomy.

**Conservation**—Lack of detailed information about the populations (e.g. size, fragmentation, etc.), ecology, area of occupancy, and extension of occurrence places, makes *A. rosellii* is classified in the category of data deficient (DD) species according to IUCN (2014).

**Vernacular Name**—One specimen cites the common name as branquillo (voucher: *Falkenberg & Albuquerque 4868*).

#### KEY TO *ACTINOSTEMON* SPECIES OCCURRING IN BRAZIL

1. Leaves grouped in the apex of branches conferring them a pseudoverticillate aspect ..... 2
2. Cataphylls in the base of inflorescence villous. Panicle-cymose inflorescences. Ovary densely villous ..... *A. amazonicus*
2. Cataphylls in the base of inflorescence glabrous to glabrescent. Racemose-cymose inflorescences. Ovary hirsute, pubescent to glabrous ..... 3

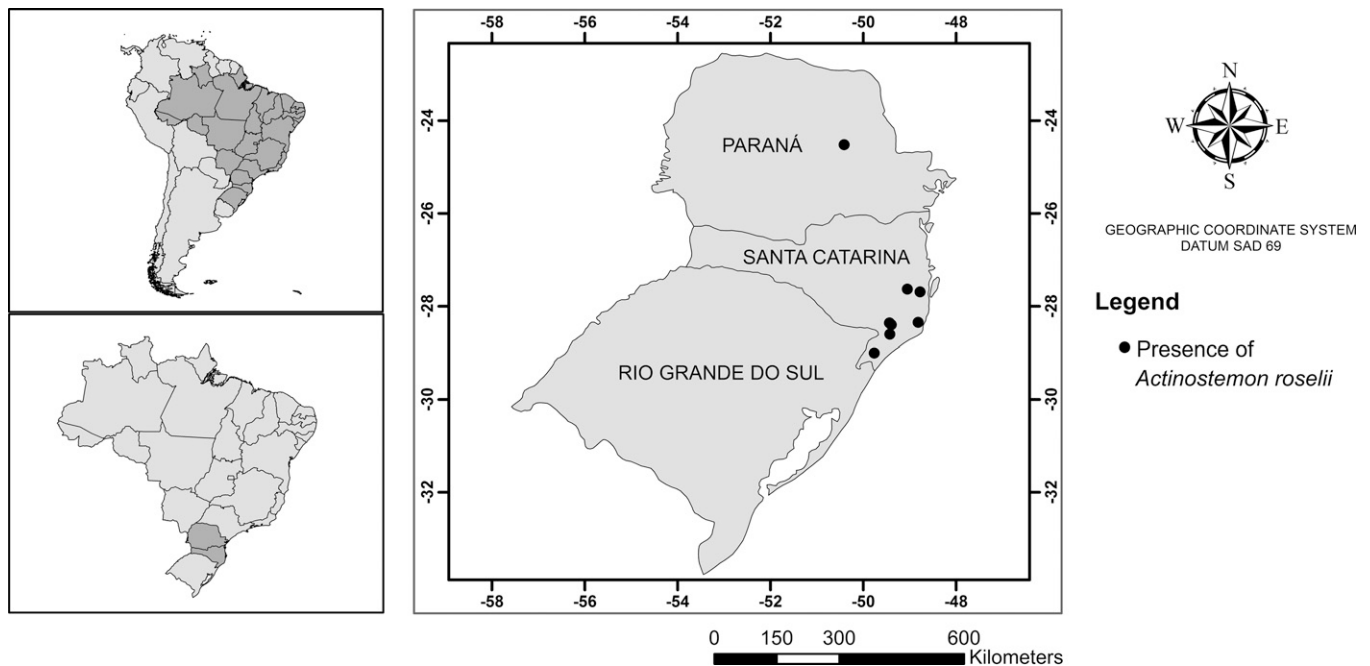


FIG. 2. Map showing the geographical distribution of *Actinostemon rosellii*.

- |    |  |       |                          |
|----|--|-------|--------------------------|
| 3. | Cataphylls in the base of inflorescence with veins little evident to absent. Leaves obovate, rarely elliptic.<br>Axis of inflorescences glabrous to glabrescent. Ovary glabrous to glabrescent | ..... | <i>A. appendiculatus</i> |
| 3. | Cataphylls in the base of inflorescence with evident veins. Leaves elliptic to narrowly elliptic.<br>Axis of inflorescences pubescent to villous. Ovary hirsute, pubescent to glabrescent      | ..... | <i>A. verticillatus</i>  |
| 1. | Leaves regularly distributed along the branches  | ..... | 4                        |
| 4. | Glabrous plants. Leaves of branches isophyllous  | ..... | 5                        |
| 5. | Ovary and fruits with echinate surface   | ..... | <i>A. echinatus</i>      |
| 5. | Ovary and fruits with smooth surface   | ..... | 6                        |
| 6. | Foliar buds ellipsoid. Bract of staminate cymule 0.7–5.1 × 0.5–1.7 mm. Staminate cymule 3–8 flowers.<br>Staminate and pistillate flowers achlamydeous  | ..... | <i>A. concolor</i>       |
| 6. | Foliar buds globoid. Bract of staminate cymule 2–2.5 × 3–3.5 mm. Staminate cymule 3–4(5) flowers.<br>Staminate flowers with 1–3 sepals, rarely absent; pistillate flowers with 3 sepals        | ..... | <i>A. rosellii</i>       |
| 4. | Indumented plants. Leaves of branches anisophyllous  | ..... | 7                        |
| 7. | Presence of leaves in the axis of the inflorescence. Stamens 6–12 in central flowers and 3–10 in lateral flowers   | ..... | <i>A. klotzschii</i>     |
| 7. | Absence of leaves in the axis of the inflorescence. Stamens 5–7 in central flowers and 2–4 in lateral flowers  | ..... | <i>A. schomburgkii</i>   |

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