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Studies in Neotropical Araliaceae. Three new species of *Sciodaphyllum* P. Browne (Araliaceae) with globose capitate inflorescences from Ecuador and Peru

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Abstract: In the genus *Sciodaphyllum* (Araliaceae), some species have paniculate inflorescences with globose capitula as their terminal units, in which numerous tightly packed flowers develop into fruits that are appressed to each other. This informal assemblage, referred to as the “globose-capitate group,” currently includes 20 described species. Three new species with this distinctive morphology are described and illustrated with photographs of plants in the field or scans of herbarium specimens: *S. basiorevolutum* from northern Ecuador at the border of Carchi and Sucumbíos provinces; *S. chachapoyense* from the department of Amazonas, Peru, known only from the province of Chachapoyas; and *S. rufilanceolatum* from the province of Carchi, Ecuador, north of Maldonado along the border with Colombia, and in the Cerro Golondrinas. For each new species, a distribution map and a preliminary risk of extinction assessment (following the IUCN Red List criteria) are provided; *S. basiorevolutum* is assessed as Vulnerable, whereas *S. chachapoyense* and *S. rufilanceolatum* are both considered to be Endangered.

Keywords: *Schefflera*, Neotropics, *Sciodaphyllum basiorevolutum*, *Sciodaphyllum chachapoyense*, *Sciodaphyllum rufilanceolatum*, *Sciodaphyllum rufilanceolatum*.

As circumscribed during the last half century, *Schefflera* was not only the largest member of Araliaceae in the Neotropics, but also globally, with 605 accepted species (Frodin & Govaerts, 2003) and several hundred more awaiting formal description (Frodin et al., 2010, Plunkett et al., 2018). Phylogenetic studies of Araliaceae based on molecular data, however, demonstrated that *Schefflera* is polyphyletic (Plunkett et al., 2005; see also Plunkett et al., 2004a, b), comprising five well supported and geographically structured clades, none of which are

sister groups. The smallest of these clades, *Schefflera* sensu stricto, contains the generic type, necessitating the taxonomic transfer of all species belonging to the other four clades. The “Neotropical *Schefflera*” clade, the second largest of them, has an estimated total of ca. 400 described and undescribed species occurring primarily in three centers of diversity, Central America, the Guiana Shield, and the Andean Cordillera (Fiaschi & Plunkett, 2011; Frodin, 1995; Frodin & Govaerts, 2003; Plunkett et al., 2005, 2019).

Studies of Neotropical *Schefflera* by Fiaschi and Plunkett (2011) and Plunkett et al. (2019) confirmed that the group is monophyletic and clarified phylogenetic relationships among its major lineages. In the study of Plunkett et al. (2019), 211 samples representing nearly 140 species were used along with 38 samples from 22 other genera of Araliaceae, from which six spacer regions were sequenced, including two nuclear (ETS, ITS) and four plastid markers (*rpl32-trnL*, *trnF-rpl32*, *trnK-rpl16*, *psbA-trnH*). The results confirmed the earlier findings of Fiaschi and Plunkett (2011) based on more limited sampling, in particular that the Neotropical clade comprises five major lineages, four of which overlapped significantly with groups informally recognized as *Cephalopanax*, *Crepinella*, *Didymopanax*, and *Sciodaphyllum* (Frodin et al., 2010; Plunkett et al. 2005, 2019), to which a small fifth clade was added, comprising just two species, informally referred to as *Gleasonia*.

Given that all species in the Neotropical clade must be transferred out of *Schefflera*, a decision was made to recognize five genera, each corresponding to one of the groups identified in earlier studies (see Lowry et al., 2019a). As a consequence, the generic name *Sciodaphyllum* P. Browne was resurrected to accommodate the 131 currently recognized species belonging to that group (Lowry et al., 2019a), and the names *Crepinella* Marchal and *Didymopanax* Decne. & Planch. were likewise resurrected for the 33 and 37 species they contain, respectively (Lowry et al., 2019b; Fiaschi et al., 2020). The two remaining groups, both of which are very small (comprising three and two described species, respectively) are being named as new genera.

Sciodaphyllum is geographically widespread, but most of its species occur in southern Central America (Costa Rica and Panama) and in the northern and central Andes, ranging from Venezuela to Bolivia, with outliers in the Antilles and the Guiana Shield. The genus is morphologically diverse and thus rather difficult to characterize, but all of its species have united petals that form a calyptate corolla abscising as a unit at anthesis. Additionally, many but not all species have a (hemi-)epiphytic habit and leaves with large ligulate stipules.

Many species of *Sciodaphyllum* have paniculate or compound-umbellate inflorescences in which the flowers are ultimately arranged in umbellules, but most of the species have other

types of ultimate inflorescence units, including heads, racemules, or spicules (Frodin & Govaerts, 2003; Plunkett et al., 2019). Of those species with flowers arranged in spherical to ovoid heads, the shape, size, and arrangement of these structures vary. These heads may be divided into two types, which we refer to as globose capitate and non-globose capitate. While a continuum exists between the extremes of these two morphologies, and while some species have heads that are intermediate in size, most capitate species of *Sciodaphyllum* can readily be assigned to one of these two types. Globose heads are usually large (at least 2 to 5 cm in diameter in fruit) and contain numerous, tightly packed flowers maturing into fruits that are obpyramidal in shape and tightly appressed to one another. Non-globose heads are smaller (generally no more than 2 cm in diameter in fruit) and contain substantially fewer flowers developing into fruits that are terete in cross-section and are not closely appressed to one another at maturity. This variation in inflorescence appearance and fruit shape appears to be due to the tight packing of flowers in the globose capitate species, which restricts the growth of the basal portion of each fruit but allows expansion of its apex.

To improve our knowledge of the globose-capitate species of *Sciodaphyllum*, collections from 14 major herbaria where studied (AAU, CPUN, CUZ, ECUAMZ, F, HOXA, LOJA, MO, NY, P, QCA, QCNE, US, USM) and carefully compared to the available type specimens (including photos) and protologues of described species. This process revealed numerous clearly distinct taxa that did not appear to correspond to any validly published names. The analysis of specimens and their comparison with type material was, however, complicated by the fact that collections of *Sciodaphyllum* are often fragmentary and poorly prepared, lacking key diagnostic characters needed for accurate identification. For example, the inflorescences are sometimes so large that it is impossible to include them in their entirety on a single herbarium sheet. As a consequence, many specimens contain only a small portion of the inflorescence, sometimes only a single axis from a highly branched structure, and thus lack critical information about its overall size and organization. The situation is further complicated by changes in inflorescence structure that occur during development. For example, in early stages, flower buds may be densely arranged in

what appear to be capitula, but as they mature, the pedicels may form and elongate, resulting in an umbellate arrangement. It is, therefore, important to obtain material from as many developmental stages as possible in order to make an informed decision regarding inflorescence types. A similar situation is encountered with leaf structure and development. In many species, the petiole base is frequently not collected, despite the fact that the shape and size of their ligulate stipules are often essential for accurate identification. Moreover, leaves often undergo significant changes as they mature. For example, the young leaves of some species are thin and covered with dense ferruginous indument, but as they mature, they thicken and lose most of their trichomes. In such cases, having a developmental series is necessary to associate the various stages of leaf development.

In order to obtain material representing as many developmental stages of globose capitate species of *Sciodaphyllum* as possible, targeted field work was conducted in Ecuador and Peru, where most of the apparently new species were identified. Results of the combined herbarium and field work suggest that the globose-capitate morphology characterizes 20 currently named and accepted species as well as more than 70 potentially new species, of which 26 are clearly circumscribed and ready to be described, along with about 45 additional novelties that will require more in-depth studies to determine their taxonomic status. Members of this group range from small treelets to larger trees (up to 15 to 20 m tall) and they typically occur at high elevations (2000 to 3500 m) in primary or partially disturbed cloud or dwarf forests, and occasionally as pioneer species in disturbed forests. Some species, however, occur at lower elevations, such as *S. pentandrum* (Pav.) Harms, which grows from 800 to 2000 m. Globose capitate species are exclusively found in the northern and central Andes, extending from southern Colombia to Bolivia.

As an initial step toward advancing our understanding of the globose capitate members of *Sciodaphyllum*, three new species initially identified based on herbarium collections, two of which were subsequently collected in the field, are described here. This work complements several other papers in which new non-globose capitate species of *Sciodaphyllum* are being described, including three from the eastern slopes of the Peruvian Andes (Mora et al., 2020a) and one with small heads from Antioquia in Colombia (Mora et al., 2020b).

For each of the three new species described here, a distribution map was prepared and a preliminary risk of extinction assessment was performed, following the IUCN Red List criteria (IUCN, 2012; IUCN Standards and Petitions Committee, 2019). To determine geographic coordinates of older collections for which longitude and latitude data were not available, an estimate was made *post-facto* using locality information from specimen labels along with maps and online resources such as Google Earth (these are indicated in square brackets).

Sciodaphyllum basiorevolutum Rodrigues-Vaz, G. M. Plunkett, & Lowry, **sp. nov.** Type: Ecuador, Carchi Province: Cantón Huaca, on the road from Mariscal Sucre (Colonia Huaqueña) to the “Estación Biológica-Guandera”, just beyond the entrance to the station, remnant forest, 0°35' 12.4"N, 77°42'35.99"W, 3348 m, 19 Oct 2016 [immature infl, b, fl, fr], *Rodrigues-Vaz & Rosillo 152* (holotype: ECUAMZ [3 sheets: ECUAMZ-00065, ECUAMZ-00066, ECUAMZ-00067]!; isotypes: MO!, NY!, QCNE!). (Fig. 1)

Diagnosis: *Sciodaphyllum basiorevolutum* can be distinguished from all other globose capitate members of the genus in Ecuador by a combination of two characters, leaflets whose margins are strongly revolute only at the base and reddish-brown pubescent indument comprising branched and shaggy trichomes found throughout, except for the glabrescent adaxial surface of the leaves.

Unbranched or branched treelet or tree, 4–18, tall. Leaves palmately compound, spirally arranged, 36.3–72.4 cm long, with lenticels on petiole base, ligulate stipule, and stem; stipule triangular, 4.6–6.2 × 4.2–5.2 cm, fleshy adaxially, covered with grayish-white pubescent indument comprising dendritic trichomes, glabrescent, margin entire, often scarious, up to 7.9 mm wide, green to purple, drying dark-reddish brown to black; petiole 19.9–39.5 cm long, 4.6–8.4 mm diam., covered with reddish-brown pubescent indument comprising branched and shaggy trichomes; leaflets 9–13, borne in a single whorl, petiolules 1.8–6.7 cm, compressed laterally, sulcate adaxially, blade lanceolate to elliptic or oblong, conduplicate, dark green adaxially, pale green abaxially (*in vivo*), olive green to dark brown above, lighter below (*in sicco*), coriaceous, 14.6–26.2 × 4.1–10 cm, covered with reddish-brown pubescent indument of branched, shaggy



FIG. 1. *Sciodaphyllum basiorevolutum* **A.** Heads in flower showing calyprate corollas covered with reddish-brown pubescent indument. **B.** Inflorescence of large globose heads. **C.** Leaflets showing strongly revolute margins at the base. **D.** Ligulate stipules with green to purple scarious margins.

trichomes when young, adaxial surface glabrescent in mature leaflets, indument persistent on abaxial surface, base obtuse to rounded or truncate, margin entire, strongly revolute toward the base (the fold up to 5 mm wide), apex acuminate to attenuate, venation pinnate, primary vein prominent, slightly raised and yellowish-green adaxially, strongly raised abaxially, secondary veins 17–26 on each side, visible to obscure adaxially, raised abaxially, tertiary veins obscure adaxially, visible abaxially, inter-secondary veins present, proximal 2–5 secondary veins originating together

from the base of the midvein, collecting vein present, 1.8–5.6 mm from margin. Inflorescence pseudo-lateral (resulting from delayed development of an initially terminal inflorescence), erect to ascending, paniculate, with three orders of branching, bracts caducous, triangular, $3.8\text{--}9.6 \times 4.1\text{--}7.5$ mm, scar narrow, crescent-shaped; primary axis 2.6–3.5 cm long (to ca. 8 cm in fruit); secondary axes 2–5, 19.4–42.4 cm long, 1.3–1.5 cm diam. at the base; ultimate units heads, spherical to ellipsoid, covered with reddish-brown pubescent indument comprising dendritic trichomes,

1.0–2.8 cm diam. in bud, expanding to 2.2–3.6 cm diam. in fruit, sessile to pedunculate, peduncle, when present, to 1.3 cm long, 0.5–1.1 cm diam. Flowers hermaphroditic, 65–122 per head, closely appressed to one another; calyx a barely visible, low, undulate rim/crown with obscure lobes, at most 0.1 mm high, 2.9–4.8 mm wide, calyx rim and disc pale green turning pinkish-red at maturity; corolla calyprate, narrowly to broadly cylindrical with a rounded to flat top, covered with reddish-brown pubescent indument; petals 6, 3.2–5.8 × 2.5–5.9 mm; stamens 5 or 6, in a single series, filaments 2–3.1 mm long at pollen presentation, anthers brownish becoming creamy yellow at pollen presentation, 1–1.5 mm long; ovary 5- or 6- (or 7)-carpellate, brownish sometimes tinged pink, drying black; styles 5 or 6 (or 7), appressed before receptivity, spreading at maturity, pale green, drying black, 1.6–3.4 mm long, united to half their length. Fruits pale green turning pale yellow, fleshy, obpyramidal, transversely pentagonal or hexagonal (rarely heptagonal), closely appressed to one another, 7.2–12.8 × 4.2–6.2 mm, base truncate to conical, with 5 or 6 (or 7) ribs when dry (as many as carpels).

Distribution and habitat.—*Sciodaphyllum basiorevolutum* is known from the border area between the provinces of Carchi and Sucumbios in northern Ecuador, in the area around the Contrafuerte del Mirador, at elevations of 2350–3500 m, in primary to disturbed forests (Fig. 2).

Etymology.—The species name refers to the main diagnostic character of this species, its strongly revolute margins at the base of the leaflets.

Conservation status.—*Sciodaphyllum basiorevolutum* has been collected at ten localities corresponding to five subpopulations. Its geographic range has an EOO of 340.1 km² and an AOO of 56 km². The species is present in one protected area, the Estación Biológica Guandera, but outside this area it is threatened by forest clearing for agriculture that involves patches ranging in size from a few km² to 100 km², resulting in projected continuing decline of EOO, AOO, quality of habitat, number of locations and subpopulations, and number of mature individuals. With regard to the primary threat of deforestation, *S. basiorevolutum* is present at 11 locations and is therefore assessed as Near Threatened [NT] using the IUCN Red

List Categories and Criteria (IUCN, 2012; IUCN Standards and Petitions Committee, 2019), since it nearly qualifies for Vulnerable status under criteria B1 and B2.

Additional specimens examined. ECUADOR. Carchi: Carretera Julio Andrade-El Carmen km 18, [00°39'10"N, 77°36'50"W], 3200 m, 16 May 1982 [fr], *Balslev 2535* (AAU [2 sheets], NY [2 sheets]); road from Julio Andrade to El Carmelo in the pass on the old road above El Playón de San Francisco, [00°39'12"N, 77°37'50"W], 3150 m, 26 Oct 1983 [fl], *Balslev 4455* (AAU); Parroquia Huaca, Bosque Protector "Guanderas", quebrada el Mirador, [00°35'N, 77°42'W], 3150 m, 18–19 Mar 1995 [fr], *Cerón 28,433* (MO [2 sheets]); 17.5 km E of Santa Bárbara along road from Tulcán to Alegría via Caramelo and Santa Bárbara, [00°35'10"N, 77°30'46"W], 2600 m, 5 Feb 1982 [fr], *Dodson 12,129* (QCNE, MO, US); 12.7 km E of La Estrellita on road to El Carmelo, [00°41'52"N, 77°39'22"W], 16 Nov 1988 [fr], *Dorr 6155* (QCNE, NY); Mirador, ca. 12 km N of El Playón de San Francisco, [00°37'N, 77°37'W], 3300–3500 m, 27 Nov 1983 [fr], *Eriksen 45,795* (AAU); SE of El Playón de San Francisco on the slopes of Cerro Mirador, [00°35'N, 77°38'W], 3300–3700 m, 28 Dec 1980 [st], *Holm-Nielsen 29,866* (AAU); Julio-Andrade-El Carmelo, turn off towards El Ajún, km 0–3, [00°39'N, 77°38'W], 3050–3100 m, 10 Aug 1990 [fl], *Jørgensen 92,361* (AAU [2 sheets]); al este de la Colonia Huaqueña, en el sector Breña o Loma Corazón, [00°38'N, 77°41'W], 3000–3200 m, 18 Feb 1989 [b, fr], *Palacios 3909* (QCNE [2 sheets], MO [2 sheets]); *ibid.* loc., [00°36'N, 77°42'W], 3200–3450 m, 20 Feb 1989 [b, fl], *Palacios 3932* (QCNE [2 sheets], MO [3 sheets]); Montufar Cantón, Lomo El Corazón (Breña), al sureste de Huaca, al este de la Colonia Huaqueña, Río Minas, [00°36'N, 77°42'W], 3200 m, 4 Apr 1991 [b], *Palacios 6968* (QCNE, MO); on the road from Mariscal Sucre (Colonia Huaqueña) to the "Estación Biológica Guandera", a little before arriving at the sign indicating the entrance to the station, 00°35'12"N, 77°42'36"W, 3348 m, 19 Oct 2016 [immature fr], *Rodrigues-Vaz 153* (ECUAMZ [2 sheets: ECUAMZ-00178, ECUAMZ-00179], NY); road from Julio Andrade to El Carmelo, turn-off towards El Ajún, a few km after El Ajún, at edge of a recently cut forest, probably used for grazing pastures, not far from river, 0°40'28.29"N, 77°37'43.91"W, 3239 m, 19 Oct 2016 [b, fr], *Rodrigues-Vaz 154* (ECUAMZ [2 sheets: ECUAMZ-00180, ECUAMZ-00181], NY); road from Julio Andrade to El Carmelo, turn-off towards El Ajún, along road a few km after El Ajún, 00°40'28.29"N, 77°37'43.91"W, 3239 m, 19 Oct 2016 [immature fr], *Rodrigues-Vaz 155* (ECUAMZ [2 sheets: ECUAMZ-00182, ECUAMZ-00183], NY); Montufar Cantón, Lomo El Corazón (Breña), al sureste de Huaca, al este de la Colonia Huaqueña, Río Minas, [00°35'N, 77°42'W], 3200–3500 m, 26 Mar 1989 [b, fl], *Tipaz 8* (QCA, QCNE, MO [2 sheets]); *ibid.* loc., 2 Jul 1989 [fr], *Tipaz 96* (QCNE [2 sheets], MO). Succumbios: Road Playón de San Francisco-La Bonita, km 28, past Santa Bárbara, [00°35'N, 77°30'W], 2690 m, 5 May 1993 [b, fl, immature fr], *Borchsenius 81* (AAU [3 sheets]); Parroquia El Playón de San Francisco, base del Cerro Mirador, sector la Pradea, quebrada Cuscungo, [00°37'36"N, 77°37'27"W], 3000–3100 m, 5 Aug 1996 [fr], *Cerón 31,976* (MO); carretera Playón de San Francisco-La Bonita, [00°37'36"N, 77°37'27"W], 2800–3000 m, 27 Dec 1986 [b, fr], *Josse 104* (NY); Parroquia La

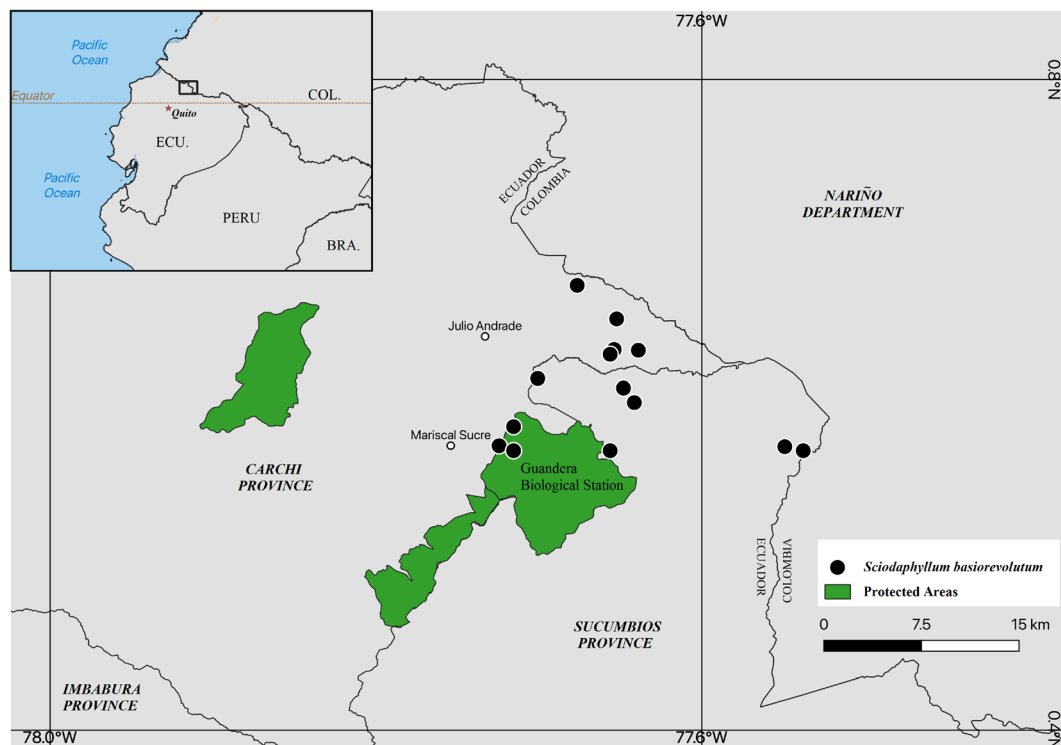


FIG. 2. Geographic distribution of *Sciodaphyllum basiorevolutum*.

Bonita, ca. 80 km de la vía Tulcán-La Agrio, sector Valle Negro, 00°26'07"N, 77°35'18"W, 2354 m, 6 Feb 2018 [b, fr], *Mora 1120* (ECUAMZ, MO, NY).

Sciodaphyllum chachapoyense Rodrigues-Vaz, G. M. Plunkett, & Lowry, **sp. nov.** Type: Peru, Amazonas: Province Chachapoyas, along road from Leymebamba to Balsas, km 410–409, dwarf forest, 06°43'16.26"S, 77°50'42.22"W, 2975 m, 10 Oct 2016 [fl, fr], *Rodrigues-Vaz & Cueva 148* (holotype: USM (mounted on several sheets)!; isotypes: MO!, NY [3 sheets: 03109069, 03109070, 03109071]!). (Fig. 3)

Diagnosis: *Sciodaphyllum chachapoyense* closely resembles *S. mathewsii* Seem. in being a treelet with paniculately arranged heads and similarly shaped coriaceous, conduplicate leaflets, but differs in having larger globose heads of ca. 62–94 flowers (vs. smaller non-globose heads with 10–40 flowers) and larger leaves (32.7–52.5 cm vs. 10.4–33 cm long).

Unbranched to branched treelet, 1–7 m tall. Leaves palmately compound, spirally arranged, 32.7–52.5 cm long, with lenticels on petiole base,

ligulate stipule, and stem; stipule triangular, 2.6–4.5 × 2.3–4.2 cm, with silvery-white floccose to lanate indument comprising branched trichomes, the margin entire; petiole 15–22.5 cm long, 4.1–6.3 mm diam., glabrous; leaflets 8–10, borne in a single whorl, petiolule 1–4.5 cm, blade oblong to obovate-oblong, conduplicate, dark green adaxially, pale green abaxially (*in vivo*), olive green to brown above and below (*in sicco*), coriaceous, 9–21.7 × 3.3–7.5 cm, densely covered with ferruginous indument when young, glabrescent, base rounded to cordate, margins entire, sometimes minutely revolute, apex acuminate, venation pinnate, primary vein prominent, slightly raised adaxially, raised abaxially, secondary veins 21–52 on each side, obscure adaxially, visible abaxially, tertiary veins obscure adaxially, visible abaxially, inter-secondary veins present, collecting vein present, 0.4–2.1 mm from margin. Inflorescence pseudo-lateral (resulting from delayed development of an initially terminal inflorescence), erect to ascending, paniculate, with three orders of branching, bracts caducous, triangular, 4.7–9.8 × 2.8–6.2 mm, scar thin, crescent-shaped; primary



FIG. 3. *Sciodaphyllum chachapoyense*. A. Branched treelet growing in fern-dominated (*Pteridium arachnoideum*) open and disturbed area. B. Inflorescence of large globose heads. C. Specimen in bud and flower, *Rodrigues-Vaz* 147 [NY03108726]. D. Leaf showing conduplicate leaflets.

axis 3.6–11.1 cm long; secondary axes 2 or 3, 21.5–31 cm long; ultimate units heads, spherical to ovoid or ellipsoid, 1.1–1.6 cm diam. in bud, expanding to 1.5–3.5 cm diam. in fruit, sessile to pedunculate, peduncle, when present, up to 9.3 mm long, 3.3–5.1 mm diam. Flowers hermaphroditic, 62–94 per head, closely appressed to one another; calyx a low undulate rim/crown, up to 0.4 mm high, 2.8–4.4 mm wide; corolla calyptrate, pale green (sometimes tinged with red), turning brownish when dry, with silvery-white floccose to lanate indument comprising branched trichomes, broadly cylindrical, with a

rounded to flat top, drying bullate/verrucose, 3.6–4.4 × 1.7–2.6 mm; stamens 5–8, in a single series, filaments 0.9–1.3 long when calyptra is first shed, expanding to 2.1–3.4 mm long at pollen presentation, anthers tan-yellow, 1–1.5 mm long; ovary 4–6-carpellate, pale green; styles 4–6, free, forming short, stout nubs, appressed before receptivity, spreading at maturity, 0.8–1.8 mm long. Fruits green, fleshy, obpyramidal, transversely square, pentagonal or hexagonal (depending on the number of carpels), closely appressed to one another, 6.5–10.3 × 2.5–4.5 mm, base truncate to conical, with 4–6 ribs when dry (as many as the carpels).

Distribution and habitat.—*Sciodaphyllum chachapoyense* is known only from fern-dominated (*Pteridium arachnoideum*), open and disturbed area in Chachapoyas Province in Amazonas Department, northern Peru, at elevations of ca. 2700–3250 m (Fig. 4).

Etymology.—The name *Sciodaphyllum chachapoyense* was chosen because this species is known only from Chachapoyas Province in Peru.

Conservation status.—*Sciodaphyllum chachapoyense* has been collected at three localities corresponding to a single subpopulation. Its geographical range has an EOO and an AOO of 12 km². The species is threatened by landslides, road maintenance, and other disturbances along the road that runs through the population, which results in projected continuing decline of EOO, AOO, quality of habitat, number of locations, and number of mature individuals. With regard to the primary threat of road-associated disturbance, *S. chachapoyense* is present at three locations and can therefore be assessed as Endangered [EN B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)] using the IUCN Red List Categories and Criteria (IUCN, 2012; IUCN Standards and Petitions Committee, 2019).

Additional specimens examined. PERU. Amazonas:

Chachapoyas Province, along road from Leymebamba to Balsas, km 410–409, 06°43'16.26"S, 77°50'42.22"W, 2974 m, 10 Oct 2016 [b, fl], *Rodrigues-Vaz 147* (MO, NY, USM); *ibid.* loc., 2975 m, 10 Oct 2016 [fl, fr], *Rodrigues-Vaz 148* (MO, NY [2 sheets], USM); *ibid.* loc., 2976 m, 10 Oct 2016 [b], *Rodrigues-Vaz 149* (MO, NY [2 sheets], USM); *ibid.* loc., km 409–408, 06°42'41.33"S, 77°50'45.85"W, 3043 m, 10 Oct 2016 [fr], *Rodrigues-Vaz 150* (MO, NY, USM); *ibid.* loc., km 411–416, [06°42'53"S, 77°51'16"W], 2700–2950 m, 21 Feb 1984 [fr], *Smith 6109* (MO, USM); middle eastern Calla-Calla slopes, near km 411–416 of Leymebamba-Balsas road, [06°42'53"S, 77°51'16"W], 3100–3250 m, 11 Jul 1962 [fr], *Wurdack 1336* (F [2 sheets], NY [2 sheets], USM).

Notes.—*Sciodaphyllum chachapoyense* and *S. mathewsii* occur in similar habitats (i.e., dwarf forests), but *S. chachapoyense* is found at elevations of ca. 2700 to 3250 m, whereas *S. mathewsii* is found at lower elevations of ca. 1980 to 2500 m.

Sciodaphyllum rufilanceolatum Rodrigues-Vaz, G. M. Plunkett, & Lowry, **sp. nov.** Type: Ecuador, Carchi: Cantón Espejo, El Gualtal, Cerro Golondrinas hembra, bosque muy húmedo montano bajo, [00°51'N, 78°08'W], 2800 m, 21 Aug 1994 [fr], *Palacios 12,491* (holotype, QCNE

[99285]!; isotype, MO [MO04799627]!). (Fig. 5)

Diagnosis: Among *Sciodaphyllum* species with ferruginous indumentum, *S. rufilanceolatum* most closely resembles *S. ferrugineum* (Willd. ex Schult.) Decne. & Planch. in being a hemi-epiphyte with tomentose to villose indument covering all parts of the plant except for the adaxial surface of the leaves, which is glabrescent when mature, but differs in having narrowly lanceolate to oblong leaflets (vs. broadly oblong to elliptic in *S. ferrugineum*).

Hemi-epiphytic, liana-like, branched treelet, 4–5 m tall. Leaves palmately compound, spirally arranged, 33.1–58.4 cm long; stipulate ligule chartaceous, ovate, 7.4–9.6 × 3–5.6 cm, clasping the stem, drying black, covered with tannish-white villous indument comprising unbranched trichomes, margin entire, sometimes scarious and drying grayish-white, up to 1 mm wide; petiole 18.9–26.5 cm long, 4.5–7.8 mm diam., covered with ferruginous villose indument comprising unbranched trichomes; leaflets 8–10, borne in a single whorl, petiolule 1.6–3.5 cm, blade narrowly lanceolate to oblong, olive green adaxially, brownish olive abaxially (*in sicco*), coriaceous, 12.6–28.4 × 2.3–5.6 cm, covered with ferruginous villose indument comprising unbranched trichomes when young, adaxial surface glabrescent in mature leaflets, indument persistent on abaxial surface, base attenuate to obtuse, margin entire, revolute, apex caudate; venation pinnate, primary vein prominent, slightly raised adaxially, strongly raised abaxially, secondary veins 27–42 on each side, visible on both surfaces, raised abaxially, tertiary veins obscure adaxially, visible abaxially, collecting vein present, 2.6–4.7 mm from margin. Inflorescence pseudo-lateral (resulting from delayed development of an initially terminal inflorescence), paniculate, with three orders of branching, covered with ferruginous villose indument comprising unbranched trichomes, bracts caducous, triangular, 2.8–3.1 × 3.2–4.6 mm, scar thin, crescent-shaped; primary axis 2.5 cm long; secondary axes 3–5, 34.9–37.2 cm long, ultimate units heads, spherical to ellipsoid, covered with tannish-white villose indument comprising unbranched trichomes, 0.7–1.2 cm diam. in bud, expanding to 1.8–2.5 cm diam. in fruit, sessile in bud, pedunculate in flower and fruit, peduncle 3.4–6.2 mm long, 1.9–3.3 mm diam. Flowers hermaphroditic, 17–39 per head, closely appressed to one another; calyx a barely visible low, undulate crest with obscure lobes, at most 0.1 mm high, 2.3–5.4 mm wide; corolla calyptrate, hemispherical,



FIG. 4. Geographic distribution of *Sciodaphyllum chachapoyense*.

petals 5, $1.7\text{--}2.4 \times 2.6\text{--}2.9$ mm; stamens 5, in a single series, filaments $2.9\text{--}3.8$ mm long at pollen presentation, anthers drying ferruginous to black, $0.9\text{--}1.2$ mm long; ovary 5-carpellate, drying ferruginous to tan; styles 5, forming a column with a bulbous base, appressed before receptivity, spreading at maturity, drying black, $2.5\text{--}3.1$ mm long, united for ca. two thirds of their length. Fruits fleshy, obpyramidal, transversely square or pentagonal, closely appressed to one another, $5.8\text{--}8.6 \times 4.1\text{--}5.3$ mm, base truncate to conical, with 5 ribs when dry (as many as the carpels).

Distribution and habitat.—*Sciodaphyllum rufilanceolatum* occurs in primary montane and dwarf forests, and has been collected at four localities in Carchi Province, Ecuador, above Maldonado, near the border with Colombia (Cantón Tulcán) and in the Cerro Golondrinas near Hualchán (Cantón Espejo), at elevations of ca. 2000–2750 m. Similar suitable habitat is also found in adjacent Colombia, in the southern part of Nariño Department, but no material from this area have been seen (Fig. 6).

Etymology.—The epithet chosen for this species reflects its two principal diagnostic

characters, lanceolate leaflets covered with red trichomes.

Conservation status.—*Sciodaphyllum rufilanceolatum* has been collected at four localities corresponding to three subpopulations. Its geographic range has an EOO of 25.5 km^2 and an AOO of 20 km^2 . The species is present in one protected area, the Bosque Protector Cerro Golondrinas, but outside this area it is threatened by forest clearing for road construction, which results in projected continuing decline of EOO, AOO, quality of habitat, number of locations and subpopulations, and number of mature individuals. With regard to the primary threat of forest clearing, *S. rufilanceolatum* is present at four locations and can therefore be assessed as Endangered [EN B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)] using the IUCN Red List Categories and Criteria (IUCN, 2012; IUCN Standards and Petitions Committee, 2019).

Additional specimens examined. ECUADOR.

Carchi. Cerro Golondrinas area, access via Chamorro property above El Carmen, which is above Hualchán, flat hilltop before steep ridge crest approach to peak, $00^{\circ}50'N$,



FIG. 5. *Sciodaphyllum rufilanceolatum*. A. Specimen in bud, Palacios 7220 [MO04853109]. B. Specimen in flower, Boyle 3423 [MO05181355]. C. Specimen in fruit, Palacios 12,491 [MO04799627]. D. Close-up of fruits of Palacios 12,491 [MO04799627].

78°12'W], 2690 m, 24 Jul 1993 [b, fr], Boyle 2344 (AAU, MO); Cerro Golondrinas, valley bottom ca. 1 km NNE of summit, 00°51'38"N, 78°08'14"W, 2740 m, 20 Jul 1994 [st], Boyle 3340 (AAU); Cerro Golondrinas, valley bottom ca. 1.5 km NNE of summit, 00°51'52"N, 78°08'10"W, 2750

m, 25 Jul 1994 [b, fl], Boyle 3423 (AAU, QCNE, MO); Tulcán Cantón, Arriba Maldonado, frontera con Colombia, sitio Chilmá, [00°51'N, 78°02'W], 2000 m, 20 May 1991 [b], Palacios 7220 (QCNE, MO).

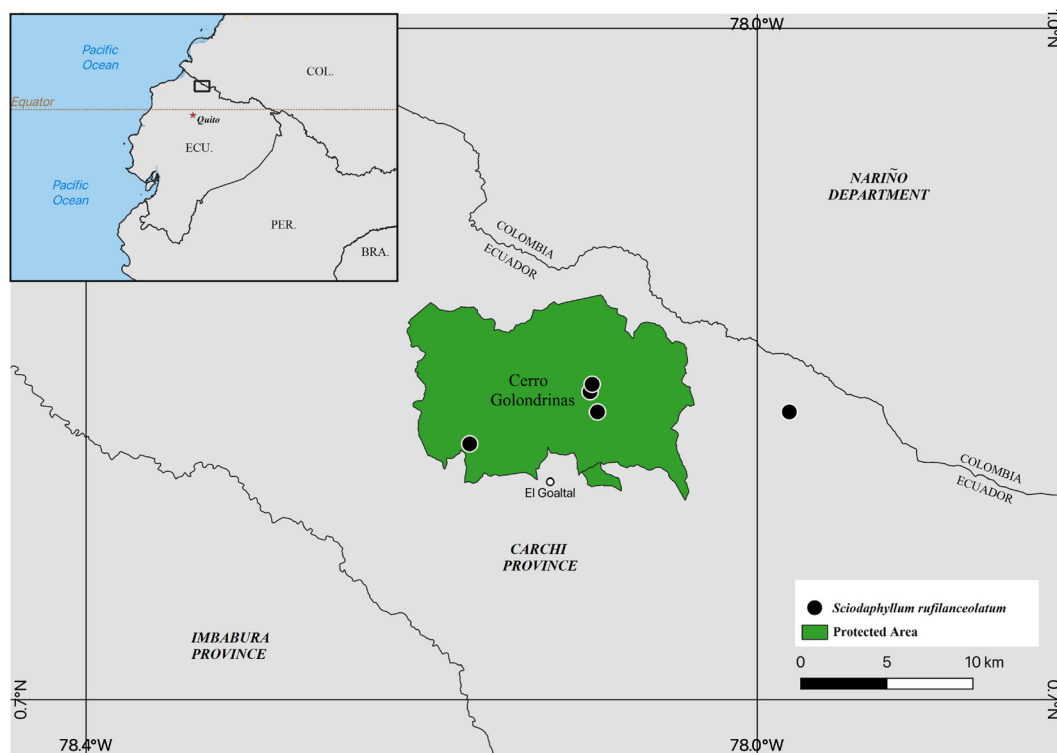


FIG. 6. Geographic distribution of *Sciodaphyllum rufilanceolatum*.

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