

Noteworthy Calymperaceae from Brazil and Venezuela

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Abstract

Calymperes levyanum Besch., *C. platyloma* Mitt., *C. bartramii* Reese, and *C. mitrafugax* Florschütz are reported new to Brazil; *Syrrhopodon incompletus* var. *luridus* (Par. & Broth.) Florschütz, *S. circinatus* (Brid.) Mitt., and *S. brevisetus* Florschütz are reported new to Brazil, and *S. berterioanus* (Brid.) C. Müll. is reported new to Venezuela. The occurrence and distribution of several other Calymperaceae in Brazil are also discussed. *Syrrhopodon rivularis* Herzog is a new synonym of *Calymperes nicaraguense* Ren. & Card.

During 1974 the Instituto Nacional de Pesquisas da Amazônia in Manaus, Brazil, sponsored a three-month course in tropical bryology which the junior author was invited to conduct. Collecting in the area of Manaus with the class, as well as study of specimens from other collectors in the region, resulted in several interesting records, range extensions, "rediscoveries" of rare taxa, and an occasional undescribed species. Many of the more noteworthy collections were of the Calymperaceae and these are reported and discussed in this article.

Richard Spruce contributed the first detailed account of the bryoflora of Amazonia. His prodigious labors in the field (1908) and his insightful treatment of the Hepaticae, particularly of the neotropical Lejeuneaceae (1885), are well known. The work of Mitten (1869), based largely on Spruce's collections, is still the basis for the study of mosses of Meso — and South America.

Relatively few bryologists have worked in central Amazonia since the time of Spruce. Prance (1971) lists individuals, some of whom collected bryophytes, who have worked in Amazonia. Although several publications of a floristic or taxonomic nature have appeared in recent years, no modern comprehensive survey of amazonian bryophytes has been attempted.

Conspicuous also is the nearly complete lack of any ecological study which would give a picture of the communities and associates of amazonian bryophytes and the local environmental conditions under which they occur. The paper by Richards (1954), dealing with an area somewhat peripheral to Amazonia proper, is an exception. The thesis by Lisbôa (1976) may also be consulted.

Historically, Amazonia has represented rather much a paradox to many observers: the lush, dense rain forest growing on quite nutrient-poor soils, and the great diversity of plant taxa — particularly of woody Dicotyledonae — occurring in a region of minimal changes in topography. As to the latter paradox, considerable evidence has been developed suggesting that the area underwent several rather severe climatic cycles during and since the Pleistocene (cf. Haffer, 1969; Simpson, 1971; Prance, 1973). These cycles and their effect on the forest—viz., a contraction of the continuous forest back to discrete refuges — seem to have fostered speciation "spurts". The continuity of the contemporary rain forest is viewed as of relatively recent occurrence.

Soils and climate represent additional variables contributing to the impetus for diversification of flora in Amazonia. While nutrient levels are generally low — Sioli (1968) states that the amazonian forest lives *on* the soil more than *out* of the soil — still variation from area to area does occur as is also the case with regard to rainfall. Around Manaus annual precipitation averages 1600-1650 mm, the principal rainy period coming during December-April. Within a short distance of Manaus it is possible to encounter a variety of forest types, the variation in all cases being a product of the complex interplay of edaphic and microclimatic factors (Ducke & Black, 1954).

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The predominant forest of the Manaus area is that called *terra firme*. This forest occurs on sites sufficiently elevated as to not be subject to periodic inundation. Calymperaceae are common in the terra firme forest, the more often encountered taxa including: *Calymperes erosum* C. Müll., *C. lonchophyllum* Schwaegr., *C. mitrafugax* Florschütz, *C. platyloma* Mitt., *C. rubiginosum* (Mitt.) Reese, *Syrrhopodon lepriurii* Mont., and *S. hornsuschuchii* Mart.

Interrupting the upland forest here and there are *campinas*, small communities of sclerophyll forest occupying the deeper and more highly drained sands. Campina forest are rather open with few heavily shaded areas. The bryophyte flora of the campinas is quite diverse with most above-ground forms being heliophytes. The typical Calymperaceae of this forest type are: *Syrrhopodon brevisetus* Florschütz, *S. cryptocarpos* Dozy & Molk., *S. fimbriatus* Mitt., *S. helicophyllum* Mitt., and *S. parasticus* var. *disciformis* (C. Müll.) Florschütz.

North of Manaus in the vicinity of the Rio Lages is a forest of a *caatinga-like* physiognomy — many small-bole deciduous trees growing on relatively thin soils. This forest is unique among the collecting sites visited in 1974 in having large areas of exposed, flat sandstone rocks and some small rocky bluffs and caves. The previously undescribed *S. annotinus* (Reese & Griffin, 1976) was discovered in this forest growing on a thin sandy soil at the edge of a rock pool. Frequent also in the Rio Lages forest is *S. sylvaticus* Mitt., which occurs on the vertical faces of rocky bluffs.

Even the urban environment of Manaus supports one species of Calymperaceae — *Calymperes richardii* C. Müll. — which grows prolifically on the *Licania* trees planted along many of the municipal streets. While *C. richardii* is widely distributed and common in the lowland neotropics, in the vicinity of Manaus it appears to be more frequent within the city than without.

In all, about 33 taxa of Calymperaceae have been collected recently by the junior author, his students, and associates, in Amazonia. Those which represent new records, or are noteworthy for other reasons, are discussed

below. Included also is the first report of *Syrrhopodon berteroi* for Venezuela. Voucher specimens are deposited as indicated for each taxon. In addition, a complete set of the Brazilian specimens is deposited at INPA.

Calymperes bartramii Reese. BRAZIL, AMAZONAS: Rio Lages, km 130 along Manaus-Caracará road, 50 m, on living tree, *Griffin et al.* 765 (FLAS, LAF). — The specimen cited above is the first record for Brazil and the first to be found with sporophytes. Prior to this report, *C. bartramii* was known only from the two sterile specimens cited in the original description (Reese, 1961), from Colombia and Venezuela. The sporophyte, with the perforated calyptra clasping the seta below the urn, is typical for the genus: seta, 3 mm; urn, 1.5 mm; operculum rostrate, 1 mm; calyptra smooth, 4 mm; spores smooth, ca. 22 μ m.

Calymperes lanceolatum Hampe. BRAZIL, AMAZONAS: Boa Fé, margem Rio Negro acima da boca do Rio Apuaú, sobre pau podre, *Curso de Briologia INPA 021319* (FLAS) Ducke forest reserve, km 26 along Manaus-Itacoatiara road, 30 m, *Griffin et al.* 021307 pp. (FLAS). PARA: Rio Trombetas, vic. Cachoeira Porteira, on log, *Prance et al.* 024357 (FLAS). — These three specimens help fill in the known range of this rare South American endemic. Formerly, *C. lanceolatum* was known only from two collections, including the type, in southern Brazil — Sta. Catarina and near Rio de Janeiro — and from one collection each from Surinam and Guiana.

Calymperes levyanum Besch. BRAZIL, MATO GROSSO: Aripuanã, near Humboldt Centre, 59°21'N, 10°12'S, on log, *Lleras & Lima P18268* (FLAS); Aripuanã, Dardanelos, picada seguindo o aeroporto, sobre tronco vivo, *Lisbôa et al.* 367 (FLAS, LAF). — The two specimens cited above are the first records of this seldom collected species from Brazil and only the second and third records from South America. The distribution of *C. levyanum* otherwise includes southern Mexico, Belize, Nicaragua, Costa

Rica, and Panama in Central America, and Puerto Rico and Cuba in the Caribbean. The previous record from South America is from Surinam (Florschütz, 1964).

Calymperes mitrafugax Florschütz. BRAZIL. AMAZONAS: CEPLAC agricultural station, km 30 along Manaus-Itacoatiara road, 30 m, on erect dead tree, *Griffin et al.* 021300 (FLAS, LAF); CEPLAC Reserve, km 29 along Manaus-Itacoatiara road, tree trunk, *Prance 20987* (FLAS, LAF). — These two are the first records from Brazil and only the second and third collections of this recently discovered species (Florschütz, 1964). *Calymperes mitrafugax* was previously known only from the type collection, in Surinam.

Calymperes nicaraguense Ren. & Card. BRAZIL. MATO GROSSO: Aripuanã, near Humboldt Center, on road to new airport, 59°21'N, 10°12'S, on tree, *Lleras & Lima P18265* (FLAS). — This collection is a new record for the species from Mato Grosso and a range extension in Brazil. The only previously reported collection from Brazil was from northern Pará (Reese, 1961). *Syrrhopodon rivularis* Herzog (Arch. Bot. Est. São Paulo 1(2):59. 1923) is a new synonym of *Calymperes nicaraguense*, and the type collection thus a new record for the state of Espírito Santo. Examination of the type of *S. rivularis* from Herzog's herbarium (Im Salto Lure auf steinen mit Podostemen, leg. Lützelburg (JE)) shows the specimen to differ in no appreciable way from typical *C. nicaraguense*. Although the label data on the specimen at JE do not agree with those published with the type description, the cited specimen is the only named "*Syrrhopodon rivularis* Herzog" in Herzog's herbarium and thus must be the holotype of the name. This report greatly extends the known range of *C. nicaraguense* to the south in Brazil.

Calymperes platyloma Mitt. BRAZIL. AMAZONAS: CEPLAC agricultural station, km 30 along Manaus-Itacoatiara road, 30 m, erect dead tree, *Griffin et al.* 021301 (FLAS);

trunk of living tree, *Griffin et al.* 021298 (FLAS, LAF); Rio Urubu, km 115 along Manaus-Caracarai road, 40 m, tree trunk, *Griffin et al.* 898 (FLAS, LAF); Ducke forest reserve, km 26 along Manaus-Itacoatiara road, 30 m, tree trunks, *Griffin et al.* 96, 113, 114, 357 (FLAS, LAF). — The specimens cited above constitute a fine series of this rare species, which has not been previously reported from Brazil. Long known solely from the type collection in British Guiana (Reese, 1961), *C. platyloma* was later reported from Surinam on the basis of four additional collections (Florschütz, 1964). The seven collections reported here thus more than double previous herbarium representation of this species.

Calymperes rubiginosum (Mitt.) Reese. BRAZIL. AMAZONAS: Maués, perto da boca do Rio Maués-Açu, tronco vivo, *Nelson 3* (FLAS, LAF); CEPLAC agricultural station, km 30 along Manaus-Itacoatiara road, 30 m, tree trunk, *Griffin et al.* 149 (FLAS, LAF); Ducke forest reserve, km 26 along Manaus-Itacoatiara road, 30 m, tree trunk, *Griffin et al.* 021309, 021312, 021314, (FLAS, LAF). — The five collections cited above represent a good series of specimens of this interesting and apparently rare little *Calymperes*. The synonymy and distribution of this species were recently discussed by Reese (1975). The seemingly anomalous distribution of *C. rubiginosum*, i.e., the great disjunction between Honduras and northeastern South America, may be resolved by future collecting in intermediate areas.

Syrrhopodon annotinus Reese & Griffin. BRAZIL. AMAZONAS: km 130 along Manaus-Caracarai road, on sandy soil, *Griffin et al.* 408 pp., 723 (FLAS, LAF). — Two additional specimens of this recently described species (Reese & Griffin, 1976), from the same general locality as the type material, were discovered during reexamination of collections of Brazilian Calymperaceae. *Syrrhopodon annotinus* shares its habitat at the Rio Lages site with *S. brevisetus*

Florschütz, plants of the two species sometimes growing together in the same turf on the sandy substrate.

Syrrhopodon berterioanus (Brid.) C. Müll. VENEZUELA. ZULIA: trail between San José de Los Altos and Topochalito, 2200-2400 m, on tree, *Griffin* 20, 71, 88 (FLAS, LAF); at San José de Los Altos, 1600-1800 m, buttress root of large tree, *Griffin* 212 (FLAS, LAF); Valley of the rio Socuy above the "Gran Sabana", 2400-2800 m, on tree, *Griffin* 296 (FLAS, LAF). — The five collections cited here are a new record for this taxon for Venezuela. Although of rather wide occurrence in the Americas, *S. berterioanus* is apparently rare in northern South America, where prior to this report it was known only from eastern Peru, Trinidad, and Tobago. It has been collected a number of times in southern Brazil.

Syrrhopodon brevisetus Florschütz. BRAZIL. AMAZONAS: Manaus-Caracarai road, km 60, 50 m, on tree base, humic soil, rotted log, *Griffin et al.* 60, 550 (FLAS), 240, 956 (FLAS, LAF); km 130, on soil, *Berg et al.* P19521 (FLAS, LAF), on humus and sandy soil, *Griffin et al.* 373, 396 pp., 397, 464 (FLAS, LAF). — This is the first report of this species from Brazil. Until the second author began collecting in the vicinity of Manaus, *S. brevisetus* had been known only from the two collections from Surinam comprising the type material (Florschütz, 1964). As the specimens cited indicate, *S. brevisetus* occurs in some abundance, although always sterile, in the region of the state of Amazonas around Manaus.

Syrrhopodon circinatus (Brid.) Mitt. BRAZIL. AMAZONAS: Manaus-Porto Velho road, *Prance* P19647 (FLAS); km 240 along Manaus-Porto Velho road, on tree, *Lleras et al.* P19600 (FLAS). — This is the first report for *S. circinatus* from Brazil. The species is otherwise known from southern Mexico to Peru, some of the Lesser Antilles, Trinidad, and northern Venezuela.

Syrrhopodon cryptocarpus Dozy & Molck. BRAZIL. AMAZONAS: Reserva Ducke, Manaus-Itacoatiara road, km 26, on tree, *Berg et al.* P17599 (FLAS), *Griffin et al.* 021307 pp. (FLAS); km 60 along Manaus-Caracarai road, 50 m, on log, termite mound, tree trunk, *Griffin et al.* 16, 590, 598, 962 (FLAS); Manaus-Caracarai road, km 62, on log, *Prance et al.* 18742 (FLAS LAF); Rio Urubu, km 115 along Manaus-Caracarai road, 40 m, on termite mound, *Griffin et al.* 890 (FLAS, LAF); Campus Inst. Nacional Pesquisas Amazônia, Manaus, 30 m, on palm trunk, *Griffin et al.* 1-38 (FLAS, LAF). TERRITORIO DO RONDÔNIA: N bank of Rio Abunã, 10 km above Fortealeza palm trunk, *Prance et al.* 8556 (FLAS). — These specimens constitute a fine series of this distinctive little moss which is widely, but sparingly, distributed in low, wet forests of northern South America.

Syrrhopodon fimbriatus Mitt. BRAZIL. AMAZONAS: Ducke forest reserve, km 26 along Manaus-Caracarai road, 30 m, on tree *Griffin et al.* 021308 (FLAS); km 45 along Manaus-Caracarai road, tree branches, *Prance et al.* 11383 (FLAS); km 60 along Manaus-Caracarai road, on trees and tree bases, 50 m, *Griffin et al.* L-4, 946 (FLAS), 31, 545 (FLAS, LAF); km 115 along Manaus-Caracarai road, tree trunk over river, *Griffin et al.* 416 (FLAS, LAF). — This series of collections indicates that this striking and rarely collected moss occurs in some abundance in the vicinity of Manaus.

Syrrhopodon helicophyllus Mitt. BRAZIL. AMAZONAS: Ducke forest reserve, km 26 along Manaus-Itacoatiara road, tree trunk, 30 m, *Griffin et al.* 345 (FLAS, LAF), 355-a (FLAS); km 45 along Manaus-Caracarai road, on sapling stem, *Prance et al.* P11380 (FLAS); km 60 along Manaus-Caracarai road, Reserva Experimental INPA, terrestrial, *Prance et al.* 18713 (FLAS, LAF); km 63 along Manaus-Caracarai road, Reserva Biológica Campina, tree branches, *B. & D. Coelho s. n.* (FLAS, LAF); Rio Lages, km 130 along Manaus-Caracarai road, on tree,

50 m, *Griffin et al.* 407 (FLAS, LAF). — These collections represent an unusually fine series of this uncommon and distinctive species.

Syrrhopodon hornschurchii Mart. BRAZIL. AMAZONAS: Ducke forest reserve, km 26 along Manaus-Itacoatiara road, 30 m, on rotting log, *Griffin et al.* 91 (FLAS, LAF); km 27, on rotting log, *Prance et al.* 11302 (FLAS); km 65, Reserva Florestal Egler, on liana, *Griffin* 498 (FLAS), on tree, *Berg et al.* P17617, P17619 (FLAS); Rio Urubu, km 115 along Manaus-Caracarai road, 40 m, on tree, *Griffin et al.* 838 (FLAS, LAF), 842 (FLAS); Rio Lages, km 130 along Manaus-Caracarai road, on tree, *Griffin et al.* 752 (FLAS, LAF); km 240 along Manaus-Porto Velho road, on tree, *Lleras et al.* P19595 (FLAS). TERRITORIO DE RORAIMA: Rio Branco entre Boiaçu e Catrimani, on log. *Curso de Briologia INPA 021318* (FLAS). — This species has its main distribution in and around the Amazon basin, with a few collections known from elsewhere in South America. The specimens cited here are a good series of a rather poorly known species.

Syrrhopodon incompletus Schwaegr. var. **luridus** (Par. & Broth.) Florschütz. BRAZIL. AMAZONAS: km 60 along the Manaus-Caracarai road, 50 m, on tree and log, *Griffin et al.* 1001 (FLAS, LAF), 021320 (FLAS); Rio Javari, behind Palmeiras Army Post, 72° 49'W, 5°8'S, on tree, *Lleras et al.* P16990 (FLAS, LAF). — This taxon is endemic to northeastern South America and the specimens cited are the first records for Brazil. Variety *luridus* is otherwise known from Guiana, French Guiana, and Surinam.

Syrrhopodon quintasii Broth. BRAZIL. MATO GROSSO: Gorge of Véu de Noiva, Chapada dos Guimarães, on rock, *Prance et al.* 19090, 19095, 19143, 19144, 19157 (FLAS), 19098 (FLAS, LAF); 5 km E of Chapada dos Guimarães on road to Embratel, 720 m, on rock, *Prance et al.* 19380 (FLAS, LAF), 19381, 19387 (FLAS). — *Syrrhopodon quintasii*, only recently recognized as such in the

Americas (Reese, 1974), seemingly occurs rather abundantly at the localities cited above. These specimens represent a new record for the species in the state of Mato Grosso. This species is otherwise known in Brazil from the states of Goiás and Minas Gerais. *Syrrhopodon hobsonii* (Grev.) Hook. & Grev. var. *spinulosus* Herzog (Beih. Bot. Centralbl. 26:69. 1909) is a previously overlooked *nomen nudum* based on *S. quintasii*. Examination of the specimens bearing this name in Herzog's herbarium (Bolivia: An schattigen Sandstein-felsen des Cerro de Santiago [Chiquitos], 700 m, Mai, 07, leg. Th. Herzog (JE, L)) shows them to be *S. quintasii*.

Syrrhopodon xanthophyllus Mitt. BRAZIL. AMAZONAS: Rio Urubu, km 115 along Manaus-Caracarai road, 40 m, on termite mound, *Griffin et al.* 890 pp. (FLAS, LAF); Ponta Negra, near Manaus, bank of Rio Negro, on termite mound, *Griffin* 291 (FLAS, LAF); km 12 along Manaus-Itacoatiara road, terrestrial, *Griffin* 215 (FLAS, LAF). — This species is apparently very rare and is poorly represented in herbaria. The collections cited extend the known range of the species in Brazil considerably to the southeast. It was formerly known only from the vicinity of the Rio Negro and Rio Casiquiare. One of the cited specimens (*Griffin et al.* 890 pp.) is a mixture of *S. xanthophyllus* and *S. cryptocarpus*.

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Resumo

Foram analisadas e reconhecidas algumas espécies da flora briológica do Brasil, particularmente da Amazônia, e Venezuela, pertencentes à família Calymperaceae. Sete (7) delas são divulgadas como novas para o Brasil — *Calymperes levyanum* Besch., *C. platyloma* Mitt., *C. bartramii* Reese, *C. mitrafugax* Florschütz, *Syrrhopodon incompletus* var. *luridus* (Par. & Broth.) Florschütz, *S. circina-*

tus (Brid.) Mitt. e *S. brevisetus* Florschütz. Apenas uma, *S. berterianus* (Brid.) C. Mull. é citada como inédita para a Venezuela.

A ocorrência e distribuição geográfica de várias espécies da família no Brasil, são discutidas

Concluiu-se ainda que — *Syrrhopodon rivularis* Herzog é um novo sinônimo de *Calymperes nicaraguense* Ren. & Card.

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