

Stenopadus andicola (Compositae: Mutisieae), a new generic record for Peru

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Abstract

Stenopadus (Compositae: Mutisieae) is newly documented for the flora of Peru based on collections of *Stenopadus andicola* PRUSKI (originally described from the Cordillera del Cóndor, Ecuador) from Deptos. Amazonas and Loreto. The newly collected flowering material has filaments attached to the corolla tube at or near the sinus of the corolla lobes, weakly or non-keeled phyllaries and the species is thereby placed in *Stenopadus* section *Stenopadus*.

Resumen

Stenopadus (Compositae: Mutisieae) es típico de la región Guayana de Brasil, Colombia, Guyana y Venezuela. *Stenopadus* tiene 15 especies, 14 de estas se presentan en esta región. De estas 14, siete son endémicas de Venezuela, una es endémica de Brasil, una es endémica de Colombia y otra endémica de Guyana. Las especies del género son leñosas (desde arbustos hasta árboles de 26 m de altura) y generalmente ocurren en suelos de arenisca. Los capítulos de *Stenopadus* son pocos en número, generalmente grandes y homógamos, contienen flores hermafroditas, actinomorfas, rojas, principalmente corolas glabras con lóbulos elongados comúnmente enrollados. Recientemente una nueva especie se describió de la Cordillera del Cóndor en Ecuador. Esta misma especie, *Stenopadus andicola* PRUSKI, registramos como nueva para el Perú, colectada en el Depto. Loreto: Cordillera Azul del Biabo y en el Depto. Amazonas: Cerros Chinim.

Introduction

Stenopadus S. F. BLAKE (Compositae: Mutisieae) is largely restricted to the Guayana region of Brazil, Colombia, Guyana, and Venezuela. The genus *Stenopadus* includes 15 species; 14 of these are endemic to the Guayana region (PRUSKI 1997, 1998). Of these Guayana regional endemics, seven species are endemic to Venezuela; *Stenopadus aracaënsis* PRUSKI is endemic to Brazil; *Stenopadus colombianus* CUATR. & STEYERM. is endemic to Colombia; and *Stenopadus megacephala* PRUSKI is endemic to Guyana (PRUSKI 1991, 1997, 1998). The species of *Stenopadus* are woody (shrubs or trees to 26 m tall), and generally occur on nutrient-poor soils derived from sandstone. The capitula of *Stenopadus* are few in number, homogamous and generally large, and all flowers are hermaphroditic. The corollas of these flowers are actinomorphic, generally glabrous, and have long lobes that are commonly coiled. Species of *Stenopadus* are among the tallest Compositae known, and *Stenopadus andicola* PRUSKI (trees to 26 m tall), *Stenopadus connellii* (N. E. BR.) S. F. BLAKE (trees to 25 m tall), and *Stenopadus cucullatus* MAGUIRE & WURDACK (trees to 20 m tall) are among the tallest American Compositae.

Stenopadus andicola was recently described from sandstone bluffs above the Río Nangarítza in the Cordillera del Cóndor in Ecuador (PRUSKI 1998). No species of *Stenopadus* were listed as occurring in the Andes in treatments of the Mutisieae for Colombia (DÍAZ-PIEDRAHITA & VÉLEZ-NAUER 1993), Ecuador (HARLING 1991), Peru (FERREYRA 1995), or Venezuela (ARISTEGUIETA 1964). Thus, the description of this species in Ecuador marked the first report of the genus in the Andes, and simultaneously the first report of the genus from outside the Guayana region. This same species, *Stenopadus andicola*, has been collected in similar habitats on sandstone in adjacent Peru (BELTRÁN & PRUSKI 2002), and its presence in Peru is here documented by citation of the voucher specimens. One Peruvian locality (Cerros Chinim, Amazonas) is relatively near the type locality in Ecuador, whereas the second Peruvian locality (near Pauya of Cordillera Azul del Biabo, Loreto) represents a more substantial range extension. These two collections of *Stenopadus andicola* in Peru represent a new generic addition to the flora of Peru.

The Mutisieae contain some of the most primitive species of Compositae, and the "ancestral asteraceous plant" illustrated in BREMER (1994) is *Stenopadus*-like. As noted by PRUSKI (1991, 1998) important primitive features found in the Guayana-centered Mutisieae include arborescent habit, thick fleshy leaves (taken as a mechanical deterrent, in light of the weak protective chemistry of the group), large capitula with florets that are bird-pollinated, paleate receptacles, short rounded style branches with a single stigmatic surface and without collecting hairs, anthers without a sculptured or elaborate apical appendage, and smooth prolate pollen. URTUBEY & STUESSY (2001) noted that the perennial herbaceous *Schlechtendalia* LESS.

(Barnadesieae, formerly Mutisieae subtribe Barnadesiinae) from Argentina, Brazil, and Uruguay is perhaps basal in the Compositae. Whether the herbaceous or arborescent habit is plesiomorphic (ancestral) in Compositae, all members of the *Stenopadus* group and the sole species of *Schlechtendalia* are nevertheless restricted to South America. We therefore take the continent of South America as the center of origin and diversification of Compositae.

In addition to the Peruvian collections of *Stenopadus andicola* being in full flower, the slightly enlarged and nearly barbellate pappus tips of these collections is an interesting feature. The type of *Stenopadus andicola* shows this feature, as do several other species of the genus from the Guayana region. However, the enlarged pappus tips in the Peruvian collections are particularly noticeable and among the more obvious among the species of *Stenopadus*. The pappus of several Guayana Mutisieae genera may be slightly enlarged and barbellate, although never much as in the related Brazilian Mutisieae genus *Wunderlichia* RIEDEL ex BENTH. (GISELA SANCHO, pers. comm.). In *Wunderlichia* the pappus tips are very much more obvious than in the Guayana genera, but nevertheless we do note here the occasional occurrence of enlarged pappus tips in the Guayana-centered Mutisieae.

An amplified description of *Stenopadus andicola* follows, as do citations of the known collections of the species. Included among these specimens are the vouchers from Peru that document the occurrence of this genus and species as new to the flora of Peru.

Stenopadus andicola PRUSKI, Novon 8: 67. 1998. Figs. 1–3.

TYPE: ECUADOR: Zamora-Chinchi: Cantón Nangaritza: Valle del Río Nangaritza, Miazí, bosque sobre pendientes fuertes de roca caliza o de pizarra, bosque primario, muy denso, 4°18'S, 78°40'W, 1200 m, 10 Dec 1990 (fr), W. PALACIOS 6712 (holotype US!; isotypes MO!, QCNE n.v.).

Trees 4–26 m tall; stems subterete, grooved, 10–20 cm diam., sericeous when young to glabrate, leafy distally, leafless proximally, internodes to 3 cm long. Leaves simple, alternate, often apically clustered, petiolate; petiole 1–4 cm long, thin and non-clasping; blade rigid-coriaceous, elliptic to obovate, 6.5–24 cm long, 2–10 cm wide, apically broadly acute to obtuse, basally cuneate, margins entire, thickened, somewhat revolute, venation pinnate, reticulate or third-order veins sometimes obscure, the upper blade surface dark green, midrib commonly sericeous to puberulent, upper surface otherwise puberulent when young to glabrous, the lower blade surface pale green, midrib sericeous to weakly so, lower surface otherwise sericeous when young to nearly glabrous. Capitula solitary, terminal, sessile to shortly pedunculate, homogamous, 25–50-flowered, florets bisexual; peduncle 0–2 cm long and not much

exserted above the bases of the subtending leaf cluster, the subtending leaves deciduous and upper node or two with elongating axillary branch(es) when capitula in fruit, the peduncle then leafless with capitula 5 cm above axillary branch(es) and uppermost leaves; involucre cylindrical to narrowly campanulate, 5–7 cm long, 2–3 cm wide, 6–8-seriate; phyllaries 40–54, imbricate, graduated, tightly appressed and rigidly erect, but inner spreading somewhat when fruiting, coriaceous to carnosous, sericeous or glabrate, green or brown marginally or apically, entire, the outer phyllaries very weakly keeled or not so, triangular-ovate, 0.5–0.9 cm long, 0.4–0.8 cm broad, apex acute or obtuse, the inner phyllaries flat, not at all keeled, elliptic-lanceolate to lanceolate, ca. 2–3 cm long, 0.4–0.9 cm wide, apex narrowly acute; receptacle flat, epaleaceous, 1–1.8 cm diam. Corollas actinomorphic, somewhat carnosous, tubular, strongly 5-cleft, ca. 31–37 mm long, magenta, glabrous externally; tube 16–18 mm long, often pilose distally within at base of filaments, about as long as the lobes; lobes linear-lanceolate, but strongly reflexed in about 3 or 4 complete backwards coils and seemingly sitting near apex of the corolla tube, lobes thus appearing to be much shorter than the tube, lobes fully extended ca. 15–19 mm long, 2-nerved or occasionally weakly 3-nerved, in such cases the medial central nerve very faint; anthers completely exserted, linear, greenish to cream-colored, ca. 15 mm long, apically acuminate, but without a sculptured or ornamented appendage, basally sagittate; tails white, smooth, linear, ca. 9 mm long, tails of adjacent anthers loosely connate; filaments ca. 15–16 mm long, inserted within the tube toward distal portion of tube or at the sinus of the corolla lobes; styles obscurely branched, magenta, glabrous without apical abaxial pollen collecting hairs, ca. 4–5 cm long, branches ovate, ca. 0.5 mm long, with a continuous stigmatic surface. Cypselas (achenes) nearly cylindrical, mostly 5-angled, ca. 10 mm long, brown, glabrous; pappus of numerous scabrid setae, several-seriate, linear, stramineous, to 20 mm long, about twice as long as the cypselas, apically slightly swollen and barbellate.

Additional material:

ECUADOR: Zamora-Chinchi: Cantón Nangaritza: Detrás del Campamento Militar de Miazí (oeste), bosque nublado con árboles cubiertos completamente de hepáticas y musgos, estrato del bosque 15 m de altura, arenizca cuarzosa meteorizada, 4°16'S, 78°42'W, 1100 m, 21 Oct 1991 (fr), W. PALACIOS et al. 8551 (MO!); Sector Orquídeas, east bank of the Río Nangaritza, dense forest on sandstone of the Hollín Formation, 04°12'57" S, 78°39' 58"W, 1040 m, 16 Jun 2002, O. CABRERA et al. 1117 (LOJA n.v.), 1100 m, 8 Aug 2002, W. QUIZHPE 140 (LOJA n.v., MO n.v., QCNE n.v.)

PERU: Amazonas: Bagua: Imaza: Aguaruna de Wanas, (km 92 Carretera Bagua-Imacita), Cerros Chinim [5°15'56"S, 78°22'07"W], bordes quebrada rocosa, 800–850 m, 31 Aug 1996, C. DÍAZ et al. 8090 (MO!). **Loreto:** Ridge at the upper Pauya,

Cordillera Azul del Biabo, montañas en las cabeceras del Río Pisqui, 8°28'45.6"S, 75°43'5.12"W, 1220 m, 12 Sep 2000, H. BELTRÁN 3333 (MO!, USM!).

There is some variation in leaf blade size and shape between the type of *Stenopadus andicola* and the Peruvian collections. However, several species of *Stenopadus* have similar degrees of variation in blade shape, petiole length, blade pubescence, and shape of the blade apex. The most variable species in these regards is *Stenopadus talaumifolius* S. F. BLAKE, which is very much more variable than the variation present among the known collections of *Stenopadus andicola*. We also note that *Stenopadus andicola* may flower when only 4 m tall, whereas some individuals are known to reach heights to 26 m, among the tallest American Compositae. Similar variation in leaf characteristics and plant height is found in other species of *Stenopadus*, and thus the vegetative variation in these collections of *Stenopadus andicola* from Peru has no taxonomic significance.

The newly collected Peruvian flowering material of *Stenopadus andicola* has filaments clearly attached to the corolla tube at or near the sinus of the corolla lobes and weakly or non-keeled phyllaries. This species is thereby placed here squarely in *Stenopadus* section *Stenopadus* sensu MAGUIRE et al. (1957a, 1957b), which is typified by *Stenopadus talaumifolius*. It is interesting to note that two of the more vegetatively plastic species of the genus (*S. andicola* and *S. talaumifolius*) are both members of *Stenopadus* section *Stenopadus*. *S. andicola* and *S. talaumifolius* are also among the most geographically widespread (*S. talaumifolius* occurs in Brazil, Colombia, Guyana, and Venezuela; see PRUSKI 1991, 1997) and ecologically successful species of the genus. These two members of *Stenopadus* section *Stenopadus* are here presumed here to be among the most evolutionarily advanced members of the genus, and *S. andicola* is particularly noteworthy in that it is the only member of the genus to have successfully invaded the Andes (PRUSKI 1998).

Distribution, ecology, and biogeography. We know *S. andicola* from only three localities: the type locality and environs on the Cordillera del Cóndor, Ecuador, and the two Peruvian localities cited herein. We have seen material of four collections, but two newer collections from about 10 km north of the type locality in Ecuador have recently (June and August 2002) been made (DAVID NEILL, pers. comm.). DAVID NEILL and colleagues have searched intensively for *Stenopadus* in forested sandstones bluffs above the upper reaches of the Río Nangaritza of the Cordillera del Cóndor, habitats similar to that of the type locality. These explorations have failed to discover *Stenopadus* in adjacent Morona-Santiago province, thus *S. andicola* apparently occurs from the Cordillera del Cóndor in Zamora-Chinchipec, Ecuador and southwards into Peru.

The collections known to us are in bud in August, flower in August and September, and fruit in October. The species is known from 800 to 1220 m elevation (ALVERSON et al. 2001 list the Loreto collection from Peru as 1700 m) in Ecuador on the Cordillera del Cóndor Ecuador and in Peru on nearby Cerro Chinim in Amazonas, Peru and the more distant Cordillera Azul del Biabo, near the border of Loreto and Ucayali, Peru.

Ecological associates of *S. andicola* occurring in the "Zona Reservada Biabio Cordillera Azul" in Loreto include species of *Retiniphyllum*, *Schefflera*, *Purdiaea*, *Pagamea*, *Talauma* (now reduced to *Magnolia*), and *Schizaea*. While Cordillera Azul is not well known as a home to former Guayana endemics, the presence there of *Stenopadus*, for example, seems to indicate a great potential for further interesting and important biogeographic discoveries. A discussion of the Cordillera Azul and its vegetation, as well as a color photograph (p. 28, Fig. 9F) of *S. andicola* (as *Stenopadus* sp. nov.) appears in ALVERSON et al. (2001).

The poorly explored Cordillera del Cóndor forms part of the international frontier between Ecuador and Peru, and until recently was the site of armed confrontations between these two neighboring countries. This Cordillera is an eastward extension of the Andes, partly segmented in the north from the main Andean chain by the Nangaritza River valley. The upper strata of the Cordillera del Cóndor differ geologically from the core Andean chain by being composed of nutrient-poor sandstones that form flat-topped ridges (DAVID NEILL, pers. comm.). Sandstone substrates, on the other hand, largely characterize the tepuis of the Guayana Highland, centered more than 1500 kms to the northeast of the biogeographically important Cordillera del Cóndor. The sandstones of the Cordillera del Cóndor and adjacent areas may provide suitable habitats for largely Guayana-centered taxa.

Recent collections have revealed that the Cordillera del Cóndor and adjacent areas are indeed home to several other disjunct genera and species (other than *S. andicola*) that are concentrated in the geologically older Guayana region. Some additional taxa largely endemic to the Guayana region, but now disjunct to the Cordillera del Cóndor and environs include *Arititiyopea lopezii* (Xyridaceae), *Bonnetia* (Theaceae), *Euceraea nitida* (Flacourtiaceae), *Everardia montana* (Cyperaceae), *Paepalanthus dichotomus* (Eriocaulaceae), *Perama* (Rubiaceae), *Perissocarpa* (Ochnaceae), *Phainantha* (Melastomataceae), *Podocarpus tepuiensis* (Podocarpaceae), *Pterozonium brevifrons* and *reniforme* (Pteridaceae) (PRUSKI 1998, DAVID NEILL & RODOLFO VÁSQUEZ, pers. comm.). Other taxa, for example *Lissocarpa* (Ebenaceae), are found largely in Guayana and the region of the Cordillera del Cóndor, but concentrated in neither. We anticipate discovery of additional exciting biogeographic links between the Lost World of the Guayana Highland and the Cordillera del Cóndor.

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References

- ALVERSON, W. S., RODRÍGUEZ, L. O. & D. K. MOSKOVITS (eds.) 2001. *Perú: Biabo Cordillera Azul*. Rapid Biological Inventories: 02. The Field Museum, Chicago.
- ARISTEGUIETA, L. 1964. Compositae. In: LASSER, T. (ed.), *Fl. Venezuela* 10: 1–941.
- BELTRÁN, H. & J. F. PRUSKI 2002. *Stenopadus andicola* (Asteraceae: Mutisieae): Un nuevo registro genérico para la Flora del Perú. Page 112 (abstract). *LX Congreso Nacional de Botánica*: 17-22 Junio 2002. Universidad Nacional de la Amazonia Peruana, Iquitos.
- BREMER, K. 1994. *Asteraceae: Cladistics & Classification*. Timber Press, Portland, Oregon.
- DÍAZ-PIEDRAHITA, S. & C. VÉLEZ-NAUER 1993. Revisión de las tribus Barnadesieae y Mutisieae (Asteraceae) para la Flora de Colombia. *Monogr. Jard. Bot. José Celestino Mutis* 1: xi + 1–162.
- FERREYRA, R. 1995. Family Asteraceae: Part VI [Tribe Mutisieae]. In: MACBRIDE, J. F. & Collaborators, *Flora of Peru. Fieldiana, Bot.* n.s., 35: v + 1–101.
- HARLING, G. 1991. Compositae-Mutisieae. In: HARLING, G. & L. ANDERSSON (eds.), *Flora of Ecuador* 42: 1–105.
- MAGUIRE, B., STEYERMARK, J. A., WURDACK, J. J. & Collaborators 1957a. Botany of the Chimantá Massif - I. Gran Sabana, Venezuela. *Mem. New York Bot. Gard.* 9(3): 393–439.
- MAGUIRE, B., WURDACK, J. J. & Collaborators 1957b. The botany of the Guayana Highland - Part II. *Mem. New York Bot. Gard.* 9 (3): 235–392.
- PRUSKI, J. F. 1991. Compositae of the Guayana Highland - V. The Mutisieae of the Lost World of Brazil, Colombia, and Guyana. *Bol. Museu Paraense, sér. Bot.* 7: 335–392.
- PRUSKI, J. F. 1997. Asteraceae. Pages 177–393. In: J. A. STEYERMARK et al. (eds.), *Flora of the Venezuelan Guayana*, Vol. 3. Missouri Botanical Garden, St. Louis.

- PRUSKI, J. F. 1998. *Stenopadus andicola* sp. nov. (Asteraceae: Mutisieae), a new generic record for Ecuador. *Novon* 8: 67–69.
- URTUBEY, E. & T. F. STUESSY 2001. New hypotheses on phylogenetic relationships in Barnadesioideae (Asteraceae) based on morphology. *Taxon* 50: 1043–1063.

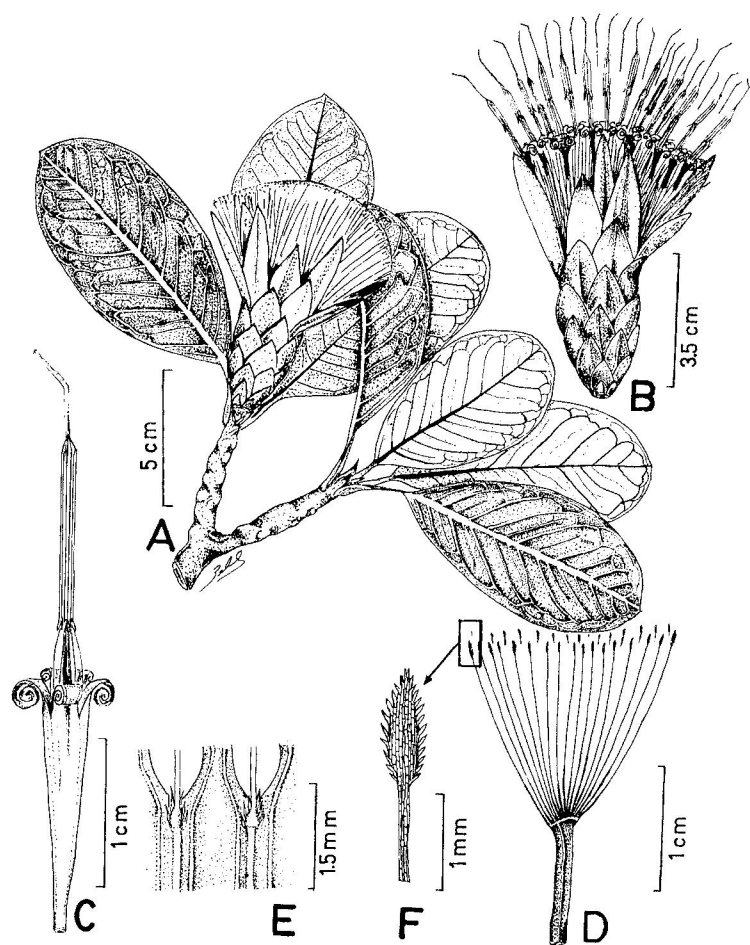


Fig. 1. *Stenopadus andicola* PRUSKI. Illustration (based on BELTRÁN 3333).

- A. Habit.
- B. Capitulum.
- C. Corolla, stamens, and style.
- D. Cypsela.
- E. Adaxial surface of corolla tube-lobe juncture, showing pilose hairs, two veins per lobe, and insertion of filaments near the sinus of the corolla lobes.
- F. Enlarged apical portion of pappus seta showing barbellate hairs.



Fig. 2. *Stenopadus andicola* PRUSKI.
Field photograph of BELTRÁN 3333 by ROBIN FOSTER.