Fungal Diversity (2010) 42:79–96
DOI 10.1007/s13225-009-0008-6

A preliminary account of *Xylaria* in the Tucuman Province, Argentina, with a key to the known species from the Northern Provinces

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Received: 22 September 2008 / Accepted: 1 September 2009 / Published online: 19 February 2010

Abstract A preliminary account of *Xylaria* in Argentina is presented based primarily on collections from part of "Las Yungas" biosphere reserve in Tucumán province. The following new taxa are proposed: *X. culicicephala*, *X. tucumanensis*, *X. filiformioidea*, *X. stilbohypoxyloides* and *X. microceras* var. *yungae*. The following new combination is made: *X. xylarioides*. Material morphologically identical to *X. ianthino-velutina* was found on wood, but a culture difference was noted. It is keyed out as *X.* aff. *ianthino-velutina*. A dichotomous key to twenty-nine taxa known so far from the Northern provinces of Argentina is presented.

Keywords New species · *Xylaria* · Argentina · *Xylariaceae*

Introduction

There have been very few investigations on the genus *Xylaria* in South America. The main papers are those by Spegazzini (1880a, b; 1881; 1884; 1887; 1889; 1899; 1902; 1909; 1919); Dennis (1956, 1957, 1958a, 1970) has added species from Argentina, Bolivia and Venezuela, while Rogers *et al*. (1988) has completed a study on the genus in Venezuela. Van der Gucht (1995) in her study on xylariaceous fungi collected in Papua New Guinea has listed Argentina, Brazil, Bolivia, Chile, Colombia and Venezuela for some of the Papua New Guinea species. Læssøe (2002) and Læssøe and Lodge (1994) have reported on a group of *Xylaria* from Ecuador and adjacent countries. Furthermore Theissen (1909), Rick (1935), Duarte Silveira and Ferreira Rodriguez (1985) have described species from Brazil. Hamme and Guerrero (1997) proposed two new taxa from South Brazil and later (2002) published a study of the biosystematics of the genus.

The previous reports from Argentina consist of 28 species described by Spegazzini, 20 of which he proposed, and 10 species added by Dennis in his works on this genus from Tropical America. The following species described by Spegazzini, i.e., *X. antarctica*, *X. argentinensis*, *X. biceps*, *X. fuegiana*, *X. hercules*, and *X. macropoda* were treated as synonyms by Dennis. All of this information, including author citations, is summarized in Table 1. Recently, Hladki (2001) and Hladki and Romero (2005) have reported *X. anisopleura*, *X. apiculata*, *X. mellissii*, *X. curta*, *X. enteroleuca*, *X. grammica* and *X. ianthino-velutina* from the Tucumán Province, Argentina, and treated *X. argentinensis*, *X. biceps*, *X. biceps* f *contracta* as synonyms. Hladki and Romero (2007) reported another twelve *Xylaria* species as new to Argentina: *X. adscendens*, *X. allantoidea*, *X. coccophora*, *X. cubensis*, *X. fissilis*, *X. gracillima*, *X. luxurians*, *X. melanura*, *X. multiplex*, *X. myosurus*, *X. kretzschmarioidea* and *X. pseudoapiculata*. The latter two taxa are only known from their type localities in Venezuela and Brazil. Hladki and Romero (2007), furthermore, described the first known cultures of: *X. kretschmarioidea*, *X. luxurians* and *X. melanura* and proposed *X. torulosa* as a synonym of *X. coccophora*. Recently *Xylaria berkeleyi* has been described as new record

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Table 1 *Xylaria* species reported by Spegazzini from Argentine Yungas

Spegazzini determination and LPS numbers	Spegazzini references	Dennis `s concepts & additions	Other interpretations; accepted in bold
X. apiculata Cooke LPS 3299!	1899	–	***X. apiculata*** Hladki and Romero (2005)
X. arbuscula Sacc. LPS 3248!	1899, 1909, 1919	*X.* Dennis (1961)	***X.*** *X. arbuscula* Hladki and Romero (2005)
X.argentinensis Speg. LPS 3250!	1902	*X. anisopleura* (Mont.) Fr. Dennis (1958b)	***X. globosa*** *X. anisopleura* Lloyd (1918) Rick (1935), Hamme and Guerrero (2002), Hladki and Romero (2005)
X. biceps Speg. LPS 3298 !	1881, 1899	*X. arbuscula* Sacc. Dennis (1956)	***X.*** *X. arbuscula* Lind (1913) Hamme and Guerrero (2002) Hladki and Romero (2005) *X. hypoxylon* f. *biceps*. Theissen (1909)
X. contracta Speg. LPS 3311!	1881	–	***X.*** *X. arbuscula* Hamme and Guerrero (2002) Hladki and Romero (2005)
X. grammica (Mont.) Fr. LPS 541	1909	*X. grammica* Dennis (1958a)	***X. grammica*** Hladki and Romero (2005)
X. ianthino-velutina (Mont.) Fr. LPS 543	1909, 1919	*X. ianthino-velutina* Dennis (1956)	***X. ianthino-velutina*** Hladki and Romero (2005) Hladki and Romero (2007)
X. macropoda Speg. LPS 3262!	1909, 1919	X. grammica Dennis (1956)	**X. grammica** Hamme and Guerrero (2002) Hladki and Romero (2005)
X. smilacicola Speg. LPS 3237!	1909, 1919	X. smilacicola Dennis (1957)	***X. xylarioides*** in here
X. torulosa (Jungh.) Speg. LPS 3238!	1909, 1919	–	***X. coccophora*** Hladki and Romero (2007)
X. venosula Speg. LPS 3293!	1899	*X. apiculata* Cooke Dennis (1956)	***X. xylarioides*** in here *X. smilacicola* Hamme and Guerrero (2002)
X. sordida Speg. LPS 3233!	1909	*X. curta* Fr. Dennis (1958a)	***X. curta*** Hladki and Romero (2005)

from Argentina by Hladki and Romero (2009, in press) and its culture has been obtained on oatmeal agar

The present work deals with *Xylaria* collected during a survey on *Xylariaceae* within part of the biosphere reserve "Las Yungas", in the Tucumán Province, Argentina.

Material and methods

The sampling area is part of the "Yunga" region, which is localized between 22º and 24º South latitude and 64º and 68º West longitude, in the Northwest of Argentina, and involves Salta, Jujuy and Tucumán provinces. "Las Yungas" was included in the World Network of Biosphere Reserve by the UNESCO in 2000.

The present study was carried out in different localities in the Tucuman region of the Yunga. With respect to the Argentine phytogeographical regions, "Las Yungas" belongs to the "Amazonic Dominion" (Cabrera 1971).

In addition, 60 specimens from different herbaria: BAFC, LIL, LPS, C, and PC (herbarium abbreviations follow Holmgren *et al*. 1990) were studied. The fresh collections were air-dried and brought into culture. Specimens and cultures were preserved in **BAFC** and **LIL**.

Observations and measurements were taken from fresh material squash-mounted in distilled water, 5% KOH and phloxine for optical microscopy and in Melzer's reagent for the amyloid reaction (IK). Drawings were made with a camera lucida.

Cultures were obtained from spores as previously explained in Hladki and Romero (2001), and grown and characterized on oatmeal agar (OM) at ca. 20°C and under 12 h fluorescent light.

Mycobank numbers (MB) are given in brackets after the name of the new species.

Results

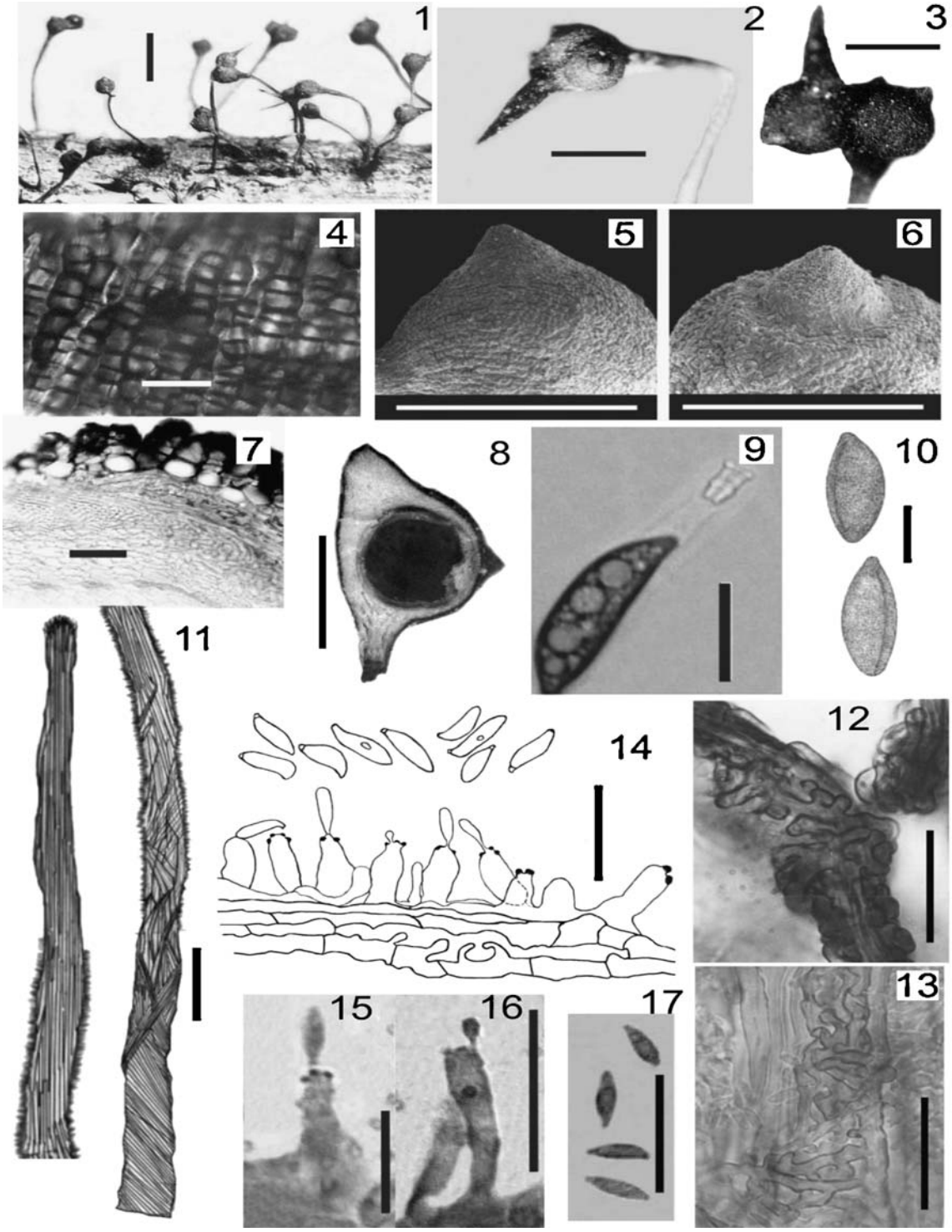
From 1421 specimens, 403 were identified as *Xylaria* species. We recognized 27 taxa, from the "Yungas" study area (Tucuman and Salta) including three new species and one new variety.

In addition, it is worth pointing out that we, like other workers (e.g. Ju and Rogers, 1999) have found and studied material identical to *X. ianthino-velutina* but from wood. Strains from fruit and wood were obtained and compared.

Xylaria culicicephala A. I. Romero & Hladki, **sp. nov**. (Figs. 1–17)

Mycobank Number: MB512721

Etymology: the perithecia in combination with the acute sterile stromatal apex resemble the head of a *Culex* mosquito.



Figs. 1, 17 *Xylaria culicicephala* (from holotype). **1.** Teleomorphic stromata**. 2.** Perithecia and sterile apex with aspect of mosquito ´s head. **3.** Perithecia and sterile apex strongly conic. **4.** Surface of perithecial wall composed by cells in uniform rows. **5-6.** Ostiolar papilla (MEB). **7.** External layers showing the cells in rows in longitudinal section. **8.** Longitudinal section of the stroma through a perithecium. **9.** Ascus apex, note apical apparatus. **10.** Ascospores. **11.** Anamorphic stroma from culture**. 12.** Hyphae from culture with puzzle-shaped cells. **13.** Hyphae from culture **14-16.** Conidiogenous cells denticulate. **17.** Conidia. Bars: 1 = 2 mm; 2, 3, 5-6, 8 = 1mm; 4, 9-17= 15 µm

A Xylaria melanura differt in ascosporis 26–30 × 10.5–12 µm *et in paucis peritheciis per stroma*.

Teleomorphic stromata solitary or in small groups, 4–8× 0.2–0.6 mm, filiform, often curved apically, stipe brown, erect, smooth, subcylindrical, not branched, bearing generally one perithecium or no more than three, that are completely visible in outline, with sterile apex attenuated conical to 1–1.5 mm long, either terminal or lateral in position. *Perithecia* spherical, 0.9–1.2 mm diam; surface of perithecial wall shiny black, composed of cells in uniform rows; external tissue and perithecial wall brownish green. *Ostioles* papillate, conical, with discs surrounding ostioles higher than the stromatal surface. *Asci* 8-spored, cylindrical, stipitate, the spore-bearing part 162–180 × 12–13 µm, stipe 80–105 µm long, apical apparatus bluing in Melzer's reagent, urniform or with parallel sides but flaring at the top, 6.5–8×5–6.5 µm. *Ascospores* brown in water mounts, unicellular; although the slightly truncate spore end is possibly the "scar" from a primary appendage, neither cellular nor gel-appendages were seen, navicular, one end being pinched, 26–30 × 10.5–12 µm ($\bar{x}$=28.1 × 10.9 µm), with germ slit straight, spore length on the flattened side.

Anamorph: not seen in nature.

Habitat: on decaying branches of dicot trees, in the litter layer.

Colonies on OM at first white adpressed mycelium with rudimentary stromata, filiform, erect, light pink, later covered with blackish mycelium, composed of thick-walled cells. *Anamorphic stromata* narrowly cylindrical. *Conidiophores* upright in palisades, sparingly branched near base. *Conidiogenous cells* terminal, cylindrical or rectangular, 7–15 × 2.5–4 µm, poliblastically, denticulate apically. *Conidia* hyaline, smooth, unicellular, ellipsoidal, gibbous, sometimes with slightly sigmoid contours, 6–7 × 2–2.5 µm, with flattened bases indicating former points of attachment to conidiogenous cell (BAFC cult.17, Romero 500).

Material examined: ARGENTINA, Tucumán, Dep., Chicligasta, Parque Provincial "El Cochuna", prov. route 331, Camping Samay, 1020 m a.s.l., 29 May 1998, A.I. Hladki 835 (LIL; **holotype**); Dep. Tafí Viejo, Parque Biológico "Sierra de San Javier", road to top of Taficillo near Nina Velardez, site El Balcón, 1090 m a.s.l., prov. route 340, 24 May 1999, A.I. Hladki 2513 (LIL); *ibid*. 20 August 1999, A.I. Hladki 2665 (LIL); *ibid*. 1 December 1999, A.I. Hladki 2351 (LIL). Dep. Yerba Buena, Parque Biológico "Sierra de San Javier", Horco Molle, 800 m a.s.l., 14 May 1999, A.I. Hladki 2293 (LIL); *ibid*. 17 November 1999, A.I. Hladki 2349 (LIL); *ibid*. 6 September 2006, A.I. Hladki 4010 (LIL).

Notes: Romero and Soto (1999) indicated this as a probable new species, although it looks very similar to *X. melanura* (Lév.) Sacc. It also shares characters with *X. axifera* Mont., *X. aristata* Mont., *X. filiformis* (Alb. & Schwein.) Fr., *X. oocephala* Penz. & Sacc., *X. stilbohypoxyloides* Hladki & A. I. Romero, *X. tucumanensis* Hladki & A. I. Romero (see below). The differences between the four most similar taxa including two further new species are summarised in Table 2. The differences found with the other species mentioned above are extracted from the studies by Dennis (1956), Læssøe and Lodge (1994), Lloyd (1924), Rogers *et al*. (1988) and Spegazzini (1884). *Xylaria axifera* has narrower ascospores (6–7 µm), with conspicuous hyaline appendages at both ends, a larger apical apparatus (7–15×4.5–7 µm) and yellowish-green anamorphic stromata, and occurs mainly on petioles of Araliaceae. *Xylaria aristata* grows on dicot leaves and has a hairy stipe. *Xylaria filiformis ss auct*. is foliicolous/herbicolous and has smaller ascospores (11–15 × 4.5–6 µm), without prominent appendages. *Xylaria oocephala* has smaller ascospores (9×3–4 µm) and smaller asci (75–80×6 µm).

Xylaria tucumanensis Hladki & A. I. Romero, **sp. nov.** (Figs. 18–21)

Mycobank Number: MB512722

Etymology: "tucumanensis" refers to the name of the Tucumán province.

A Xylaria culicicephala differt in ascosporis 17–19.5×8 *µm et in* 9–17 *peritheciis per stroma*.

Teleomorphic stromata solitary, 12–15×0.5–0.6 mm, stipe 6–7×0.2–0.3 mm, smooth, cylindrical or subcylindrical, unbranched, fertile part 6–8 mm, bearing 9 to 17 perithecia with exposed outlines, though sometimes fused, arranged in zic-zag or in rows, sterile apex attenuated conical to 0.3–0.4 mm long. *Perithecia* spherical, 0.4–0.5 mm diam; surface of perithecial outlines, shiny black, composed by cells in uniform rows, perithecial wall greenish-brown; inner tissue whitish, scanty, "*textura intricata*" *Ostioles* conically papillate with a pale brown surrounding disc. *Asci* 8-spored, cylindrical, stipitate, the spore-bearing part 95–120×9–10 µm, stipe 90–125 µm long, with amyloid inverted hat apical apparatus, 4.5–5 × 2.5–4 µm. *Ascospores* medium brown, unicellular, navicular with pinched ends, mostly with two large guttules, 17–19.5×8 µm ($\bar{x}$=18.4×7.8 µm) and with straight germ slit, nearly spore length on flattened side.

Anamorph: not seen in nature, presumed to be present on apical parts of younger stromata.

Habitat: on bark remains of a dicot trunk.

Material examined: ARGENTINA, Tucumán, Dep. Yerba Buena, Parque Biológico "Sierra de San Javier", Horco Molle, road parallel to dispensary, 800 m a.s.l., on bark of dicot trunk, 18 March 1998, A.I. Hladki and A.I. Romero 616 (LIL; **holotype**).

Notes: this species recalls *X. culicicephala* but it bears more perithecia per stroma and has smaller ascospores. See Table 2 for further details.

Table 2 A comparison of Argentinian species likely to be confused with the new taxa *X. culicicephala* and *X. stilbohypoxyloides*

	X. melanura	*X. stilbohypoxyloides*	*X. culicicephala*	*X. tucumanensis*
Stromata	Gregarious, caespitose 2–23 × 1–3 mm	Gregarious with a stilbohypoxyloid aspect 1.5–5×0.3–0.5 mm	Solitary or in small groups 4–8×0.2–06 mm	Solitary 12–15×0.5–0.6 mm
Stipe	Subcylindrical, stout, occasionally dichotomous branched near the base	Strap-like, less than 3 mm long, creeping, irregularly branched, generally immersed within the substrate	Subcylindrical, stout, not branched	Subcylindrical, stout, not branched, Smooth
Apex	Long acicular sterile	lateral acicular sterile	attenuated conical sterile	attenuated conical sterile
Number of perithecia/stroma	2–19	1–2	1 or up to 3	9–17
External view of the surface	Delicately rugose, black	Strongly wrinkled, black	Smooth and shiny, black	Smooth and shiny black
Perithecial wall	Light brown, with unwell individual ized cells	Light brown, with hexagonal cells	Greenish brown, composed by cells in uniform rows	Dark greenish brown, composed by cells in uniform rows
Apical apparatus	Urniform 6.5–8×4–5 µm	Urniform 9–13×5–8 µm	Urniform to rectangular 6.5–8×5–6.5 µm	Urniform 4.5–5 × 2.5–4 µm
Ascospores	Navicular, 30–36.5 × 10.5–13 µm, germ slit straight or slightly oblique spore-length, ventral	Fusiform or inequilaterally ellipsoid with slightly rounded ends, 28–32.5×8–9 µm, germ slit straight spore length, ventral	Navicular with rounded ends, 26–30 × 10.5–12 µm, germ slit straight spore-length, ventral	Navicular with pinched ends, 17–19.5 x 8 µm germ slit straight length, ventral
Substrate	On hard wooded branch in the litter	On decorticated branch and rotten decorticatedwood in the litter	On branches, in the litter	On rotten bark, in the litter

Xylaria filiformioidea Hladki & A.I. Romero, **sp. nov.** (Figs. 22–26)

Mycobank Number: MB512723

Etymology: stromata resemble those of *X. filiformis*.

A Xylaria filiformis differt in ascosporis 8–9×4–5 µm, *utrisque extremis cum appendicibus complanatis hyalinis ca* 2 × 2 µm, *rima germinativa recta prope longitudinem sporae in latere complanato*.

Teleomorphic stromata in small groups, filiform, unbranched; the fertile parts cylindrical or subglobose, 1–2.5× 0.8–2 mm, with perithecia completely free in outline, in aggregates or occasionally solitary or in rows descending down the stipe with surface shiny black, in section the external layer is composed of thick-walled cells, the outer layer being the thickest one; sterile apex thin, acute to 0.1 mm long. *Stipe* thin, strap-like or subcylindrical, simple, smooth except for wrinkles, 3–15 × 0.2–0.5 mm (to 1 mm at base). *Perithecia* globose, 200–400 µm diam, with conical papillate ostioles. *Asci* 8–spored, cylindrical, stipitate, 98–115×5–8 µm, spore-bearing part 50–65 µm, apical apparatus I+, deep blue, urniform 2.5–4 × 2.5–4 µm. *Ascospores* rusty brown, inequilaterally ellipsoid to navicular, ends broadly rounded with hyaline, globular appendages at both ends, in fresh material, 8–9×4–5 µm ($\bar{x}$=8.6× 5 µm); germ slit straight, almost spore length sometimes on the more flattened side, other times on the concave side.

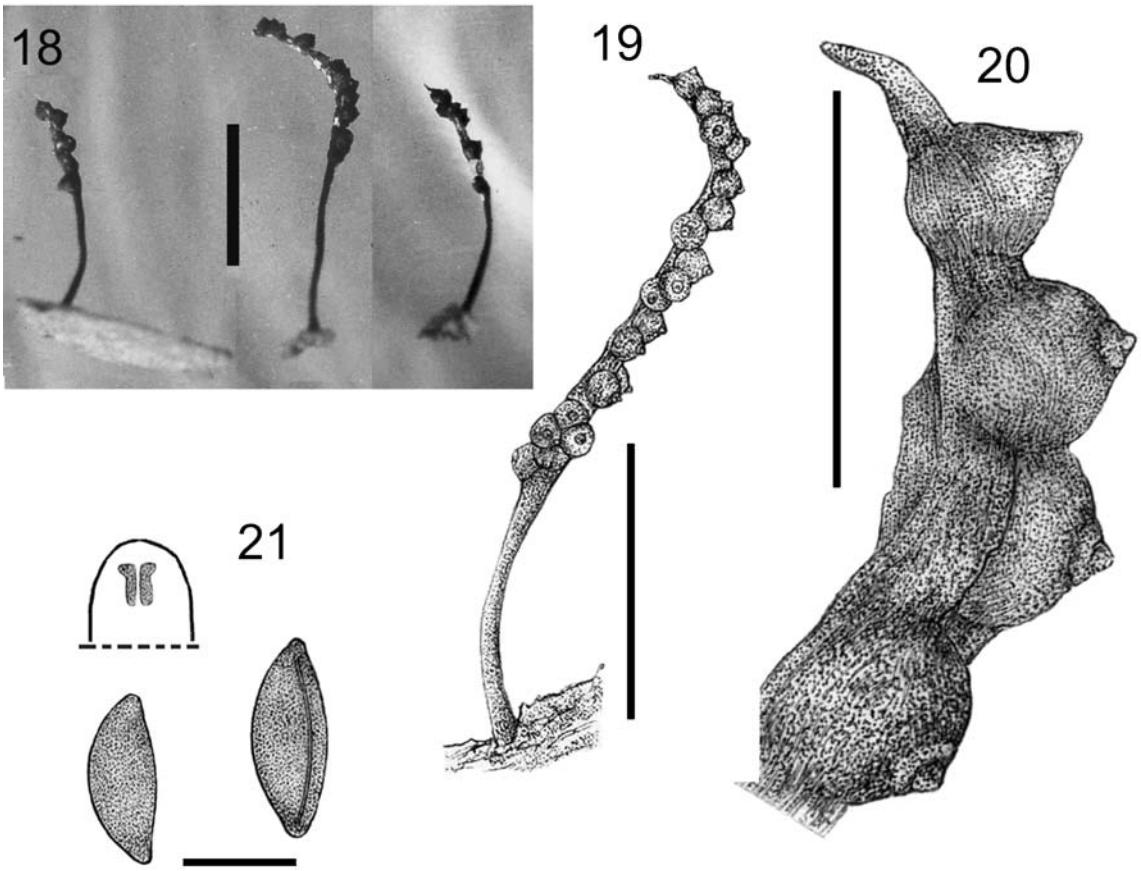
Anamorph: not seen in nature.

Habitat: On dead leaves of indet. dicot tree.

Material examined: ARGENTINA, Tucumán, Dep. Yerba Buena, Parque Biológico "Sierra de San Javier", Horco Molle, 800 m a.s.l., on decaying leaves of indet. dicot tree, on the central vein, 12 February 1999, A.I. Hladki 2131 (LIL; **holotype**). Dep. Monteros, Reserva Provincial La Florida, route prov. 325, 700 m a.s.l., on decaying leaves of indet. dicot tree, 11 June 1999, A.I. Hladki 2584 (LIL).

Notes: this taxon differs from other species on leaves (Læssøe and Lodge 1994; Rogers 1986; Rogers *et al*. 1988; San Martín and Rogers 1989; San Martín *et al*. 1997) mainly by the smaller ascospores and the evanescent appendages. The perithecial arrangement is very variable. Sometimes the stromata bears naked perithecia, solitary or in small globose-subglobose or cylindrical groups.

It is close to *X. amphithele* San Martín & J. D. Rogers and to *X. filiformis* (Alb. & Schwein.) Fr. The former seems to be different because it has larger ascospores (12–14×7–8 µm). It would be desirable to compare the new taxon with the holotype of *X. amphithele* but a loan request was not granted based on the holotype being small and fragile. Likewise the features of the stroma are similar to those of the stroma of *X. filiformis* (Rogers 1986) but this species has larger ascospores (13–16×5–7 µm) without appendages (Rogers 1986). *Xylaria filiformioidea* differs from "*Xylaria*



Figs. 18, 21 *Xylaria tucumanensis* (from holotype). **18-19.** Teleomorphic stromata**. 20.** Perithecia and sterile apex strongly conic. **21.** Apical apparatus (I+) and ascospores. Bars: 12 = 5 mm; 13= 1mm; 14= 10 µm

species 2" (Rogers *et al*. 1987), in having only scattered perithecia on the rachis without any delimitation of a subglobose head; the papillate ostioles are not conical, the apical apparatus is rectangular and different in width (3 × 1.5 *vs* 2.5–4 × 2.5×4 µm) and the ascospores are a bit longer (9–10.3 *vs* 8–9 µm). It is noteworthy that the stromatal morphology of leaf inhabiting *Xylaria* species appears to be highly plastic (as in *X. meliacearum*, Læssøe and Lodge 1994) and further characters from molecular studies would be highly welcome in this group, as in other complex *Xylaria* groups.

Xylaria aff. ***ianthino-velutina*** (Mont.) Fr., Nova Acta Regiae Soc. Sci. Upsal. (ser.3) 1: 128 (1851). (Figs. 27–32)

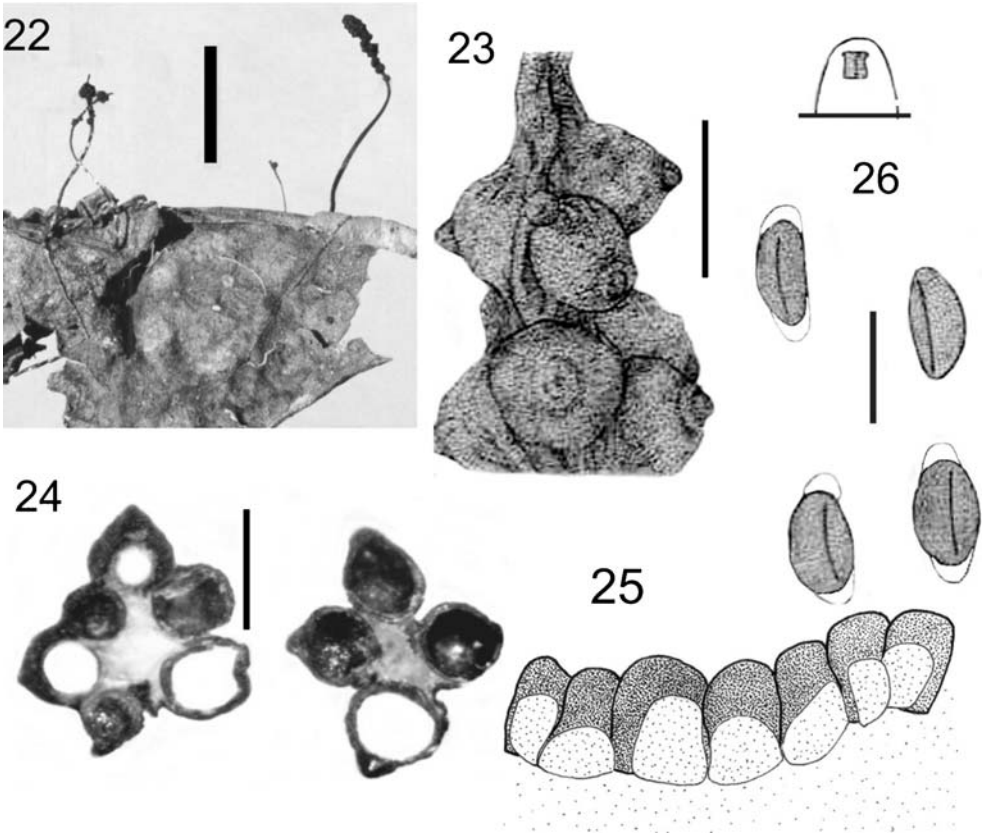
Teleomorphic stromata gregarious, generally parallel to the substrate; fertile region unbranched or branched, more or less flattened and ribbon-like cupreous brown, hairy with black almost free perithecial outlines. *Stipe* ill defined, more or less ribbon-like, cupreous-brown to violet-brown, tomentose with wide and pannose base. *Perithecia* globose to ovoid, 300–500 µm. *Ascospores* brown, inequilateral navicular with rounded ends, with hyaline, short, rounded gel appendages at the both ends when immature, 10.5–12 × 4–5 µm ($\bar{x}$=10.9×4.9 µm), germ slit straight, spore length on flattened side.

Colony on OM whitish yellowish, appressed, later zoned with festooned black margin; sterile stromata cylindrical, dichotomously branched at the apex, 18–20 × 1 mm (BAFC cult.; A.I. Hladki 2363 LIL).

Habitat: on branches of dicot trees; one tree identified as the native *Cinnamomum porphyrium* (Griseb.) Kosterm. (Lauraceae).

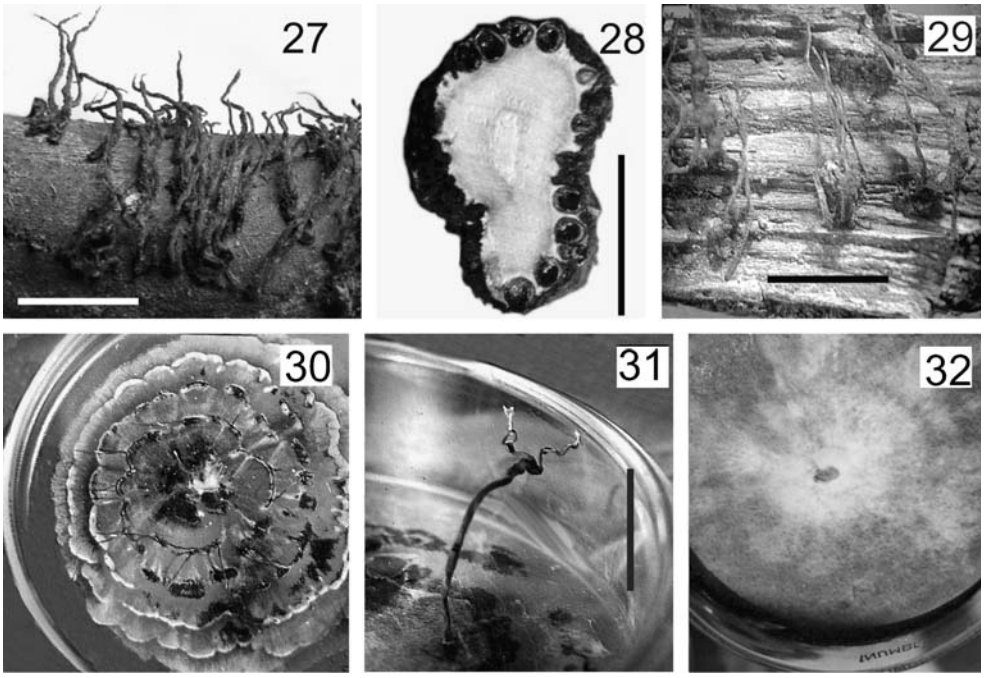
Geographical distribution: Brazil, China, Peru, Puerto Rico, USA (BPI's specimens); and Mexico (Dennis 1956; San Martín, 1992; San Martín and Rogers 1989).

Material examined: ARGENTINA, Salta, Dep. Orán, El Oculto, 23º O 7' S—64º 29' W, 7 June 2002, G.M. Suárez 2894, 2895, culture, (LIL). Dep. Santa Victoria, Los Toldos, finca El Nogalar 22º 16' 670″ S, 74º 42′ 735″ O, 1600 m a.s.l., September 2002, M.M. Schiavone 2898 (LIL). Tucumán, Dep. Chicligasta, Parque Provincial "El Cochuna", prov. route 331, camping Samay, 1020 m a.s.l., 14 October 1997, A.I. Hladki 520 (LIL); *ibid*. 29 May 1998, A.I. Hladki 824, 834, 844 (LIL); *ibid*. 17 May 1999, on decorticated wood, A.I. Hladki 2449 (LIL); *ibid*. 14 August 1999, on decorticated wood, A.I. Hladki 2591 (LIL); gregarious on



Figs. 22, 26 *Xylaria filiformioidea* (from holotype). **22.** Teleomorphic stromata on leaf. **23.** Perithecia. **24.** Transversal Section of the stroma. **25.** External layer with cells in uniform rows. **26.** Apical part of the ascus and ascospores (in Melzer). Bars: 22-24 = 1 mm; 25-26= 10 µm

decorticated wood, A.I. Hladki 2597 (LIL); *ibid*. 12 Nov. 1999, on twigs, A.I. Hladki 2746 (LIL). Dep. Lules, Quebrada de Lules, 13 October 1997, on dead trunk, A.I. Hladki 535 (LIL); *ibid*. Villa Nougués, 30 Mar. 1995, on wood, M.V. Catania 412 (LIL). Dep. Monteros, Reserva Provincial "La Florida", prov. route 325, 700 m a.s.l., 11 June 1999, on wood, A.I. Hladki 2568 (LIL); *ibid*. 25 August 1999, on dead trunk, A.I. Hladki 2737 (LIL). Dep. Tafí Viejo, Parque Biológico "Sierra de San Javier", road to top of Taficillo near Nina Velardez, site El Balcón, 1300 m



Figs. 27, 32 *Xylaria* aff. *ianthino-velutina*. **27.** Teleomorphic stromata on wood (Hladki 520, LIL). **28.** Transversal section of the stroma. **29.** Anamorphic stromata on wood (Hladki 2745, LIL). **30.** Colony on OM. **31.** Sterile stromata in culture. **32.** Colony on OM but the strains form *X. ianthino-velutina* from fruits (Hladki 2847, LIL). (30-31: strain from specimen on wood; BAFC cult.; Hladki 2363 LIL). Bars: 27, 29, 31 = 10 mm; 28= 1 mm

a.s.l., 1 March 1999, teleomorphic stromata gregarious in rows on bark, A.I. Hladki 2258 (LIL); *ibid*. 24 May 1999, on wood, A.I. Hladki 2500 (LIL); *ibid*. 20 August 1999, on fallen branch, A.I. Hladki 2669 (LIL). Dep. Trancas, Hualinchay, route 311, 14 Feb. 1996, wood of *Cinnamomum porphyrium* "laurel", A.I. Hladki 418 (LIL); *ibid*. La Higuera, 23 August 1999, on wood, A.I. Hladki 2692 (LIL); on big dead decorticated dicot trunk covered in bryophytes, A.I. Hladki 2686 (LIL); on wood with bryophytes, A.I. Hladki 2688 (LIL); A.I. Hladki 2695 (BAFC); gregarious stromata on fallen trunk with bryophyte, A.I. Hladki 2700 (LIL); 15 November 1999, on wood, A.I. Hladki 2760 (LIL); on twigs, A.I. Hladki 2763 (LIL). Dep. Yerba Buena, Horco Molle, 13 October 1997, A.I. Hladki 533 (LIL), *ibid*. 18 March 1998, on wood, A.I. Hladki 605 (LIL); *ibid*. 6 April 1998, on wood, Hladki 691 (LIL); *ibid*. 17 August 1999, on short trunk, A.I. Hladki 2601 (LIL); on trunks, A.I. Hladki 2606 (LIL); stroma solitary on corticated wood, A.I. Hladki 2612 (LIL). BRAZIL: Río de Janeiro, 17 December 1923, on fallen wood, Weir, (BPI 585100); Río Grande do Sul, Arroio do Meio, 1920, J. Rick, (BPI 585108). CHINA: Kintung, Yunnan, 22 October 1933, on wood, Y. Tsiang, (BPI 585106). PUERTO RICO: Río Piedras, 12 January 1915, wood of *Hymenaea courbaril*, B. Fink, (BPI 585093).

Notes: The first Argentinean record of *X. ianthino-velutina* from fruits was reported by Spegazzini (1909). Besides, this species has recently been described from fruits from northwest Argentina by Hladki and Romero (2005). In the present work, specimens from dicot wood are considered very similar to *X. ianthino-velutina* Mont. Nevertheless *X. ianthino-velutina* is generally reported as a fruit inhabiting species, as summarized by Rogers (1979). However, San Martín & Rogers (1995) have mentioned that *X. ianthino-velutina* also colonizes rotten wood. On morphological grounds, we agree with the identification of all the BPI material as *X. ianthino-velutina* on wood (material from China was identified by Dennis; material from Puerto Rico by Miller; material from Brazil by unknown determinator). Except for the fact that it grows on wood, all the morphological features are the same as those of the material growing on fruit. Nonetheless, we have isolated one strain from specimen from wood and three from fruit and the colonies are different. The colony from fruit is whitish and later becomes greenish-brown without zones, and does not form stromata (A.I. Hladki 2847, LIL in Hladki and Romero 2005), while the colony from wood has concentric zones, and the border is black and festooned. Sterile stromata are formed (see Figs. 23–24). Ju and Rogers (1999) also described cultures from two collections of *X. ianthino-velutina* collected on wood in Taiwan and with similar culture features to the colony obtained during our study. A similar situation can be observed in *X. mellissii* (Berk.) Cooke that occasionally can be found on woody fruits too (as *X. arbuscula* Sacc., San Martin & Rogers, 1989, and J. Fournier comm. personal) so further work and molecular study is necessary to reach a definitive conclusion on the status of wood inhabiting *X. ianthino-velutina*.

Xylaria microceras var. ***yungae*** Hladki & A. I. Romero **var. nov.** (Figs. 33–41)

Mycobank Number: MB512726

Etymology: refers to the holotype area "Las Yungas".

A Xylaria microceras var. microceras differt in longitudine ascosporum, 6.5–8 µm *versus* 9.5–10 µm.

Teleomorphic stromata solitary or in small groups. *Fertile region* cylindrical or flattened, 11–24 × 2–3.5 mm; surface dark brown to blackish with abundant remains of yellowish brown ectostroma, perithecial outlines inconspicuous. *Stipe* glabrous, short, less than 2 mm long. *Perithecia* globose or cylindrical under mutual pressure, 0.2–0.4 mm. *Ostioles* papillate, minute, conical. *Asci* 8-spored, cylindrical, stipitate, the spore-bearing part 57–61 × 5 µm, stipe 35–40 µm long, apical apparatus I+, deep blue, inverted hat-shaped, 1.5 × 1.5 µm. *Ascospores* light to medium brown, inequilaterally ellipsoid with rounded ends, 6.5–8×4 µm ($\bar{x}$=7×3.9 µm), germ slit straight slightly less than spore-length on flattened side.

Anamorph: not seen in nature.

Material examined: ARGENTINA, Tucumán, Dep. Monteros, Reserva Provincial "La Florida", route prov. 325, 700 m a.s.l., 17 February 1999, on small dicot trunk, A. I. Hladki 2199 (LIL: **Holotype,** BAFC **isotype**).

Material of X. microceras var. *microceras:* GUYANE *in sylvis montosis Kau et Sinamariensibus*, 1839, Leprieur 242 (Holotype PC).

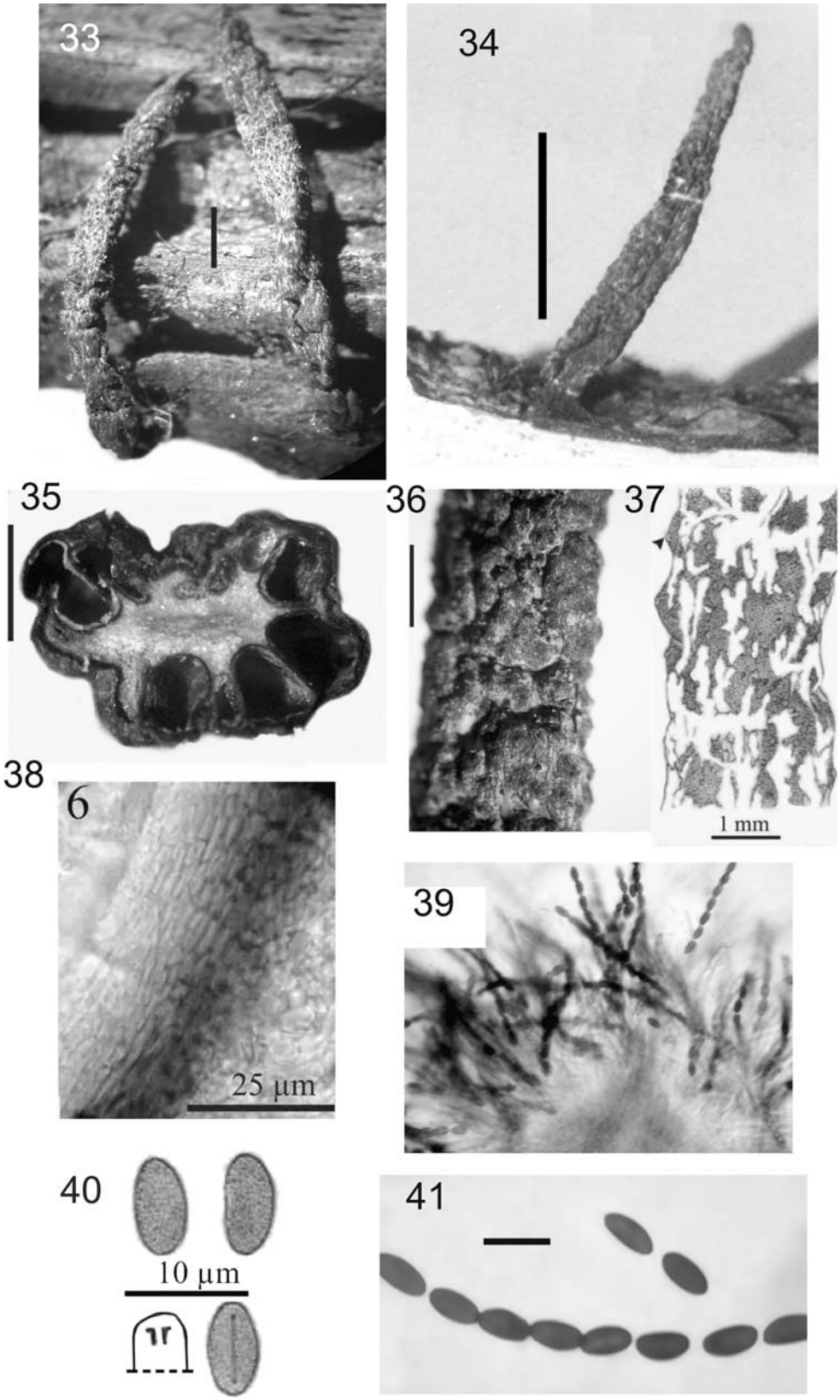
Notes: Our material coincides with the features of the holotype of *X. microceras* in almost all macroscopic and microscopic characters, except for the size of the teleomorphic stromata, of the asci and the ascospores. The stromata of the new variety are more robust, 11–24 × 2–3.5 mm *vs*. 8–17 × 1 mm, (2.5 × 1–6 mm in Rogers *et al*. 1988), the asci have a shorter spore bearing region 57–61 µm *vs* 69–71 µm, and a longer stipe 35-40 µm *vs* 15–30 µm and the ascospores are smaller 6.5–8×4 µm *vs* 9.5–10×3.5 µm. We therefore propose this as a new variety.

Xylaria microceras var. *microceras* has not been recorded from Argentina.

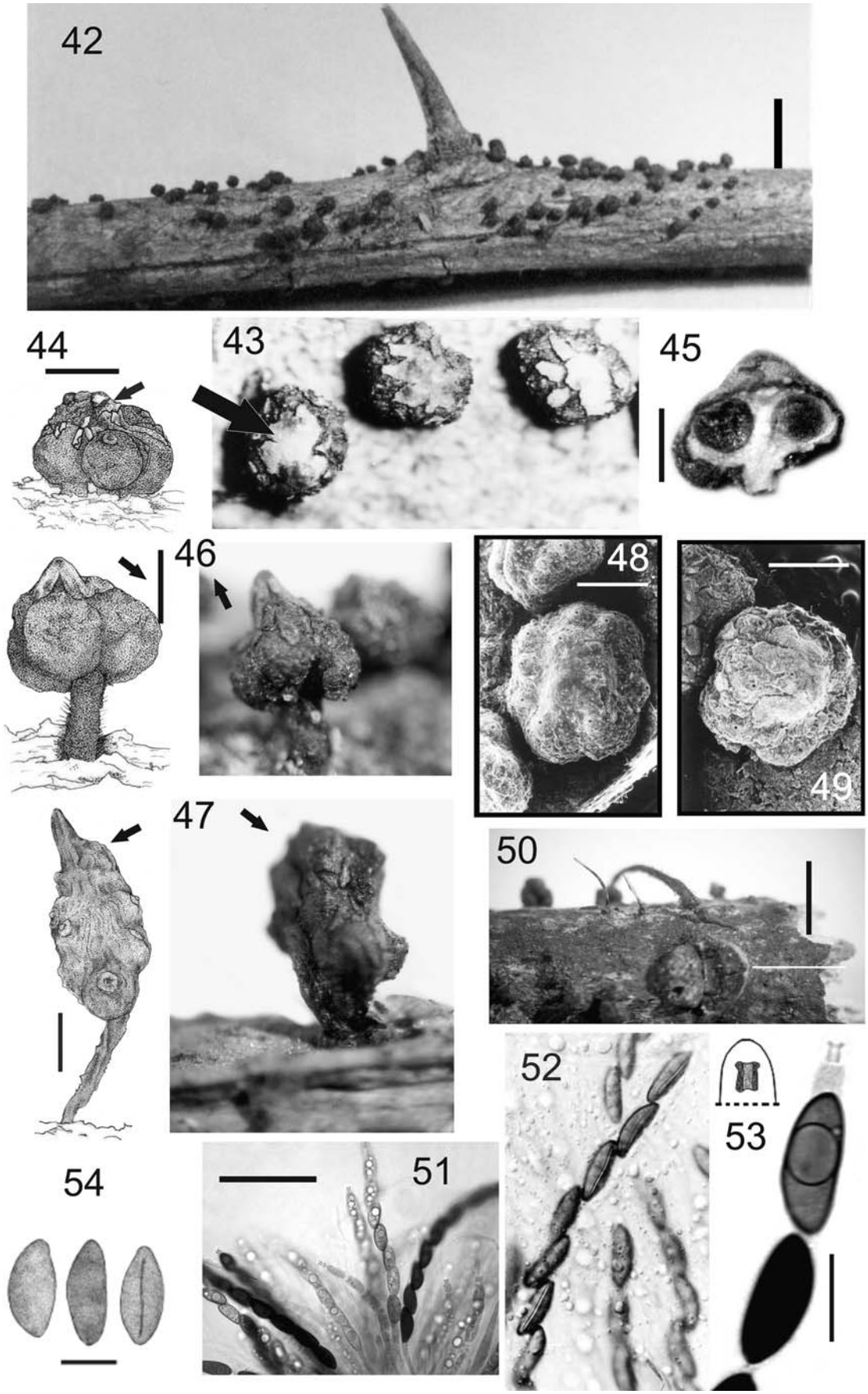
Xylaria xylarioides (Speg.) Hladki & A.I. Romero, **comb. nov**. (Figs. 42–54)

Mycobank Number: MB512724

Basionym: *Hypoxylon xylarioides* Speg., Anal. Soc. Ci. Argent. 9: 158–192. (1880). TYPUS *in caulibus dejectis putrescentibus Jussieae*, *in paludosis secus*, Recoleta, Mart. 1880 (LPS 1972!).



Figs. 33, 41 *Xylaria microceras* var. y*ungae* (from the holotype). **33-34.** Teleomorphic stromata. **35. T**ransversal section of the stroma. **36-37.** Stroma surface**.** **38**. Perithecial wall in section **39.** Asci. **40-41.** Apical part of the ascus and ascospores. Bars: 33 = 2 mm; 34= 10 mm; 35, 36, 37= 1 mm; 38= 25 µm; 39= 50 µm; 40, 41= 10 µm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◀ **Figs. 42, 54** *Xylaria xylarioides*. **42**. Teleomorphic stromata on *Smilax* sp. (Hladki 2433, BAFC) **43-44.** Teleomorphic stroma with subglobose fertile region (43 drawing; 44 photo, note scales arrow). **45.** Longitudinal section of a stroma. **46.** Drawing and photo of a teleomorphic stroma with conical fertile region. **47.** Teleomorphic stromata with subcylindrical fertile region. **48-49**. Teleomorphic stromata in apical view (MEB). Note the scales and ostiols. **50**. Anamorphic stromata (black arrows) (Hladki 2405, LIL)**. 51.** Asci. **52.** Ascus: spored-part. Note the germ slits. **53.** Apical apparatus (I+) and ascospores. **54**. Ascospores. Bars: 42= 1 cm; 44, 46-49 = 5 mm; 45, 50= 1 mm; 51-52= 50 µm; 53-54= 10µm

=*Xylaria venosula* Speg., Bol. Acad. Nac. Ci. Córdoba 11: 133. (1889). TYPUS: *Ad caudices muscosos putrescentes in sylvis Prope Aphiahy*, *per ann*. 1881–88 (sub. n. 1684–2360) (LPS 3293!).

=*Xylaria papillata* Syd. in De Wild., Fl. Bas. et Moy. Congo, III: 18. (1909). TYPUS: *Kisantu*, *déc*. 1906, Vanderyst s.n. (S—not seen)

=*Xylaria smilacicola* Speg., An. Mus. Nac. B. Aires 19: 348. (1909). TYPUS: Tucumán, Parque Roca, sobre *Smilax* (LPS 3237!).

=*Xylaria schreuderiana* Van der Byl., Ann. Univ. Stellenb. 10: 3 (1932). TYPUS: on dead wood, Knysna, South Africa, Van der Byl. 1365. (K—not seen).

Teleomorphic stromata solitary or in small groups. *Fertile region* subglobose to conical, occasionally subcylindrical, 7–21 × 0.8–2 mm, with perithecial outlines conspicuous and conical sterile apex, with light brown peeling outer layer splitting in bands; stromatic surface dark brown, wrinkled. *Stipe* short 0.1–3 × 0.2–0.7 mm subcylindrical, occasionally pilose, dark brown, simple sometimes branched. *Perithecia* globose, 0.3–0.6 mm diam. *Ostioles* papillate, minute, black, generally with light brown discs surroundings the ostioles. *Asci* 8-spored, 135–189 × 8–9 µm, spore-bearing part 105–135 µm, stipe 30–81 µm, apical apparatus I+, light blue, 2.5–5 × 2.5–4 µm, rectangular to umbonate. *Ascospores* brown to dark brown, inequilaterally ellipsoid to navicular, 17–21 × 6.5–9 µm ($\bar{x}$=18.3 × 7.7 µm), germ slit straight, almost full-length on flattened side.

Anamorph not seen in nature.

Habitat: on dicot twigs; *Solanum* (Solanaceae) and *Jussiaea* sp. (Onagraceae) and on monocot stems, *Ripogonum scandens* (Smilacaceae) (Rogers and Samuels 1986); and *Smilax* sp. (Smilacaceae) (Spegazzini 1880a, 1881, 1909).

Geographical distribution: Argentina, Buenos Aires (Spegazzini 1880a as *Hypoxylon xylarioides*), Tucumán (Spegazzini 1909, as *X. smilacicola* and *X. venosula*); Brazil, São Paulo (Spegazzini 1889 as *X. venosula*), New Zealand (Rogers and Samuels 1986 as *X. schreuderiana*), South Africa (Miller 1942, as *X. schreuderiana*) and (Dennis 1961, as *X. papillata*).

Material examined: ARGENTINA, Salta, Dep. Santa Victoria, Los Toldos, Finca El Nogalar, 22° 16′ 670″ S, 74° 42′ 735″ O, 1600 m a.s.l., 2 August 2001, on twigs, A.I. Hladki 2391 (LIL). Tucumán, Dep. Burruyacú, Sierra de Medina, finca Mansilla, Aguas Negras, km. 31 de Villa Padre Monti, 1600 m a.s.l., prov. route 310, 12 December 1997, teleomorphic and anamorphic stromata on twigs, A.I. Hladki 564 (LIL); *ibid*. 1 April 1998, on corticated branch, teleomorphic stroma sessile or stipitate, A.I. Hladki 671 (LIL). Dep. Chicligasta, Parque Provincial "El Cochuna", prov. route 331, near camping Samay, 1020 m a.s.l., 28 March 1994, on small twigs, A.I. Hladki 2407 (LIL); *ibid*. 17 May 1999, on *Smilax* sp., A.I. Hladki 2433 (BAFC); on twigs, A.I. Hladki 2441 (LIL); *ibid*. 12 November 1999, A. I. Hladki 2398 (LIL). Dep Monteros, Toma de Los Reales, on twigs, 21 November 2002, A.I. Hladki 2908, 2914, 2402 (LIL); *ibid*. Reserva Provincial "La Florida", prov. route 325, 700 m a.s.l., 3 July 1998, A.I. Hladki 918 (BAFC); teleomorphic and anamorphic stromata on twigs, A.I. Hladki 930 (LIL); *ibid*. 17 February 1999, A.I. Hladki 2186 (LIL); *ibid*. 11 June 1999, on twigs, A.I. Hladki 2557 (LIL); *ibid*. 25 August 1999, on twigs, A.I. Hladki 2404, 2742 (LIL), *ibid*. 24 November 1999, on twigs with *X. arbuscula*, A.I. Hladki 2400 (LIL); on twigs, A.I. Hladki 2401 (LIL). Dep. Tafí del Valle, 20 April 2006, A.I. Hladki 2928 (LIL). Dep. Tafí Viejo, Parque Biológico "Sierra de San Javier", road to top of Taficillo near Nina Velardez, site El Balcón, 1090 m a.s.l., 24 May 1999, on *Smilax* sp., A.I. Hladki 2519 (LIL); *ibid*. 20 August 1999, on twigs, A.I. Hladki 2406 (LIL); on twigs with *X. arbuscula*, A.I. Hladki 2640 (LIL); teleomorphic and anamorphic stromata on twigs, A.I. Hladki 2642 (LIL)*; ibid*. 1 December 1999, on *Smilax* sp. twigs, teleomorphic and anamorphic stromata, A. I. Hladki 2405 (LIL). Dep. Trancas, Hualinchay, prov. route 311, 1600 m a.s.l., 6 March 1990, mesophitic shrubs, A.I. Hladki 277 (LIL); *ibid*. San Pedro de Colalao, prov. route 311, 8 March 1990, a 14 Km of San Pedro, teleomorphic and anamorphic stromata on twigs, A.I. Hladki 333 LIL. Dep. Yerba Buena, Parque Biológico "Sierra de San Javier", Horco Molle, near infirmary, 800 m a.s.l., 12 February 1999, on twigs with *X.* aff. *ianthino-velutina*, A.I. Hladki 2112 (LIL)*; ibid*. 17 August 1999, on twigs, A.I. Hladki 2402 (LIL); *ibid*. 12 May 2006, on *Smilax* sp. A.I. Hladki 2970–71 (LIL).

Notes: Hypoxylon xylarioides was originally described by Spegazzini (1880a) from Recoleta, Buenos Aires. Rick (1935) proposed it as a synonym of *K. heliscus* (Mont.) Massee, but Dennis (1956) described it as a kretzschmarioid state of *X. apiculata*, a taxon later found to differ in ascospore and colony morphology (Hladki and Romero 2005). Later, Rogers and Ju (1998), in the treatment of the genus *Kretzschmaria*, mentioned it in a list of excluded names, pointing out Dennis's proposal mentioned above.

After the examination of the holotype (LPS 1972) of *Hypoxylon xylarioides*, we agree with Dennis that it belongs to the genus *Xylaria* but it is not *X. apiculata*. The types of *X. smilacicola*, *X. venosula* and *H. xylarioides* share all characters that we consider of taxonomic value (e.g. ascospores of the same colour, shape and size, with the same germ slit morphology; *H. xylaroides* 15.5–19.5×8–9 µm; *X. venosula* 17.5–21.5×7.5–9 µm; *X. smilacicola* 15.5–18×6.5–8 µm). They differ in the shape of the fertile region (from globose to subglobose to subcylindrical) and the length of the stipe (from 0.5–13 mm or occasionally absent), characters that we accept as intraspecific variation and characters that intergrade in the extensive material studied. *Xylaria papillata* and *X. schreuderiana*, are accepted as synonyms solely based on the description and excellent drawings of the type collection by Dennis (1961), and on the description and illustrations by Rogers and Samuels (1986) respectively. Ju and Rogers (1999) distinguishes in the key *Xylaria papillata* and *X. schreuderiana*, mainly by the ascospores size being a bit bigger in *X. schreuderiana*. However, even in one collection we have seen variation that would cover all the mentioned names, including subglobose, sessile stromata (as in *H. xylarioides* and *X. papillata*), stipitate, conical stromata with few perithecia, with or without setiform hairs at the base (as in *X. schreuderiana* and in *X. smilacicola*), and subcylindrical stroma with numerous perithecia (as in *X. venosula*), all of them with matching microscopical characters.

The specimens from New Zealand are all on monocot wood, preferably *Smilacaceae*.

The area of distribution in Argentina is extended to the Salta Province.

Xylaria stilbohypoxyloides Hladki & A.I. Romero, **sp. nov**. (Figs. 55–62)

Mycobank Number: MB512725

Etymology: the stromata are macroscopically similar to those of *Stilbohypoxylon* Henn.

A Xylaria melanura differt in ascosporis 28–32.5× 8–9 µm, *rima germinativa obliqua per longitudinem sporae et in pede reptante et fasciforme*.

Teleomorphic stromata with a stilbohypoxyloid aspect, gregarious forming a compact crust with strap-like irregularly branched, ± horizontal, less than 3 mm long., stipes generally immersed within the substrate, bearing one perithecium and ending in a lateral sterile acicular apex. *Perithecia* pyriform or globose, 0.7–1.2 × 0.5–0.9 mm. *Ostioles* papillate black, strongly conical, encircled by a pale brown disc. *Asci* 8-spored, cylindrical, stipitate, 210–360×9–12 µm, spore-bearing part 150–180 µm, stipe 54–120 µm, apical apparatus I+, deep blue, urniform, 9–13× 5–8 µm. *Ascospores* brown, fusiform or inequilaterally ellipsoid, with slightly rounded ends, 28–32.5×8–9 µm ($\bar{x}$=31.2 × 8.2 µm), appendages absent, germ slit slightly oblique full spore length on flattened side.

Anamorphic stromata gregarious, erect, dark brown, 1–5×0.3 mm, subcylindrical, twisted, fertile apex conical, covered by a yellowish brown tissue, small and young perithecia are observed at the base. *Conidiophores* cylindrical, unbranced. *Conidiogenous cells* terminal, cylindrical, very light brown. *Conidia* globose to ellipsoidal, light brown, 4 × 2 µm.

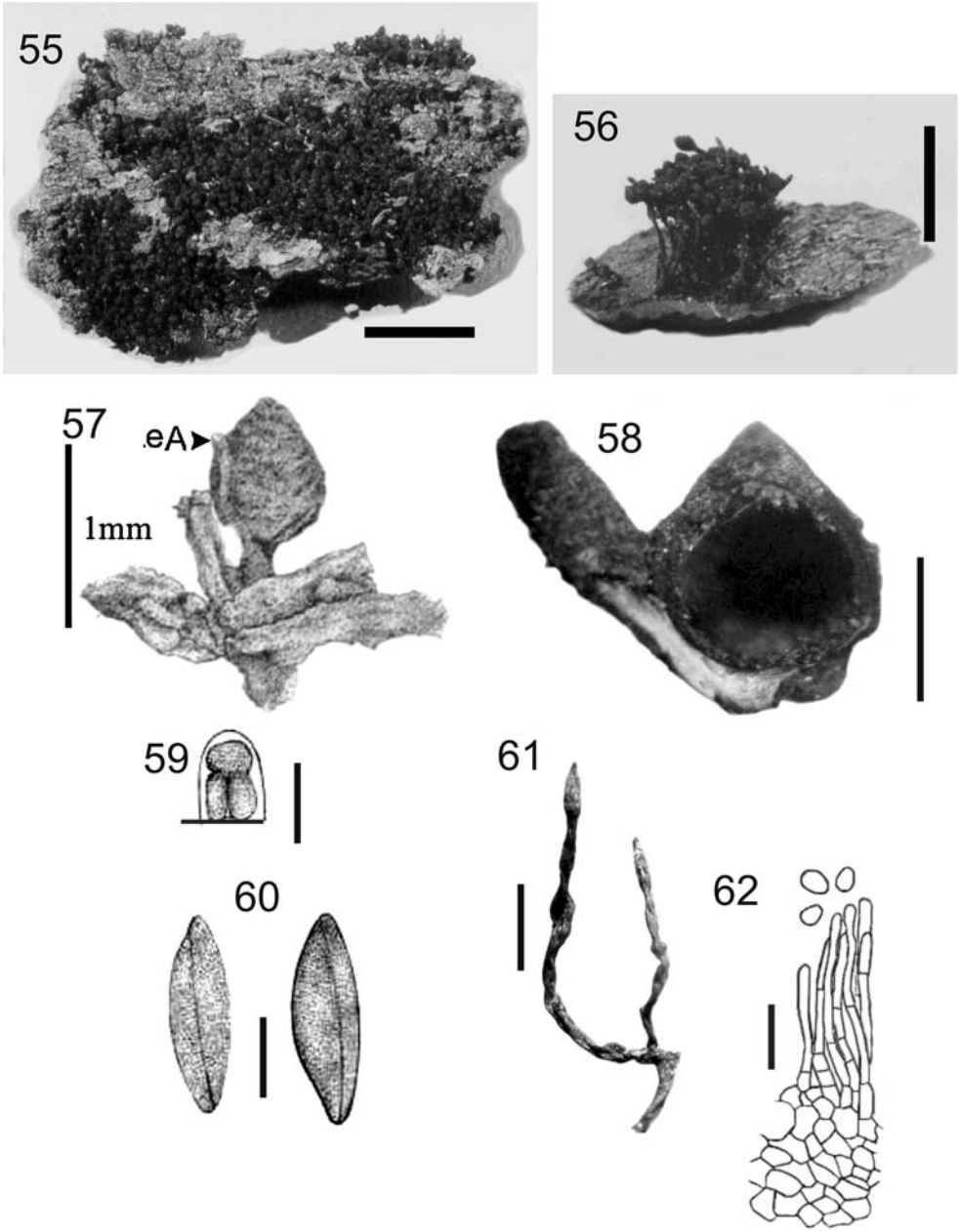
Habitat: on decorticated branches and occasionally on *Allophylus edulis* (A. St.-Hil., A. Juss. & Cambess.) Radlk., twigs (Sapindaceae).

Material examined: ARGENTINA, Tucumán, Dep. Chicligasta, Parque Provincial El Cochuna, prov. route 331, Camping Samay, 1020 m a.s.l., 17 May 1999, A.I. Hladki 2346 (LIL; **holotype designated here**), *ibid*. 28 March 1995, A.I. Hladki 384 (LIL); *ibid*. 14 October 1997, A.I. Hladki 524 (LIL); 29 May 1998, A.I. Hladki 828 (LIL); *ibid*. 12 November 1999, on *Allophylus edulis*, A.I. Hladki 2347, 2359, 2360 (LIL). Dep. Tafí Viejo, Parque Biológico Sierra de San Javier, road to top of Taficillo, near Nina Velardez, site El Balcón, 1090 m a.s.l., prov. route 340, 1 December 1999, A.I. Hladki 2361 (LIL); *ibid*. Sierra de San Javier, Quebrada de Cainzo, 8 Nov. 1953, F. Vervoost (LIL). Dep. Tafí del Valle, Tafí del Valle, 31 March 1997, M.V. Catania & A.I. Hladki 499 (LIL). Dep. Trancas, La Higuera, 1500 m a.s.l., 15 November 1999, A.I. Hladki 2348 (LIL). Dep. Yerba Buena, Parque Biológico "Sierra de San Javier", Horco Molle, 800 m a.s.l., 14 May 1999, A.I. Hladki 2293 (LIL); *ibid*. 17 November 1999, A.I. Hladki 2349 (LIL); *ibid*. 6 September 2006, A.I. Hladki 4010 (LIL).

Notes: At first sight, this species looks similar to a *Stilbohypoxylon* species, due to the fact that the strap-like stipes are overlooked being hidden under the bark. In consequence, the stromata appear to be sessile. Besides, the lateral acicular apex, reminds the lateral synnema of *Stilbohypoxylon*.

This new species is compared with *X. melanura*, *X. culicicephala* and *X. tucumanensis* in Table 2.

In the studied area, anamorphic stroma or young teleomorphic stroma are found in spring (September-October).



Figs. 55, 62 *Xylaria stilbohypoxyloides* (from holotype) **55-56.** Teleomorphic stromata forming compact crust. **57.** Stroma with sterile acicular apex. **58.** Longitudinal section of the stroma. **59.** Apical apparatus (I+). **60.** Ascospores. **61.** Anamorphic stromata. **62.** Conidiophores and conidia. Bars: 55= 10 mm; 56, 57, 58, 61= 1 mm; 59, 60, 62= 10 µm

Key to *Xylaria* species known so far from North of Argentina based mainly on teleomorphic characters (species with * are reported from provinces not part the "Yungas")

1. Stromata formed on leaves or fruits….....…….……...……....2
1. Stromata formed on wood…….....…….…….……..3
2. On dicot leaves. Stromata filiform, unbranched, fertile part cylindrical sometimes subglobose 1–2.5×0.8–2 mm, surface black and shiny, with fully exposed perithecial outlines; stipe thin, strap-like or subcylindrical. Ascosp. 8–9×4–5 µm, germ slit straight, almost spore-length.....…..…….***X. filiformioidea***

2. On woody *Fabaceae* and *Bignoniaceae* fruits. Stromata strap-like to semi-cylindrical, 10–130 × 1.5–3.5 mm, velvety, with exposed perithecial outlines, rachis hairy ending in a sterile long apex, simple, forked or with more branches. Ascosp. 10.5–12 × 4–5 µm, germ slit straight, almost spore-length with hyaline appendages when immature.....***X. ianthino-velutina***
3. Fertile part of stromata more than 5 mm diam.....4
3. Fertile part of stromata less than 5 mm diam.....13
4. Stromatal surface smooth, thick, hard-textured and without conspicuous perithecial outlines, but may have coarse papillate ostioles and/or appresed ectostromatal remmants.....5
4. Stromatal surface roughened, thin, soft-textured, and/or with conspicuous perithecial outlines.....9
5. Stromatal surface cupreous brown, dark brown to black.....6
5. Stromatal surface yellowish without any stripes or blackish with remains of ectostroma in longitudinal greyish stripes.....8
6. Stromata clavate or rarely globose. Ascosp. 9.5–10×4–5 µm inequilateral with broadly rounded ends, germ slit straight, inconspicuous, less than full spore length.....***X. cubensis***
6. Stromata clavate to cylindrical. Ascosp. bigger.....7
7. Ascosp. inequilaterally ellipsoid to navicular, with narrow rounded ends, 12–13×5.5–6.5 µm, germ slit conspicuous, straight, almost spore length on flattened site.....***X. allantoidea***
7. Ascosp. inequilaterally ellipsoid to navicular, with broadly rounded ends, 14–20×5.5–7.5 µm, with long straight germ slit usually somewhat less than full spore lenght (12–14 µm)..... ***X. poitei*** (a)
(a). Data from holotype of *X. hercules* Speg. LPS 3226! (Formosa Province, Argentina)
8. Stromata cylindrical to clavate-fusiform, 3–12 × 1–3.5 cm, dried specimens longitudinally splitting down the middle becoming hollow and curled inwards; surface yellowish to light brown when fresh, with inconspicuous umbilicate to papillate ostioles, entostroma brown to black with sap in the middle. Ascosp. inequilaterally ellipsoid to reniform with narrowly rounded ends, 21–28.5×6.5–8 µm, short oblique or sigmoid germ slit on the flattened side.....***X. telfairii***
8. Stromata cylindrical to clavate with 2 or 3 constricted regions, 3–9×0.7–2 cm, with rounded fertile apex or sometimes sharp sterile apex, surface blackish with longitudinal grey, ectostromatal stripes with small, papillate, ostioles in rows, entostroma black. Ascosp. 12–14.5×4–6.5 µm, with straight full length germ slit on the flattened side.....***X. grammica***

9 (4). Stromata discoid to flattened conical, attached to the substrate by a basal, short, central reduced stipe; perithecia not visible in outline. Ascosp. inequilaterally ellipsoid, 8–13×5–8 µm, with straight full length germ slit on the flattened side.....***X. enteroleuca***

9. Stromata not discoid or flattened conical.....10
10. Stromata extremely variable in shape, generally strawberry-shaped, 2–37 × 2–24 mm with perithecial contours fairly conspicuous; stipe almost absent to 1.5–42 × 1–4.5 mm. Ascosp. brown or dark brown, inequilaterally ellipsoid to navicular with narrow rounded end, 22–30×8–9.5 µm, with sigmoid germ slit almost full length.....***X. globosa*** (b)
(b) published as *X. anisopleura* in Hladki and Romero (2005). According to T. Læssøe (com. pers) *X. anisopleura* Mont. is a synonym of *X. globosa* (Spreng.: Fr.) Ito and Imai (1940)

10 Stromata cylindrical-clavate, flattened or not; without visible perithecial outlines. Ascosp. with straight germ slits.....11

11 Stromata cylindrical to clavate with rounded apex, 7–63 × 2.5–23 mm, surface black, rugose with yellowish brown hexagonal ectostromatal squamules, becoming blackish brown when old; stipes cylindrical, short, with longitudinally splitting. Ascosp. inequilaterally ellipsoid to navicular with rounded ends 9–12.5×3–4.5 µm, germ slit straight full length on the flattened side.....***X. curta***

11 Stromata clavate-flattened or cylindrical-flattened with pannose bases.....12

12. Stromata clavate-flattened with sterile ribbon-like and branched apex, 11–35 × 2–15 mm, stromatal surface cupreous brown, with fragmented reticulate ectostroma, exhibiting the black surface underneath and±discoid ostioles. Ascosp. inequilaterally ellipsoid, slightly curved, brown, with rounded ends, 10–13×4–5 µm, germ slit conspicuous, straight, almost full length on flattened side.....***X. adscendens***
12. Stromata flattened cylindrical, 75–80×8–10 mm, stromatal surface black. Ascop. inequilaterally ellipsoid, dark brown, 9–10×4.5–5 µm, germ slit inconspicuous, straight, 5–7.5 µm long on flattened side..... * ***X. holmbergii*** (c)

(c) Data from holotype of *X. holmbergii* Speg. LPS 3310 (Misiones Province, Argentina). Probably related to the *X. corniformis* (Fr.) Fr.-complex

13(3) Ascosp. with spiral or oblique germ slit…….....…..……..14

13. Ascosp. with straight germ slit…….…….....……..……..15

14. Stromata solitary or gregarious, but never fasciculate, 5–34 × 1–4.5 mm, simple, cylindrical or conical, with inconspicuous perithecial outlines, sterile ribbon-like apex, occasionally flabelliform, surface dark brown, with longitudinal ectostromatal stripes of brown tissue. Ascosp. inequilateral ellipsoid to navicular with broadly rounded ends, germ slit spiral almost spore-length, 15.5–19×5–6.5 µm. Colony on OM black, felty; with numerous sterile, cylindrical, black stromata, 15–24×0.5–1 mm, with white branched apex when reaching the top of the Petri dish…….....……...***X. pseudoapiculata***

14. Stromata gregarious, fasciculate, 8–34 × 1.5–2.5 mm, simple or branched, cylindrical, with almost "free" perithecia or sometimes fused, with short conical, sterile apex, surface dark brown, with yellowish brown ectostromatal squamules at the "perithecial" bases. Ascosp. inequilaterally ellipsoid, 22–26×6.5–8 µm, germ slit oblique, short. Colony on OM black, with whitish margin and occasionally covered by aerial yellowish mycelium, with few filiform, small, 10–13× 0.4–0.5 mm, sterile stromata…….....….....……***X. luxurians***

15(13) Stromata densely crowded, cerebroid, globose to irregular, 3–7 mm diam, with a "kretzschmarioid" aspect; stipe immersed within the substrate, very reduced or long and strap-like, 5–15 mm long. Ascosp. brown, inequilaterally ellipsoid to navicular with narrow rounded ends, 26–32.5×8–9 µm, germ slit short, straight or slightly oblique on flattened side.....…….....……...***X. kretzschmarioidea***

15. Stromata with xylarioid or stilbohypoxyloid aspect…….....…….……...16

16. Stromata composed of a very slender, delicate stipe on which a few "naked" perithecia are arranged.....17

16. Stromata with thicker stipe and with either partially or totally invisible perithecial outlines…….……..20

17. Stromata gregarious, with a stilbohypoxyloid aspect; strap-like stipe irregularly branched, generally immersed within the substrate, bearing one naked perithecium and ending in a lateral sterile acicular apex. Ascosp. fusiform or inequilaterally ellipsoid, 28–32.5×8–9 µm, germ slit slightly oblique full spore length on flattened side……***X. stilbohypoxyloides***

17. Stromata solitary or gregarious; erect cylindrical stipes, 4–23 mm long…….....……..18

18. Stromata solitary or in small groups, 4–8×0.2–0.6 mm, bearing generally one perithecium or no more than three, surface of perithecial outlines shiny black, composed of cells in uniform rows; external tissue and perithecial wall brownish green. Ascus with apical apparatus 6.5–8×5–6.5 µm. Ascospores navicular, one end being pinched, brown, 26–30 × 10.5–12 µm, germ slit straight, spore length on flattened side…….....***X. culicicephala***

18. Stromata solitary or gregarious, bearing several perithecia (3–19).....……19

19. Stromata gregarious, 2–23 × 1–3 mm; surface delicately rugose, black with a long acicular sterile apex. Ascosp. navicular to inequilaterally ellipsoid, 30–36.5 × 10.5–13 µm, germ slit straight or slightly oblique spore-length on flattened side…….....……..……..***X. melanura***

19. Stromata solitary, 12–15×0.2–0.3 mm, surface of perithecial outlines shiny black, composed of cells in uniform rows, external tissue and perithecial wall brownish green. Ascus with apical apparatus 4.5–5 × 2.5–4 µm. Ascosp. navicular, 17–19.5×8 µm, straight germ slit, nearly spore-length on flattened side…….……***X. tucumanensis***

20(16). Stromata with distinct perithecial outlines.....……...21

20. Stromata without or with only slightly visible perithecial outlines.....…..……23

21. Stromata gregarious, generally parallel to the substrate; fertile region ribbon-like to semicylindrical, cupreous brown, hairy with black perithecial, almost free. Stipe ill-defined, ribbon-like or subcylindrical, cupreous brown to violet brown, tomentose overall, wide and pannose base. Ascosp. brown, navicular with broadly rounded ends, with hyaline gel appendages when immature, 10.5–12 × 4–5 µm, germ slit straight, spore length on flattened side. Colony on OM whitish yellowish, appressed, later zoned with festooned black margin; sterile stromata cylindrical, dichotomous branched in the apex, 18–20 × 1 mm.....……..***X.*** aff. ***ianthino-velutina***

21. Stromata gregarious, occasionally caespitose, erect; fertile region cylindrical and glabrous. Ascosp. without gel appendages….....……..…..……22

22. Stromata caespitose, growing on large fallen trunks without bark, 4–43 × 1–2.5 mm; fertile region dark brown to black, nodulose, with conspicuous perithecial contours, with abundant remains of yellowish brown ectostromatal tissue on "perithecial" bases and on the stipe, becoming totally black when mature; sterile apex yellowish brown, generally conic and short; stipe glabrous with discoid base, Ascosp. navicular with broadly rounded ends, 9–13×4–5.5 µm, germ slit inconspicuous, straight, spore-length on flattened side…….....….***X. coccophora***

22. Stromata gregarious, growing on little twigs, erect or parallel to the substrate, 13–40 × 1–1.5 mm; fertile region dark brown to black with conspicuous perithecial contours, with scanty brown remains of ectostroma; sterile apex acute and long, 2–8 mm long; stipe tomentose with wide base. Ascosp. inequilaterally ellipsoid or fusiform with narrowly rounded ends, 9–13×4–5 µm, germ slit conspicuous, straight almost spore length on flattened side.....***X. gracillima***

23(20). Stromata lanceolate or cylindrical-fusiform with stipe less than 2 mm long…….....……..24

23. Stromata cylindrical to conical with stipe more than 2 mm long……25

24. Stromata solitary or in small groups, cylindrical or flattened, 11–24 × 2–3.5 mm; surface dark brown to blackish with abundant remains of yellowish brown ectostroma, perithecial contours inconspicuous, perithecia with minutely papillate ostioles. Ascosp. inequilaterally ellipsoid, with broadly rounded ends, 6.5–8×4 µm, germ slit straight, slightly less than spore length on flattened side……..……***X. microceras*** var. ***yungae***

24. Stromata gregarious, lanceolate or flattened, 12–20 × 1.5–2.5 mm; surface opaque black, without visible perithecial contours, with prominent conical shiny black papillae ostioles. Ascosp. inequilaterally ellipsoid to navicular with broadly rounded ends, 8–9×3.5–5 µm, germ slit straight, inconspicuous, spore length on flattened side.....***X. myosurus***

25(23) Stromata fasciculate, surface with longitudinal stripes of black ectostroma, becoming hollow at maturity.....…26

25. Stromata solitary or in small groups, surface dark brown with longitudinal stripes of light brown ectostroma……27

26. Stromata densely caespitose, 3–22 × 0.5–1 mm, cylindrical, outline undulate or nodulose, apex sterile, acute; surface dark brown to black with tiny, black, papillae ostioles, acute tip. Ascosp. brown, inequilaterally ellipsoid to navicular, with rounded ends, 9.5–12.5×4–5 µm, germ slit inconspicuous, straight, slightly less than spore length on flattened side…….....……..……...……***X. multiplex***

26. Stromata laxly fasciculate, 18–25 × 2–4 mm, cylindrical or flattened flabelliform pointing towards the apex, very fragile, perithecial outlines inconspicuous, surface dark brown, with prominent conical papillae ostioles; inner tissue dark brown to black, hollow. Ascosp. brown, navicular, 14.5–17.5×4–7 µm, germ slit straight to slightly oblique almost spore length on flattened side.....…..……***X. fissilis***

27(25). Stromata subglobose to conical, sessile or with a short stipe less than 3 mm long. Ascosp. brown to dark brown, inequilaterally ellipsoid to navicular, 17–21 × 6.5–9 µm, germ slit straight, almost spore length on flattened side….....…….…….....***X. xylarioides***

27. Stromata cylindrical, with well-developed stipes.....…….28

28. Ascosp. brown, inequilaterally ellipsoid to navicular, with narrowly rounded ends, 21–25×7.5–8 µm, germ slit straight, almost spore length on flattened side. Colony on OM slow growth (9 cm diam/5 weeks), mycelium greenish black with age; hyphae erect, brown, dark brown and profusely branched apex. Stromata rudimentary, sterile, conical to lobulate, 2–3 × 1–1.5 mm……...……***X. apiculata***

28. Ascosp. brown, inequilaterally ellipsoid to navicular, with broadly rounded ends, 12–14.5×5–6.5 µm, germ slit straight spore length on flattened side. Colony on OM fast growth (9 cm diam/ 2½–3 weeks), mycelium greyish black alternated with white concentric areas, velvety. Hyphae hyaline, thin, unbranched and others dark with many short protuberances. Anamorphic stromata filiform, conidia hyaline, 5–5.5 × 1–1.5 µm.....***X. mellissii*** (d)

(d) published as *X. arbuscula* Sacc. in Hladki and Romero (2005)

Discussion

The present work deals with species of *Xylaria* collected during a survey of the *Xylariaceae* within part of "Las Yungas" in the Tucumán and Salta Provinces, Argentina. Twenty-seven taxa were found including three new species and one new variety herein proposed. In Argentina "Las Yungas" occupies 5.2 million hectares with a subtropical climate and very diverse flora depending on the different altitudes (Brown *et al*. 2002).

Most of the species found were on angiosperms. Four of the 27 taxa were found on gymnosperms, including *X. curta* on *Pinus taeda* L. and *X. mellissii*, *X. grammica*, *X. pseudoapiculata* on *Podocarpus parlatorei* Pilg. *Xylaria* was collected from just one family of monocotyledons, the *Smilacaceae*, with just one species (*X. xylarioides*) the same as reported in New Zealand (Rogers and Samuels 1986). San Martín and Rogers (1995) also reported that most species of *Xylaria* collected in Mexico were on angiosperms, especially dicotyledonous plants with only 5.5% on monocots and none on gymnosperms.

The largest number of species of *Xylaria* was found on *Cinnamomum porphyrium*, a native *Lauraceae*, and included *X. globosa*, *X. mellissii*, *X.* aff *ianthino-velutina*, *X. fissilis* and *X. melanura*. On the other hand, *X. mellissii* and *X. curta* colonized more hosts than any other species including members of the *Betulaceae*, *Bombacaceae*, *Lauraceae*, *Sapindaceae*, *Podocarpaceae* and *Fabaceae*,

Lauraceae, *Myrtaceae*, *Verbenaceae*, *Pinaceae*, respectively. San Martín and Rogers (1995) also reported that these two species colonized more different hosts and substrates than other species.

Little is known about Ascomycota on bark and wood of *Podocarpus*. Catania (2001, 2005) has recently started a study in Las Yungas on Ascomycota on *Podocarpus parlatorei*, a native species. We collected *X. mellissii*, *X. grammica* and *X. pseudoapiculata* on *Podocarpus parlatorei*. *Xylaria castorea* Berk. is the most common *Xylaria* in New Zealand and is one of the few *Xylaria* species reported on *Podocarpus hallii*. *X. luteostroma* var. *macrospora* was found on *Dacrydium*, another *Podocarpaceae* (Rogers and Samuels 1986).

Geographically we can compare our results to those from a study on *Xylaria* in Rio Grande do Sul, (30º 01´S, 51º13´ W) in southern Brazil by Hamme and Guerrero (2002). They found 23 species from that area. We collected sixteen of those taxa in Las Yungas, Argentina, which could be expected since both regions have subtropical climates and belong to the "Amazonic Dominion" (Phytogeographical region according to Cabrera and Willink 1980).

In the New Zealand revision of *Xylaria* 19 species were reported (Rogers and Samuels 1986) while 27 were recorded in the "Yungas" region. Seven species were common to both countries: *X. cubensis*, *X. globosa* (p.p. as *anisopleura*), *X. xylarioides*, *X. apiculata*, *X. mellissii*, *X. cf filiformis and X. cf myosurus*. These results are probably according to what one can expect from a temperate region as New Zealand (ranging from approximately 34º to 47°S) and from a subtropical area as the "Yungas", with more diversity.

Van der Gucht (1995) found 26 species of *Xylaria* in Papua New Guinea (3º 30´–7º 30´S, 144º–148 E) and 14 of them were also present in this Argentinean region (22º–24º S, 64º–68º W; below of the Capricornio tropic 23 º 27´ S). Our results support the hypothesis of a pantropical distribution (2007) for at least six species including *X. adscendens*, *X. allantoidea*, *X. globosa*, *X. curta*, *X. grammica*, and *X. telfairii*. As was mentioned by her also, *X. cubensis* is found in various tropical, subtropical and temperate localities of the world.

Because Las Yungas is only a small portion of Argentina and because most of Argentina has not been surveyed for Xylariaceae, this account of *Xylaria* in Argentina is a preliminary study. Few conclusions can be drawn from this limited study but it will serve as the basis for additional studies throughout the country in order to fully understand the diversity, distribution, and host range of *Xylaria* in Argentina.

In this study we were not able to utilize molecular data to aid fungal identification, but in future studies it will be necessary to utilize molecular data to increase confidence in the conclusions and differentiate taxa within species complexes. The gene loci that best adequately differentiate species in the *Xylariaceae* are however, presently unclear (Peláez *et al*. 2008; Tang *et al*. 2009) and requires further research.

Acknowledgements We would like to express our gratitude to the curators of the following herbaria for the loan of specimens: BAFC, LIL, LPS, C, PC and to Dr. San Martín for sending some of his papers and to Dr. Amy Rossman for other articles. We are thankful to Dr. Mary Palm for reading the discussion and to Dr. Orlando Petrini for revising the Latin name *X. stilbohypoxyloides*. Specially, we would to add our gratitude to Dr. Læssøe for all his important contribution as a reviewer.

We express our appreciation to the authorities of Fundación Miguel Lillo, Tucumán, for financial support. We are also grateful to Inés Jaume for the ink drawings.

This is publication N° 172 of the PRHIDEB-PROPLAME, partially financed by the Argentine National Research Council.

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