

THE GENUS *KRETZSCHMARIA* FROM TUCUMAN, ARGENTINAA. I. HLADKI<sup>1</sup> AND A. I. ROMERO<sup>2</sup>

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**ABSTRACT** Six taxa of *Kretzschmaria* -including those taxa formerly considered as *Ustulina*- from Argentina are described and included in keys. Two new species, *Kretzschmaria argentinensis* and *K. sigmoidirima*, are proposed. *K. deusta*, *K. sandvicensis* and *K. pavimentosa* are first records from Argentina. The distribution area in Argentina of *K. clavus* is enlarged.

**Keywords:** Xylariaceae, new species, *Kretzschmaria argentinensis*, *K. sigmoidirima*, *Ustulina*.

## INTRODUCTION

During a survey of species belonging to the family Xylariaceae in Tucumán Province in NW Argentina, species of the genus *Kretzschmaria* were studied. *K. clavus* (Fr.: Fr.) Sacc. is the only record from Argentina made by Spegazzini (1909). Neither in other papers by Spegazzini (1880, 1881) on the group nor in the works of Dennis (1956, 1957, 1958) on South American material have any species of this genus been recorded from Argentina.

The purpose of this paper is to present the results of the study of 74 specimens collected during several years. These results include the proposal of two new species, the report of three first records for Argentina, and a key to these six Argentine *Kretzschmaria* species.

## MATERIALS AND METHODS

During 1999 four samplings were carried out, one per season in summer, autumn, winter and spring, in the montane forest of Tucumán, specifically in "The Yungas Phytogeographic Province" or "Tucumano-Bolivian Forest" (Cabrera, 1971, Hueck 1978). In total 74 samples were collected. The materials were air-dried and brought into culture. Teleomorphic specimens were preserved in LIL and BAFC. Previous collections (1988/89/95/97/98), kept at LIL and 54 specimens from BAFC, BPI, FH,

GZU, ITCV, K, LIL, LPS, NY, S, W, WSP were also studied (herbarium abbreviations follow Holmgren *et al.*, 1990).

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 made from teleomorphic stromata as follows. The upper part of a perithecium-bearing stroma was removed with a sterile razor blade. The contents of the exposed perithecium were rehydrated with sterile distilled water, scooped out with a sterile needle and transferred to a Petri plate containing 2% Oatmeal agar in 9 cm diam. Petri plates and incubated under laboratory conditions at approximately 12 hr per day fluorescent light at 20 ° C.

## RESULTS

From the 74 collections, 39 specimens were identified as *K. clavus* (Fr. Fr) Sacc., 18 as *K. deusta* (Hoffm.: Fr.) P. Martin, 3 as *K. pavimentosa* (Ces.) P. Martin, 5 as *K. sandvicensis* (Reichardt) J. D. Rogers & Y.-M. Ju, 6 as the new species, *K. argentinensis* A.I.Hladki & A.I.Romero, and 2 as another new species *K. sigmoidirima* A.I.Hladki & A.I.Romero.

### Key to species of *Kretzschmaria* from Argentina

1. Stromata stipitate or sessile, the fertile parts and/or stipes often fused, individual parts seldom exceeding 1 cm diam.....2
1. Stromata more or less sessile, but often attached by rhizoid-like processes or narrow connectives; fertile parts usually exceeding 1 cm diam.....4
2. Ascospores with a conspicuously sigmoid to spiral germ slit.....*K. sigmoidirima* sp. nov.
2. Ascospores with a straight germ slit shorter than spore length.....3
3. Ascospores 35-40.5 x 10.5-12 µm, stromata usually stipitate, the fertile part 1-3 mm diam, strongly roughened by scales.....*K. argentinensis* sp. nov.
3. Ascospores 25-30 x 6.5-9 µm, stromata stipitate, the fertile part 2-5.5 mm diam, smooth.....*K. clavus*
4. Ascospores mostly longer than 40 µm.....*K. pavimentosa*
4. Ascospores mostly shorter than 40 µm.....5
5. Ascospores 26-31.3 x 6.5-7.8 µm, with a germ slit shorter than spore length.....*K. deusta*
5. Ascospores 32.5-40.3 x 9.1-12 µm, with a germ slit slightly shorter than spore length.....*K. sandvicensis*

## DESCRIPTIONS

*Kretzschmaria argentinensis* A.I. Hladki & A.I. Romero, sp. nov.

(Fig. I: 1-5; Fig. III: 3)

Etym.: after Argentina

A *Kretzschmaria clavus* differt in ascosporis (35.1-40.3 x 10.4-11.7  $\mu\text{m}$ ) dimensionis, et in stromatibus per parvos clavos cum superficiebus rimosis compositis. Holotypus LIL: Argentina: Tucumán: Depto. Chicligasta, Parque Provincial El Cochuna, ad viam prov. 331, Camping Samay, 1300 m asl., in ligno indet., 17-XI-1999, Hladki 2303. Isotypus BAFC 50.692 et BPI 747.563.

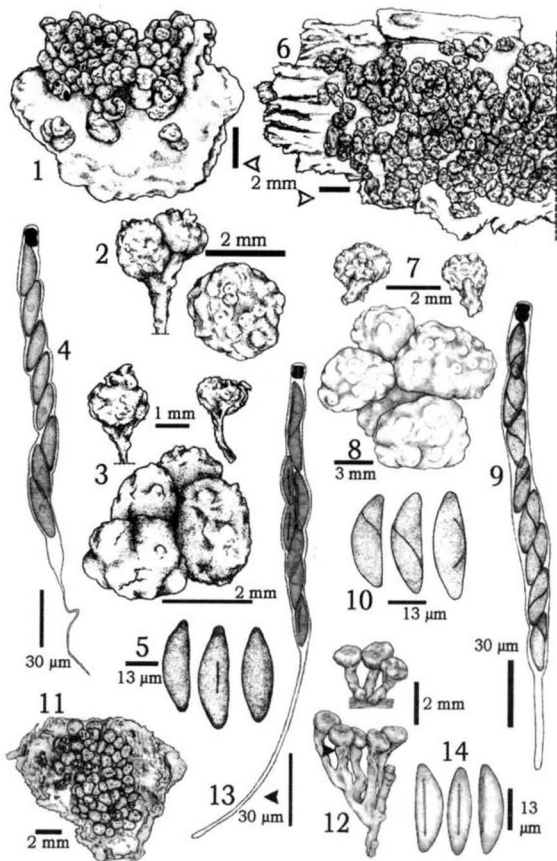
*Stromata* with convex, turbinate or obconical fertile parts 1-3 mm diam., usually densely aggregated or fused into a small crust, tapering downwards into radiating, infrequently branched, cylindrical stipes, or sessile; surface dull blackish brown, cracked into small scales (corky, reticulate, fragmentary crust); carbonaceous immediately beneath surface; tissue between and beneath perithecia coriaceous, yellowish or brown, becoming dark brown and disintegrating. *Perithecia* spherical, 0.4-0.8 mm, 1-4 per club. *Ostioles* minutely conical (hardly visible among the fragments of the clubs). *Asci* 8-spored, cylindrical, stipitate, fugacious, 246-315  $\mu\text{m}$  total length x 12  $\mu\text{m}$ , spore-bearing parts 168-267  $\mu\text{m}$  long, stipes 36-78  $\mu\text{m}$  long, apical ring IK<sup>+</sup>, urn-shaped, 9-12 x 6.5-8  $\mu\text{m}$ . *Ascospores* brown to dark brown, unicellular, fusoid, inequilateral, with narrowly rounded ends, often pinched, smooth, 35-40.5 (-44) x 10.5-12 (-13)  $\mu\text{m}$ , with a straight germ slit shorter than spore length.

It was not possible to obtain a culture after several attempts.

*Specimens examined*: The holotype LIL. Isotype BAFC, BPI. Argentina: Tucumán: Depto. Chicligasta, Parque Provincial El Cochuna, ruta prov. 331, Camping Samay, 1300 m asl., 28-III-95, Catania 381, BPI; ibid 14-VI-97, Hladki, 496, 494b LIL; ibid 14-VIII-99, Hladki 2314 LIL; ibid. 12-XI-99, Hladki 2336 LIL.

*Substratum*: on remains of bark from large semi-rotten trunks of a dicotyledon.

*Notes*: It is interesting to point out that this new species was only found in the type locality in 1995, 1997 and 1999. The new taxon seems to be close to *K. micropus* (Fr.: Fr.) Sacc. and to *K. clavus* (Fr.: Fr.) Sacc. The lectotype of *K. micropus* (NY!) was also studied. The clubs of *K. micropus* and *K. argentinensis* are similar in size and shape, but the clubs of the latter have a strongly roughened surface and the diagnostic feature of the conical or spine-like processes or umbos on the fertile parts of *K. micropus* is absent. The stalk can be present or not in the Argentine species but, when present, it is cylindrical and generally short, whereas in *K. micropus* it is strap-like. The apical ring of *K. argentinensis* is larger than in *K. micropus* (9-12 x 6.5-8  $\mu\text{m}$  and 7-8 x 5  $\mu\text{m}$ , respectively). Both species have similar ascospores in shape and colour and size but, in this new species, the germ slit is short whereas in *K. micropus* it is almost as long as the total length of the spore. Another difference is the number of perithecia per stroma: in *K. argentinensis* there are many, but in *K. micropus*, generally, there is only one. With respect to *K. clavus*, the main differences are: a) *K. argentinensis* has small clubs (1-3 mm diam.) and a convex and very rugose surface (never plane). Stromata are sessile or with short, cylindrical or subcylindrical, rarely branched stipes. It lacks the dull reddish



brown tomentum at the base of stipes which is generally present in *K. clavus*. b) Perithecia are spherical and smaller in size (0.4-0.8 mm) than *K. clavus*. c) The apical ring (9-12 x 6.5-8  $\mu$ m) is larger than in *K. clavus*. d) Ascospore size range 35-40.5 (-44) x 10.5-12 (-13)  $\mu$ m is close to the maximum values of the size of the ascospores of *K. clavus*.

*K. clavus* is very abundant in all the localities where we have collected and no specimen with intermediate features was found. The differences warrant the new species.

*Additional material:* **Angola:** Welwitsch, on wood, type of *Hypoxylon aggregatum* (= *K. micropus*), **K. Brazil:** Rick, J., on wood, as *Kretzschmaria lichenoides* (= *K. micropus*) GZU-Petrak 2084; Sao Paulo, 5.IV.1947, Fogg, H., on wood, as *K. spinifera* (= *K. micropus*) GZU-Petrak. **Mexico:** 1895, Smith, C.L., on wood, lectotype of *K. micropus*, NY.

*Kretzschmaria clavus* (Fr.: Fr.) Sacc., Syll. Fung. II, p. XXIX, 1883

(Fig. I: 11-14; Fig. III: 7)

= *Sphaeria clavus* Fr., Linnaea 5: 543, 1830; Fr.: Fr., Syst. Mycol. Index, p. 162., 1832

For list of synonyms and description see Rogers & Ju (1998)

Cultures were obtained (Cult. Collections LIL 702, 854, 807, 906). Macroscopical features of the colonies are the same as of those given by Rogers & Ju (1998). Coiled hyphae of the mycelium were observed as those described in several cultures of *Xylaria* species (Van der Gucht, 1996). Anamorph was not produced.

*Specimens examined:* **Argentina:** Buenos Aires: Santa Catalina, 23-IX-1969, Gamundi, Dring & Martínez BAFC 50076. Misiones: Parque Nacional Cataratas del Iguazú, Camping Ñandú, Reserva, 28-X-1973, Wright, Deschamps & Del Busto M-2426, on the base of a semirodden palm (*Syagrus* sp.) BAFC 50077. *Ibid.* Macuco, 23-IX-1984, Job M-3814 BAFC 30407. Tucumán: Depto. Chichigasta, Parque Provincial El Cochuna, Prov Route 331, Camping Samay, 1300 m asl, 10-XI-89, Hladki 228 LIL; BAFC cult. XXXX; *ibid* 14-VI-97, Hladki 495 LIL, *ibid.* 14-X-97, Hladki 529 LIL; *ibid.* 23-IV-98, Hladki 756 LIL; *ibid* 29-V-98, Hladki 847 LIL; *ibid* 15-II-99 Hladki 2159 LIL; *ibid* 17-V-99 Hladki 2304 LIL; 14-VIII-99 Hladki 2312 LIL; *ibid.* 12-XI-99 Hladki 2333 LIL. Depto: Lules, Quebrada de Lules, on a pathway next to the camping, 21-III-88, Hladki 159 LIL; *ibid.* Prov. Route 380 facing the river, 5-IV-88, Hladki 175

**Fig. I. 1-5:** *Kretzschmaria argentinensis* 1. Macroscopic morphology of stromata. 2-3. Macroscopic morphology of infrequently branched and unbranched, cylindrical stipes. 4. Ascus with apical ring, I<sup>+</sup>. 5. Ascospores with germ slit. 6-10. *Kretzschmaria sigmoidirima* 6. Macroscopic morphology of stromata densely aggregated or fused into small crust. 7. Macroscopic morphology of cylindrical, irregular and short stipes. 8. Stromatal surface with strongly mammiform ostioles (arrow). 9. Ascus with apical ring, I<sup>+</sup>. 10. Ascospores with sigmoid to spiral germ slit. 11-14. *Kretzschmaria clavus* 11. Macroscopic morphology of stromata. 12. Macroscopic morphology of erect, cylindrical, unbranched stipes. Stipes branches fusionate at the base, radiating from a common centre as small bunches, with "apophysis" (arrow). 13. Ascus with apical ring, I<sup>+</sup>. 14. Ascospores with germ slit.

**LIL**; Depto. Yerba Buena, Sierra de San Javier, Quebrada de Cainzo, on *Phoebe porphyria* (Griseb.) Lillo, Vervoost, as *K. puiggarii* (Speg.) Sacc. **LIL**; *ibid.*, Río Los Sosas, El Indio, 1200 m asl, 19-VII-1974, Deschamps & Del Busto 2578, on semirotten trunk of *Phoebe porphyria* **BAFC** 50075, *ibid.*, Parque Biológico Sierra de San Javier, Horco Molle, 800 m asl, near University residence, crossing Muerto river, 6-IV-98, Hladki 702 **LIL**, road parallel to dispensary, 14-V-99 Hladki 2286 **LIL**, *ibid.* 18-VIII-99 Hladki 2317 **LIL**, *ibid.* 17-XI-99 Hladki 2334 **LIL**; Depto: Monteros, Reserva Provincial La Florida, Prov route. 325, 700 m asl, 3-VII-98, Hladki 883 on trunk of *Phoebe porphyria* **LIL**, *ibid.* 17-II-99 Hladki 2170 **LIL**, *ibid.* 11-IV-99 Hladki 2309 **LIL**, *ibid.* 25-VIII-99 Hladki 2325 **LIL**. Depto: Trancas, La Higuera, Cerro Alto de La Totorá, crossing river La Higuera, 1500 m asl, 21-V-99 Hladki 2305 **LIL**, 23-VIII-99 Hladki 2324 **LIL**. Depto: Tafi Viejo, Parque Biológico Sierra de San Javier, road to top of Taficillo near Nina Velardez site, El Balcón, 1300 m asl, 25-II-99 Hladki 2253 **LIL**, 24-V-99 Hladki 2308 **LIL**, 20-VIII-99 Hladki 2319, on semirotten trunk of "Horco cebil" (*Piptadenia macrocarpa*) **LIL**. Depto: Burreyacú, Sierra de Medina, Prov. route 310, Km 31 from Villa Padre Monti, Aguas Negras, Finca Mansilla, 1600 m asl, 30-X-98 Hladki 2001 **LIL**.

*Additional material:* **Africa:** Lloyd, C.G., as *K. puiggarii* **BPI** 716922 [Lloyd herb. 11995]. **Brazil:** Rio Grande do Sul, I. 1922, Rick, J. 20380, on wood, as *K. divergens* **BPI** 594482; Mato Grosso, Serra da Chapada, Buriti, 6.IV.1894, Malme G.O., on wood, **BPI** 594483. isotype of *K. divergens*, **S** holotype; Rio Grande do Sul, Sao Leopoldo, 1906, Rick, J., on wood, as *K. divergens* **BPI** 594484; Apiaty, Sao Paulo, Puiggari J., on wood, ex Spegazzini **BPI** 716921 [Lloyd Herb. 12004], type of *K. puiggarii* **LPS** 27236; Itatiaia, 19.X.1969, Dring, D.M. 117, on wood, as *K. clavus* **K** 62682. **Nicaragua:** Castillo Viejo, Río San Juan, II-III.1893, Smith, C.L., on wood, **BPI** 716923 [Lloyd herb. 11993], **BPI** 716925 [Lloyd herb. 11995], **GZU-Petrak** 2089 [ex Lloyd herb] type of *K. pusilla*. **Zaire** "Belgian Congo", Vanderyst, H., on wood, as *K. pusilla* by Lloyd, C.G. **BPI** 716924 [Lloyd herb. 12813].

*Substratum:* Stromata are generally on big, fallen, rotten trunks of dicotyledon covered by mosses; however a note in the collection **BAFC** 50 077 reads "on monocotyledon". Most of the time, because of the condition of the substratum, it was difficult to identify the host. Some specimens were found on living trees of *Phoebe porphyria* (Griseb.) Lillo, *Piptadenia excelsa* (Horco cebil) (Griseb.) Lillo, as well as on semi-rotten palm *Arecastrum* sp., **BAFC** 50077).

In the "Fiscal Reserve Parque La Florida" there is a large number of living trees attacked by this species and stumps are so completely covered by black stromata that they seem to be burnt. It is worth mentioning that in a pure forest of *Podocarpus parlatorei* Pilg. it is not present on this tree although it occurs on other hosts in the same area.

*Geographic distribution:* Brazil, Ecuador, French Guiana, Grenada, Mauritius, Nicaragua, Papua New Guinea, Paraguay, Puerto Rico, Uganda, U.S.A., Zaire (Rogers & Ju 1998), Mexico (San Martín & Rogers, 1993), Venezuela (Dennis, 1970), Guyana, St. Vincent, Colombia, Cuba (Dennis, 1957), Bolivia (Dennis, 1958).

*Notes:* The Argentine specimens coincide with the description given by Rogers & Ju. (1998) except for: a) Dull reddish brown tomentum at the base of the stipe in fresh and young specimens that is lacking in old ones. b) A small eccentric sterile umbo in some specimens (LIL 847, 703, 906, 883, 495, 529, 2170, 2253, 2317, BAFC 50077) and in some clubs, as was also observed by San Martín & Rogers (1993) in Mexican specimens. It is worth saying that in the original description of this species the umbo is not mentioned and according to Rogers & Ju (1998) is an important character which they use in the key to separate species into two groups. c) Thick stipe just at the point of union to the club, which we call apophysis. d) Asci with longer pedicels. e) rather shorter ascospores.

The specimens show large morphological variation, sometimes appearing as loose, light to dark brown crusts of aggregations of clubs, poorly branched, with erect stipes, and with the appearance a nail (identical to Dennis (1957) 'drawing of this species), but at other times they appear as a large, compact crust of fused clubs with a smooth, black, plane surface identical to Dennis' drawing (1957) to illustrate *K. coenopus* (Fr.:Fr.) Sacc., on highly branched stipes, sometimes erect, sometimes parallel to the substratum but not losing their individuality nor their cylindrical shape.

According to Rogers & Ju (1998) *Kretzschmaria clavus* is undoubtedly a pathogen of roots and/or butts. It was reported by Ko *et al.* (1977) to cause root rot of *Macadamia integrifolia* Maiden & Betche, the most serious disease of this tree in Hawaii. It is very common to observe large fallen trunks with almost 70 % of their surface covered by *K. clavus*, in addition to effuse *Kretzschmaria* ustulinoid type stromata such as *K. deusta* (Hoffm.: Fr.) P. Martin, or *K. sandvicensis* (Reichardt) J. D. Rogers & Y.-M.- Ju..

Although the stromata persist during the different seasons the best time to find young grey coloured stromata with the anamorph in the Tucumán "Yungas", is between the end of spring and the beginning of summer. It is very important to take into account the presence of this pathogenic species because of its destructive effects (Ko *et al.* 1977, 1982, 1986).

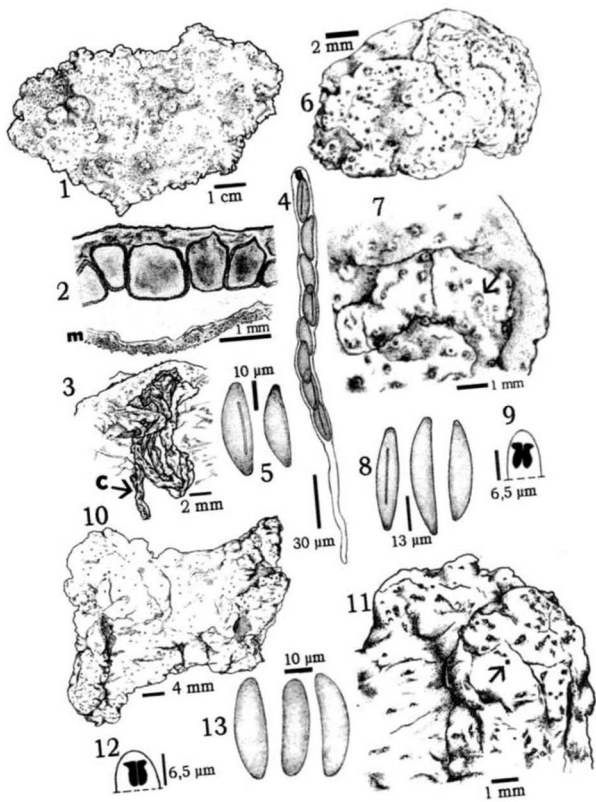
*Kretzschmaria deusta* (Hoffm.: Fr.) P. Martin, J. S. African Bot. 36: 80. 1970

(Fig. II: 1-5; Fig. III: 5)

= *Sphaeria deusta* Hoffm., Veg. Crypt. I, p: 3. 1787; Hoffm.: Fr., Syst. Mycol. II, p. 345. 1823; non Wahlenberg, 1812.

For list of synonyms see Rogers & Ju (1998)

*Stromata* pulvinate to effused pulvinate, rarely orbicular, discrete, densely aggregated or fused, 10-28 x 1-4 mm, attached to substrate with narrow connectives, usually with crenate, sloped margins; surface dark brown to blackish brown, especially towards the margin of the stromata, often with reticulate major cracks; carbonaceous immediately beneath the surface; tissue between and beneath perithecia coriaceous to woody, white to gray, becoming dark brown and disintegrating; with a hairy brown coppery mat in the abaxial face of the stroma. *Perithecia* obovoid to tubular, 0.4-1.3 x 0.6-1.4 mm. *Ostioles* conic papillate, minute, darker than the surface of the stroma. *Asci* 246-276 µm total length x 10-14 µm, spore-bearing parts 171-189 µm long, stipes 66-





114  $\mu\text{m}$  long, apical ring  $\text{IK}^+$ , urn-shaped, 4-5 x 4-5  $\mu\text{m}$ . *Ascospores* brown to dark brown, unicellular, fusoid- inequilateral, with acute ends sometimes pinched, smooth, 26-31 (-34) x 6.5-8 (-9)  $\mu\text{m}$ , with a straight germ slit less than 2/3 of spore length.

Cultures were obtained (Cult. Collections LIL 2287, 2301, 2306). The features of the colonies are the same as of those given by Jong and Rogers (1972) and Petrini and Müller (1986) except for anamorph was not produced.

*Specimens examined: Argentina:* Tucumán: Depto. Chicligasta, Parque Provincial El Cochuna, prov. route 331, Camping Samay, 1300 m asl., 29-V-98, Hladki 838 LIL; ibid 17-V-99, Hladki 2301 LIL; ibid. 12-XI-99, Hladki 2338 LIL; Depto. Yerba Buena, Parque Biológico Sierra de San Javier, Horco Molle, 800 m asl, near University residence, crossing Muerto river, 6-IV-98, Hladki 714 LIL; ibid road parallel to dispensary, 18-VIII-99 Hladki 2316 LIL, ibid. 17-XI-99 Hladki 2341 LIL; Depto: Monteros, Reserva Provincial La Florida, ruta prov. 325, 700 m asl, 17-II-99 Hladki 2202 LIL, ibid. 11-VI-99 Hladki 2310 LIL, ibid 25-VIII-99 Hladki 2327 LIL, ibid. 24-XI-99 Hladki 2344 LIL. Depto: Trancas, La Higuera, Cerro Alto de La Totorá, crossing river La Higuera, 1500 m asl, 19-II-99 Hladki 2216 LIL, ibid. 21-V-99 Hladki 2306 LIL, 23-VIII-99 Hladki 2322 LIL, ibid. 15-XI-99 Hladki 2339 LIL; Depto: Burreyacu, Sierra de Medina, prov route 310, Km 31 from Villa Padre Monti, Aguas Negras, Finca Mansilla, 1600 m asl, 19-V-99 Hladki 2302 LIL, on living *Podocarpus parlatorei* Pilg. Depto: Tafi Viejo, Parque Biológico Sierra de San Javier, road to the top of Taficillo near Nina Velardez site, El Balcón, 1300 m asl, 1-XII-99 Hladki 2345 LIL.

*Additional material: Cuba:* Central Trinidad, Iznaga, Prov. Santa Clara, 21.XI.1924, Weir, J. R., on wood of *Cailliea glomerata*, as *Ustulina zonata* by Weir, J. R. BPI 586819; GZU-Petrak 1075. **Czech Republic:** Mähren (now Moravia), Olspitz bei Mähr.- Weißkirchen, X.1931, Petrak, F., Mycoth. General. 1886, on wood, as *Ustulina deusta* by Petrak, F. WSP 19263. **French Guiana:** Säul, Circuit Grand Fosse, elev. 300-350 m, 10.II.1986, Samuels, G.J. 3633, bark NY. **Germany:** Bavaria, Mittelfranken, Kr. Hersbruck, Kukensborg, 23.IX.1946, Starcs, K. 2732, on wood of *Fagus sylvatica*, as *Ustulina vulgaris* WSP 15763. **Mexico:** José María Morales Municipality, Quintana Roo, 6.XI.1986, San Martín 733, on living Citrus tree ITCV. **Puerto Rico:** Mayaguez, Earle, F. S. 247, on wood, as *Ustulina zonata* by Diehl, W. W.

**Fig. II. 1-5** *Kretzschmaria deusta*. 1. Macroscopic morphology of stromata. 2. Longitudinal sections of a stroma with a hairy brown coppery mat in abaxial face (m). 3. Stromata attached to substrate with narrow connectives (c). 4. Ascus with apical ring,  $\text{I}^+$ . 5. Ascospores with germ slit. 6-9. *Kretzschmaria pavimentosa* 6. Macroscopic morphology of a stroma. 7. Stromatal surface with ostioles coarsely papillate, conical (arrow). 8. Ascospores with germ slit. 9. Apical ring  $\text{I}^+$ . 10-13. *Kretzschmaria sandvicensis* 10. Macroscopic morphology of a stroma. 11. Stromatal surface with ostioles papillate ostiolar openings (arrow). 12. Apical ring  $\text{I}^+$ . 13. Ascospores with germ slit.

**BPI** 587147. U.S.A. : Kentucky, Fort Thomas, IV.1912, Weir, J. R. 2716, on wood of *Fagus americana*, as *Ustulina linearis* **BPI** 587139; New Jersey, 31.VII.1920, Sterling, E. B., on wood **GZU**- Petrak 2023, isotype of *Hypoxylon magnosporum*, Ohio, Hamilton Co., Cincinnati, Stanberry Park, 2.X.1956, Cooke, W.B. 30434, on wood of *Fagus grandifolia*, as *Ustulina vulgaris* **WSP** 45000. **U.K.**: Scotland, Midlothian, South Queensferry, 16.X.1965, Watling, R. 926, on wood of *Fagus sylvatica*, as *Ustulina deusta* **E** 00046128; Cooke, M. C., *Fungi Britannici Exsiccati*, Ed. II, no. 465, on wood, as *Ustulina vulgaris* **E** 00046132; ex herb. Cooke, on wood, as *Ustulina vulgaris* **E** 00046133; Hants, Lyndhurst, X. 1879, Baker, J. G., beech on wood, as *Ustulina vulgaris* **E** 00046129.

*Substratum*: Specimens were generally found on large branches or fallen decaying trunks of dicotyledon, with bark or decorticated, along with fern rhizomes and mosses. They were also detected at the base of stumps along with of *K. clavus*. Only once they were found on a living tree of *Podocarpus parlatorei* Pilg.

*Geographic distribution*: Czech Republic, Germany, U.K., U.S.A. Mexico.

According to Rogers & Ju (1998) this species is most commonly encountered in the North Temperate Zone. San Martín & Lavin (1997) has reported it from Mexico.

*Notes*: Rogers & Ju (1998) point out that there are reports of this species from tropical and subtropical zones, but they believe these records are misidentifications and correspond to the tropical species *K. pavimentosa* (Ces.) P. Martin, *K. sandvicensis* (Reichardt) J. D. Rogers & Y.-M. Ju and *K. zonata* (Lév.) P. Martin. However, *K. deusta* is present in Tucumán province, "The Yungas Phytogeographic Province", a subtropical zone of the Amazonic Domain, Neotropical Region, following Cabrera, 1971 and Hueck, 1978. Its identification was confirmed by examination of the holotypes of *K. pavimentosa* and *K. sandvicensis* and specimens determined as *K. zonata* by Rogers & Ju (1998).

*K. deusta* is the first record from Argentina. These Argentine specimens coincide with their description except for: a) Presence of a hairy brown coppery mat in the reverse of fresh stromata (**LIL** 2202). b) Some specimens have effuse-pulvinate stromata without stipes or with very long, strap-like (**LIL** 2327) stipes immersed in cracks of the wood. This was also observed by Martin (1970).

*K. deusta* and *K. sandvicensis* are similar. The main differences between them are the features and size of the ascospores: in *K. deusta* they are: 26-31 (32.5) x 6.5-8 (-9) µm, with narrow round ends and with a short, straight germ slit whereas, in *K. sandvicensis* they are 32.5-40.5 x 9.1-12 µm, with broadly round ends and with a long germ slit occupying 80 % of the total length of the ascospore. It is very important to state that Schwarze *et al.* (1995) have shown soft-rot cavity formation in the S<sub>2</sub> layer of secondary cell walls caused by *K. deusta*.

*Ecological observations*: The best period for collecting is between late summer and autumn and at the end of spring and early the summer anamorphic stromata are found with a grayish surface due to mass of conidia.

*Kretzschmaria pavimento* (Ces.) P. Martin, J. S. African Bot. 42: 74. 1976

(Fig. II: 6-9; Fig III: 4)

≡ *Hypoxylo* *pavimentosum* Ces., Atti Accad. Sci. Fis. 8: 18. 1879

For list of synonyms see Rogers & Ju (1998)

*Stromata* discoid, restricted-pulvinate, or effused pulvinate, discrete or densely aggregated, 8-30 x 2-3 mm, usually with crenate, steep margins; surface greyish brown, smooth or with major cracks; carbonaceous immediately beneath the surface; tissue between and beneath perithecia coriaceous to woody, white to gray, becoming dark brown and disintegrating. In the abaxial face of the stromata a coppery brown hairy mat is present. *Perithecia* obovoid to obclavate, 0.8-1.3 x 1.1-1.2 mm. *Ostioles* papillate, minute, dark brown. *Asci* 264-288 µm total length x 10-12 µm broad, spore-bearing parts 150-170 µm long, stipes 99-120 µm long, apical ring IK<sup>+</sup>, urn-shaped, 5-6.5 x 4-5 µm. *Ascospores* brown to dark brown, unicellular, fusoid-inequilateral, with acute ends sometimes pinched, smooth, 42-55 x (-8) 9-13 µm, with a straight germ slit shorter than the spore length (19.5-22 µm length).

Cultures were obtained (Cult. Collections LIL 514, 515). The features of the colonies are the same as of those given by Rogers & Ju (1998). Anamorph was not produced.

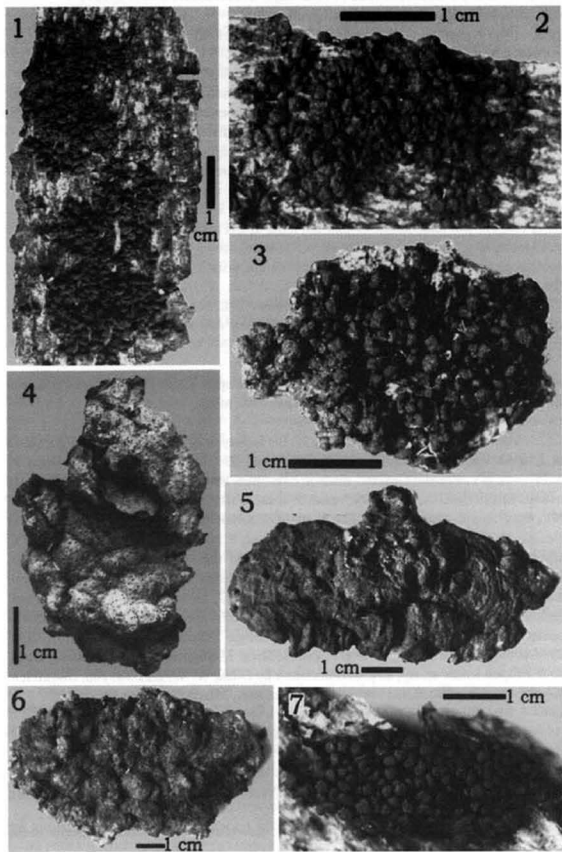
*Specimens examined*: **Argentina**: Tucumán: Depto. Chichigasta, Parque Provincial El Cochuna, prov. route 331, Camping Samay, 1300 m asl., 14-X-97, Hladki 514 LIL.

*Additional materials*: **Brazil**: Ule, H. E., Holotype of *Kretzschmaria bulgarioides* S; Ule, H. on wood Pará, Municipio Oriximiná, Rio Trombetas, 19.VI.80, Dunn P. 80PHD-16 NY. **French Guiana**: Piste de Saint-Elie, Km 16 on road between Sinnamary and St. Elie, ECEREX, ORSTOM research area, II-III. 1986, Samuels, G. J. 4037, bark NY; Paul Isnard Area, ca. 150 Km S of St. Laurent du Moroni, Citron, Mt. Decou Decou, 11, 12.III.1986, Samuels, G.J. & Searwar, P. 4237 & 4246, bark of liana NY; Upper Marouini River: between Roche Koutou and unnamed granitic, 19,20-VIII-87, Samuels, G.J. et al. 5920 NY **Guyana**: Cuyuni-Mazaruni Region, Mazaruni Subregion, along Koatse R., II, III-87, Samuels, G. J. et al. 4927, on log NY. **Malaysia**: Borneo, Sarawak, Beccari, O. 206, on wood K 52691. lectotype of *Kretzschmaria pavimento* *sum*. **Mexico**: Chiapas State, Ocosingo Municipality, Boca de Chajul, 29.V.1988, San Martín, F. 838 ITCV. **Puerto Rico**: Mayaguez, Las Marias Road, Earle, F. S. 246, on rotten stump, as *Ustulina zonata* by Diehl, W. W. BPI 587146. **Sudafrica**: Krysna, Garden of Eden, I. 1958, as *Ustulina deusta*, Martin, P. 52 BAFC.

*Substratum*: on decaying trunk of a dicotyledon.

*Geographic distribution*: Brazil, Ecuador, French Guiana, Guyana, Grenada, Honduras, Malaysia, Mexico, New Zealand, Puerto Rico, Taiwan (Rogers & Ju, 1998); Dennis, 1970).

This fungus is one of the most frequently encountered *Kretzschmaria* species in the tropics and subtropics (Rogers & Ju, 1998).



*Notes:* Our material coincides with the description given by Rogers & Ju (1998) except for: a) thinner and more sloped margins and b) the presence of a hairy mat in the inferior part of the stromata.

*Ecological observations:* It was only found once in the en Río Cochuna area in October 1997 although almost all the province was explored in the different seasons during several years.

*Kretzschmaria sandvicensis* (Reichardt) J. D. Rogers & Y.-M. Ju. Mycotaxon LXVIII: 366. 1998

(Fig. II: 10-13; Fig. III: 6)

=*Hypoxylon sandvicense* Reichardt, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. I, 75: 6. 1877

For list of synonyms see Rogers & Ju (1998)

*Stromata* pulvinate to effused pulvinate, discrete, orbicular to densely aggregated or fused, 18-85 x 1-4 mm, attached to substrate with narrow connectives, usually with crenate, sloped margins; surface dark brown to blackish brown specially at the margins, often with reticulate major cracks; carbonaceous immediately beneath the surface; tissue between and beneath perithecia coriaceous to woody, white to gray, becoming dark brown and disintegrating; in the inferior face a hairy cuprous brown mat is present. *Perithecia* rectangular to ovoid, 0.6-1.2 x 0.4-0.8 mm. *Ostioles* finely papillate. *Asci* 261-330 µm total length x 10-12 µm broad, spore-bearing parts 141-189 µm long, stipes 120-180 µm long, apical ring IK<sup>+</sup>, urn-shaped, 5-6.5 x 5-6.5 µm. *Ascospores* dark brown, unicellular, fusoid to ellipsoid, inequilateral, with broadly rounded ends, smooth, 32.5-40.5 x 9-12 µm, with a straight germ slit slightly shorter than the spore length (80 % of the total length of the ascospore).

Cultures were obtained (Cult. Collections LIL 2311, 2106). The features of the colonies are the same as of those given by Rogers & Ju (1998). Anamorph was not produced.

*Specimens examined:* **Argentina:** Tucumán: Depto. Chicligasta, Parque Provincial El Cochuna, prov. route 331, Camping Samay, 1300 m asl., 10-XI-89, Hladki 234 BAF; ibid 15-II-99 Hladki 2160 LIL; 14-VIII-99 Hladki 2311 LIL; ibid. 12-XI-99 Hladki 2325 LIL; Depto: Tafi Viejo, Parque Biológico Sierra de San Javier, road to the top of Taficillo near of Nina Velardez site, El Balcón, 1300 m asl, 20-VIII-99 Hladki 2320 LIL.

*Additional materials:* **Colombia:** near Tumaco, XII. 1940, Skutch & Stryker, Stakman 245, on wood, as *Ustulina zonata* by Diehl, W.W. BPI 587044. **French**

**Fig. III. General Aspects:** 1-2. *Kretzschmaria sigmoidirima* (LIL 715). 3 *Kretzschmaria argentinensis* (LIL 494b). 4 *Kretzschmaria pavimentosa* (LIL 521). 5 *Kretzschmaria deusta* (LIL 2327). 6 *Kretzschmaria sandvicensis*. (LIL 2160). 7 *Kretzschmaria clavus* (LIL 2309).

**Guiana:** Piste de Saint-Elie, Km 16 on road between Sinnamary and St. Elie, ECEREX, ORSTOM research area, II-III.1986, Samuels, G. J. 3861, on bark **NY**. **India:** Bombay, 1882, Carter, H. J., on wood, **K** 52689, holotype of *Kretzschmaria tessulata*. **Java:** Tjibodas, 1907-1908, Höhnel, F., Weese's Eumycetes Selecti Exs. 431, on rotten wood, as *U. zonata* **BPI** 587148. **U.S.A.:** Hawaii, Wailuku, 1868-71, Wawra 1831&1832, on corticated wood **W1831, W1832**: holotype of *Hypoxylon sandwicense*.

*Substratum:* on semi-rotten trunk of a dicotyledon.

*Geographic distribution:* Colombia, French Guiana, Guyana, India, Mexico, New Caledonia, Papua New Guinea, Philippines, Puerto Rico (Rogers & Ju, 1998); Dennis, 1970). This fungus is one of the most frequently encountered *Kretzschmaria* species in the tropics and subtropics (Rogers & Ju, 1998).

*Notes:* see notes on *K. deusta*.

*Kretzschmaria sigmoidirima* A.I. Hladki & A.I. Romero, sp. nov.

(Fig. I: 6-10; Fig. III: 1-2)

Etym.: sigmoid= curved like the letter S, *rima* = slit

A *Kretzschmaria curvirima* differt in ascosporis ((26)30-32.5 x (8-)9-10.5  $\mu$ m) dimensionis, et in annulo apicali 8 x 5-6.5  $\mu$ m. Holotypus: **LIL**. Argentina: Tucumán: Depto. Yerba Buena, Parque Biológico Sierra de San Javier, Horco Molle, 800 m asl, ad viam prope dispensarium, 17-XI-99, Hladki 2340. Isotypus **BAFC** 50.694 et **BPI** 747.564.

*Stromata* with convex or flattened fertile parts 1.5-3.5 mm diam., usually containing one or two perithecia, densely aggregated or fused into a small crusts, frequently sessile or tapering downwards into cylindrical, irregular and short stipes, surface dull brown, irregular by cracked into diminute scales; carbonaceous immediately beneath the surface; tissue between and beneath perithecia coriaceous, yellowish or brown, becoming dark brown and disintegrating. *Perithecia* ovoid to spherical, 0.5-0.7 x 0.5-0.9 mm. *Ostioles* strongly mammiform papillate. *Asci* eight-spored, cylindrical, stipitate, fugacious, 195-297  $\mu$ m x 10-12  $\mu$ m, spore-bearing parts 165-207  $\mu$ m long, stipes 80-91  $\mu$ m long, apical ring IK<sup>+</sup>, urn-shaped, 8 x 5-6.5  $\mu$ m. *Ascospores* dark brown, unicellular, ellipsoid or fusoid, inequilateral, with narrowly rounded ends, smooth, (26-) 30-32.5 x (8-) 9-10.5  $\mu$ m, with a sigmoid to spiral germ slit slightly shorter than the spore length.

Unfortunately, several attempts to culture it proved unsuccessful.

*Specimens examined:* Holotype: **LIL**. Isotype **BAFC** 50694, **BPI** 747564. Same data as holotype, 06-IV-98, Hladki 715.

*Additional material:* **Guyana:** Cuyuni-Mazaruni Subregion, vic. Chinoweing Village, elev. 650-750m, 20-23.II.1987, Leg.: Samuels, G.J. et al. 4642<sup>a</sup>, Det.: Rogers, on wood, holotype of *K. curvirima* J.D. Rogers & Y.-M. Ju, **NY**. Isotype of *K.*

*curvirima* WSP 69722.

*Substratum*: on remains of bark from semi-rotten large trunks of a dicotyledon.

*Notes*: It is worth mentioning that although almost all the province was explored, this new taxon was only found in this locality in autumn and spring.

It was compared with the holotype (NY!) of *K. curvirima* Rogers & Ju (1998) since this was the only species recorded with a sigmoid germ slit. This feature is almost the same in both species but they differ because: a) *K. curvirima* has conic spines on almost all the clubs, whereas in *K. sigmoidrma* they are absent b) the perithecia in *K. sigmoidrma* are ovoid to spherical and c) perithecia, apical apparatus and ascospores are smaller than in *K. curvirima*

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