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Abstract


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In the present paper, collections deposited in HAJB and determined as Kretzschmaria and Hypoxylon with stromatic morphology similar to some taxa called “ustulinoid” were re-examined macroscopically and microscopically. Eight species of Kretzschmaria are recognized. Kretzschmaria cetrarioides, K. clavus, K. coenopus, K. micropus and K. zonata are corroborated for Cuba. Kretzschmaria milleri, K. pavimentosa and K. sandvicensis constitute new records for Cuba. A dichotomous key for the identification of the treated species and also their descriptions, distributions in Cuba and preliminary IUCN Red List categorizations are included in this work.

Additional key words: systematics, kretzschmaroid taxa, ustulinoid taxa, Hypoxylon

Introduction

Recio (1991) published the results of the first study of the genus Kretzschmaria Fr. (Ascomycota, Xylariaceae) in Cuba, in which K. clavus (Fr. : Fr.) Sacc., K. coenopus (Fr. : Fr.) Sacc. and K. micropus (Fr. : Fr.) Sacc. were corroborated and K. cetrarioides (Welw. & Curr.) Sacc. was recorded for the first time in the country.

Dennis (1961) and Van der Gucht (1995) considered Kretzschmaria coenopus as a synonym of K. clavus. Later, Rogers & Ju (1998) shared this opinion and proposed a new taxonomic treatment for the genus accepting 16 taxa distributed according to the morphology as kretzschmaroid and ustulinoid taxa, represented by K. clavus and K. deusta (Hoff. : Fr.) P. Martin, respectively. In addition, Rogers & Ju (l.c.) reported K. zonata (Lév.) P. Martin for the first time in Cuba.

Considering the limited knowledge about the Cuban taxa of Kretzschmaria, fundamentally with respect to the ustulinoid taxa, the aim of this paper is to update the information about this genus in Cuba.

Material and methods

Materials deposited in the mycological collection at the National Botanic Garden Herbarium, HAJB (M) as Kretzschmaria (kretzschmaroid taxa) and some collections previously determined as Hypoxylon Bull, with similar characters to ustulinoid fungi, H. cf. cerebrinum (Fée) Cooke, H. cf. cyclopicum Speg. and H. deustum (Hoffm. : Fr.) Grev., were re-examined.

A stereo microscope was used to observe the characteristics of the stromata and perithecia. The characters of the asci and ascospores were observed in slides mounted in Melzer’s iodine reagent and KOH 10 %, respectively, in a bright-field microscope.

Citation of herbarium codes follows Holmgren & al. (1990).

Due to the impossibility of revising the original materials related to Kretzschmaria, determinations of Cuban specimens were based on the descriptions offered by Rogers & Ju (1998), following also the order they used to characterize the structures of the taxa cited.

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Results and discussion


None of the accepted species appears in the Red List of Cuban fungi (Mena & al. 2012). Our experience and the available information allow us to assign them a preliminary categorization of Least Concern (LC) following IUCN (2012).

Finally, we consider it interesting that although the most common hosts for *Xylariaceae* are “dicot” plants, two species treated in this paper were on monocots: *Kretzschmaria coenopus* on *Bactris cubensis* Burret (*Palmae*) and *K. pavimentosa* on unidentified Palmae. Rogers & Ju (1998) cited *K. cetrarioides* and *K. pavimentosa* on oil palm and monocot wood, respectively.

Key to accepted species of *Kretzschmaria* in Cuba

1. Stromata tapering downwards into a definite attachment ......... 2
   - Stromata attached to substrate with narrow connectives ....... 5
2. Attachments of stromata totally or partially strap-like ........... 3
   - Attachments of stromata cylindrical ..................... 4
3. Attachments of stromata strap-like; fertile heads of stromata free or fused to base, forming sheets, containing several perithecia; ascospores 25–30 × 8–12 µm ........... 1. *K. cetrarioides*
   - Attachments of stromata at first strap-like, later compressed cylindric; fertile heads of stromata not fused, containing 1 or 2 perithecia; ascospores 26–32 × 8–11 µm .......... 4. *K. micropus*
   - Ascospores 29–38 × 7–11 µm, germ slit 22–29 µm .............. 3. *K. coenopus*
5. Stromata generally with steep thick crenate margins; ascospores dark brown, fusiform-inequalateral, with acute ends sometimes pinched, 31–50 × 8–12 µm, germ slit much less than spore length .......... 6. *K. pavimentosa*
   - Stromata usually with sloped margins; ascospores with germ slit slightly less than or nearly equalling spore length ............... 6
6. Ostioles coarsely papillate; ascospores dark brown, fusiform to ellipsoidal, in unequalateral, with narrowly rounded ends occasionally pinched, 38–47 × 11–16 µm, germ slit straight, slightly less than spore length .......... 5. *K. milleri*
   - Ostioles finely papillate to moderately papillate .......... 7
   - Ascospores with narrowly to broadly rounded ends not pinched, 33–43 × 8–11 µm . 7. *K. sandvicensis*

Descriptions of the species


*Stromata* with subglobose, obconical or obovoid fertile heads, mainly flattened at ends, 1–5 mm in diam., containing several perithecia, frequently fused into a crust to 9 cm in diam., tapering downwards into radiating, cylindric to mainly strap-like stipes, free or concrecent to base, forming sheets, at first with a brown hyphal cover, soon glabrescent; surface greyish to blackish, slightly cracked on upper part and more deeply on sides, umbos infrequent, sporadically covered with remnants of outermost layer or with very small polygonal areas; immediately beneath surface carbonaceous; tissue between and beneath perithecia whitish to dark brown, coriaceous to woody, frequently disintegrating. *Perithecia* subglobose to obovoid, 0.9–1.3 mm high, 0.6–1 mm in diam. *Ostioles* conical-papillate. *Asci* not observed. *Ascospores* unicellular, dark brown, ellipsoidal to inequilateral, with narrowly rounded ends, 25–30 × 8–12 µm, smooth, germ slit not easily distinguished, straight, more than 20 µm, less than spore length.

Remarks — Van der Gucht (1995) considered the grade of branching stipes as the main difference between *Kretzschmaria cetrarioides* and *K. clavus*. In our opinion the range of the germ slit length cited by this author (24–26 µm and 16–20 µm, respectively) represents the most significant difference between these species. Recio (1991) cited a > 20 µm germ slit length for *K. cetrarioides*.

Specimens examined — CUBA; LA HABANA PROVINCE: Boyeros, road between Calle 100 and Carretera de las Guásimas, on very wet dead trunk, 15 Nov 1990, M. Benítez & M. Camino (HAJB M6666); Calabazar, Jardín Botánico Nacional, Arroyo Pancho Simón, 25 Jan 1990, M. Benítez & al. (HAJB M6628, HAJB M6629); ibid., on dry dead trunk of *Guazuma tomentosa*, 31 Jan 1991, M. Benítez & D. López (HAJB M6689); ibid., Zona Ecológico-Didáctica, on dead stump of *Ficus pandurata*, 5 Oct 1995, M. Clavel (HAJB M7438). — PINAR DEL RÍO PROVINCE: Sandino, Península de Guanahacabibes, S of Bolondrón, 0–50 m, moist semi-deciduous forest, on *Peltophorum adnatum*, 17 Nov 1976, G. Recio (HAJB M2986); San Cristóbal, Río Manantial, on dead trunk, 12 Apr 1987, R. Rankin (HAJB M5895).
2. *Kretzschmaria clavus* (Fr. : Fr.) Sacc., Syll. Fung. 2: xxix. 1883 ≡ *Sphaeria clavus* Fr. in Linnaea 5: 543. 1830; Fr.: Fr., Syst. Mycol. Index: 162. 1832 ≡ *Hypoxylon clavus* (Fr. : Fr.) Mont. in Ann. Sci. Nat., Bot., ser. 2, 13: 355. 1840 ≡ *Rhopalopsis clavus* (Fr. : Fr.) Cooke in Cooke & M. Badé (HAJB M3996); ibid., on dead trunk, 9 Apr 1983, G. Recio & M. Benítez (HAJB M3997); ibid., on wood, mainly rounded at ends, 3–6 mm in diam., containing numerous perithecia, packed in dense swarms, frequently compressed or deformed by mutual pressure, tapering downwards into radiating, subcylindrical stipes, simple or branched, up to 6 mm high, smooth; surface brown-coppery to dark brown, blackish, ± cracked, incipient umbos occasionally observed, sporadically covered with remnants of outermost layer or with very small polygonal areas; immediately beneath surface carbonaceous; tissue between and beneath perithecia whitish to dark brown, coriaceous to woody, frequently disintegrating. *Perithecia* subglobose to obovoid, 1.2–1.4 mm high, 0.6–1 mm in diam. *Ostioles* finely conical-papillate. Asci not complete, spore-bearing part 207–217 μm long, with apical ring bluing in Melzer’s iodine reagent, urn-shaped, 4.5–6 μm high, 3–4 μm wide. *Ascospores* unicellular, brown to dark brown, ellipsoid, inequilateral, with narrowly rounded ends, 29–38 × 7–11 μm, smooth, germ slit straight, 22–29 μm, less than spore length.

*Remarks* — In spite of the similarity of characters present in *Kretzschmaria clavus* and *K. coenopus*, Dennis (1957) treated *K. coenopus* as a distinct species according to the form of the fertile heads, dimensions and branching of the stipes, number of perithecia and prominence of the ostiolar papillae. Dennis (1961) considered *K. coenopus* as synonym of *K. clavus*. Later, Martin (1970) treated *K. coenopus* as an independent species. Recio (1991) considered *K. coenopus* as an independent species based on the statistical study of the germ slit lengths in Cuban specimens. This criterion is maintained in this paper. Van der Gucht (1995) and Rogers & Ju (1998) considered *K. coenopus* as a synonym of *K. clavus*.


*Stromata* with subglobose, obconical or occasionally turbinate fertile heads, mainly flat at ends, 3.5–7 mm in diam., containing numerous perithecia, packed in dense swarms, frequently compressed or deformed by mutual pressure, tapering downwards into radiating, subcylindrical stipes, simple or branched, up to 6 mm high, smooth; surface brown-coppery to dark brown, blackish, ± cracked, incipient umbos occasionally observed, sporadically covered with remnants of outermost layer or with very small polygonal areas; immediately beneath surface carbonaceous; tissue between and beneath perithecia whitish to dark brown, coriaceous to woody, frequently disintegrating. *Perithecia* subglobose to ovoid, 0.9–1.4 mm high, 0.5–0.7 mm in diam. *Ostioles* mainly convex-papillate. Asci not observed. *Ascospores* unicellular, brown to dark brown, ellipsoid, inequilateral, with narrowly rounded ends, 29–38 × 7–11 μm, smooth, germ slit straight, 22–29 μm, less than spore length.

*Remarks* — See the following species.
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4. Kretzschmaria micropus (Fr.: Fr.) Sacc., Syll. Fung. 2: xxix. 1883 ≡ Sphaeria micropus Fr. in Linnaea 5: 542. 1830; Fr.: Fr., Syst. Mycol. Index: 169. 1832 ≡ Hypoxylon micropus (Fr.: Fr.) Berk. in J. Linn. Soc., Bot. 10: 383. 1869 ≡ Rhopalopsis micropus (Fr.: Fr.) Cooke in Grevillea 11: 94. 1883. – Fig. 1D; 2G, H.

Stromata with subglobe to slightly compressed fertile heads, up to 2 mm in diam., containing 1 or 2 perithecia, densely aggregated, generally with 1 lateral developed umbo; stipes cylindrical to mainly cylindrical-compressed, simple or branched, covered with brown hyphae, at base horizontally arranged, totally free or a little concrescent; surface dark brown to blackish, cracked in a very distinct form with light brown and blackish areas; immediately beneath surface carbonaceous; tissue between and beneath perithecia whitish to dark brown, coriaceous to woody, disintegrating. Perithecium subglobe, 1–1.8 mm high, 0.6–1.6 mm in diam. Ostioles sharply conical-papillate. Asci not observed. Ascospores unicellular, dark brown, ellipsoid to inequilateral, with narrowly rounded ends, 26–32 x 8–11 µm, smooth, germ slit not easily distinguished, straight, more than 20 µm, less than spore length.

Remarks — In this fungus the fertile heads are usually not fused forming large crusts, as in Kretzschmaria cetrarioides, but the morphology of the ascospores is very similar.


5. Kretzschmaria milleri J. D. Rogers & Y. M. Ju in Mycotaxon 68: 363. 1998. – Fig. 1E, F; 21, J.

Stromata pulvinate to effuse pulvinate, 1–4 cm in diam., 1–2.5 mm thick, attached to substrate with narrow connections, with crenate margins; surface brown-coppery, cracked; immediately beneath surface carbonaceous; tissue between and beneath perithecia whitish to dark brown, coriaceous to woody, disintegrating. Perithecium obvoid, 1.3–2.8 mm high, 0.5–1.2 mm wide. Ostioles coarsely papillate to somewhat conical. Asci not complete, with apical ring bluing in Melzer’s iodine reagent, urn-shaped, 10–13 µm high, 6–8 µm wide. Ascospores dark brown, fusiform to ellipsoid, inequilateral, with narrowly rounded ends occasionally pinched, 38–47 x 11–16 µm, smooth, germ slit straight, slightly less than spore length.

Remarks — This fungus differs from the remaining ustulinoid taxa here studied by the presence of coarsely papillate ostiolar openings.


Stromata aggregated or fused, discoid or effuse pulvinate, 1–10 cm in diam., 1–3.5 mm thick, attached to substrate with narrow connections, generally with steep thick crenate margins; surface brown-coppery to dark brown; immediately beneath surface carbonaceous; tissue between and beneath perithecia white to grey, coriaceous to woody, becoming dark brown and disintegrating. Perithecium obvoid to tubular, 1.1–1.9 mm high, 0.6–1.3 mm wide. Ostioles papillate. Asci not complete, with apical ring bluing in Melzer’s iodine reagent, c. 6.8 µm high, 3.5–5.5 µm wide. Ascospores dark brown, fusiform-inequilateral, generally with acute ends sometimes pinched, 31–50 x 8–12 µm, smooth, germ slit straight, much less than spore length.

Remarks — Kretzschmaria pavimentosa differs from the other ustulinoid taxa here treated mainly in the steepness and thickness of the stromata margins and in the ascospore germ slit being much less than the spore length.

Specimens examined — Cuba: Guantánamo Province: Baracoa, near Río Duaba, road of ascent to Yunque de Baracoa, evergreen mesophyllous forest, on dry trunk, 17 Apr 1986, M. Camino (HAJB M4808); banks of Río Toa, between Tabajó and Bernardo, 1 km from W margin, destroyed montane rainforest, on dead trunk of Jambosa vulgaris, 18 Apr 1986, M. Camino (HAJB M4834, HAJB M4844); Arroyo Punta Gorda, Arroyón, gallery forest, on wet dead trunk, 27 Apr 1986, M. Camino (HAJB M4945). — La Habana Province: Boyeros, Calabazar, Jardín Botánico Nacional, nursery,
on dead trunk of *Palmae*, 17 Sep 1987 (HAJB M5480). — PINAR DEL RÍO PROVINCE: Candelaria, ascent to Loma El Salón, 400–500 m, seasonal evergreen forest, on dry dead stump, 3 Nov 1987, M. Rodríguez (HAJB M6617). — SANTIAGO DE CUBA PROVINCE: Trindad, Fomento, hills SW of Gavilanes, 300–500 m, on dead trunk lying on ground, 9 Nov 1979, M. Rodríguez (HAJB M3615).


*Stromata* separated, aggregated or fused, 1.5–7 cm in diam., 2–3 mm thick, attached to substrate with narrow connectives, with crenate margins; surface brown-coppery to dark brown, with reticulate cracks; immediately beneath surface carbonaceous; tissue between and beneath perithecia brown to dark brown. *Perithecia* globose to obovoid, 1.3–1.8 mm high, 0.6–1.5 mm wide. *Ostioles* papillate to finely papillate. *Asci* not complete, with apical ring bluing in Melzer’s iodine reagent, urn-shaped, 5–6 µm high, 3–4 µm wide. *Ascospores* unicellular, dark brown, fusiform to ellipsoidal, inequilateral, with acute ends very frequently pinched, 25–37 × 9–12 µm, smooth, germ slit straight, slightly less than or nearly equalling spore length.

Remarks — The ascospore morphology of *Kretzschmaria sandvicensis* and *K. milleri* is similar, but the ostiolar papillae are very different.

Specimens examined — CUBA: CIENFUEGOS PROVINCE: Cumanayagua, Sierra del Escambray, road between Los Tornos and El Naranjo, on base of very wet living trunk, 3 Nov 1987, M. Rodríguez (HAJB M5518). — PINAR DEL RÍO PROVINCE: Candelaria, ascent to Loma El Salón, on dry stump, 23 Feb 1990, M. Benítez (HAJB M6617). — SANTI SPÍRITUS PROVINCE: Fomento, hills SW of Gavilanes, 300–500 m, on dead trunk lying on ground, 9 Nov 1979, M. Rodríguez (HAJB M3615).


*Stromata* separated, aggregated or fused, 0.5–6 cm in diam., 2–3.5 mm thick, attached to substrate with narrow connectives, with sloped crenate margins; surface brown-coppery to dark brown, with reticulate cracks; immediately beneath surface carbonaceous; tissue between and beneath perithecia brown to dark brown. *Perithecia* mainly globose to obovoid, sometimes tubular, 1.3–1.7 mm high, 0.8–1.4 mm wide. *Ostioles* coarsely papillate. *Asci* not complete, with apical ring bluing in Melzer’s iodine reagent, urn-shaped, 5–6 µm high, 3–4 µm wide. *Ascospores* unicellular, dark brown, fusiform to ellipsoidal, inequilateral, with acute ends very frequently pinched, 25–37 × 9–12 µm, smooth, germ slit straight, slightly less than or nearly equalling spore length.

Remarks — *Kretzschmaria zonata* is characterized by the presence of sloped stromata margins and ascospores very frequently with pinched ends.


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References

IUCN 2012: IUCN Red List categories and criteria: version 3.1, ed. 2. – Gland & Cambridge: IUCN.