
A new marine *Xylomyces* on *Rhizophora* from the Caribbean and Hawaii

Jan Kohlmeyer and Brigitte Volkmann-Kohlmeyer

Institute of Marine Sciences, University of North Carolina at Chapel Hill, Morehead City, North Carolina 28557 USA.

Kohlmeyer, J. and Volkmann-Kohlmeyer, B. (1998). A new marine *Xylomyces* on *Rhizophora* from the Caribbean and Hawaii. *Fungal Diversity* 1: 159-164.

Xylomyces rhizophorae Kohlm. and Volkm.-Kohlm. sp. nov. is described from intertidal and submerged wood and bark of *Rhizophora mangle* roots and prop roots in the Bahamas, Belize, Martinique, Tobago, the U.S. Virgin Islands (St. John), and Hawaii (Oahu). The new species is compared with five *Xylomyces* species from freshwater habitats. The potential saltwater adaptation of *X. chlamydosporis* is discussed.

Introduction

Collections made in the mangroves of the Caribbean and Hawaii between 1970 and 1992 contained an unknown hyphomycete (Kohlmeyer, 1980, 1981) that was tentatively identified as *Xylomyces* sp. It differs from the type species *X. chlamydosporis* Goos, R.D. Brooks and Lamore (1977), a species from a river in Rhode Island by its morphology, substrate, geographic distribution, and occurrence in marine habitats. Recently, Goh *et al.* (1997) described four additional species of *Xylomyces* from submerged wood in freshwater habitats. In the following we describe the new marine *Xylomyces* and compare it with the other taxa of this genus.

Materials and methods

Dead submerged roots and branches of *Rhizophora mangle* L. were collected in the Caribbean and Hawaii, air dried, examined under a dissecting microscope and scanned for fungal species. Permanent slides were prepared according to the method described by Volkmann-Kohlmeyer and Kohlmeyer (1996). All material is deposited in the herbarium of the Institute of Marine Sciences (IMS), except for the Isotype that has been lodged at the New York Botanical Garden (NY).

Taxonomy

Xylomyces rhizophorae Kohlm. and Volkm.-Kohlm., sp. nov. (Figs. 1-6)

Etymology: from the host genus, *Rhizophora* (Rhizophoraceae).

Hyphae 1.5-4 μm diam., plerumque superficiales, septatae, ramosae, dilute brunneae ad atro-brunneae. *Conidiophora* et conidia absentia. *Chlamydo sporae* plerumque apicales, rariter intercalares, singulares vel catenatae, raro ramificantes, filamentosae, vulgo latissimae ad apices, contractae versus bases, 95-370 (-500) \times (8-) 9-16 μm , diam. ad bases 5.5-8 μm , 11-43 (-64) septatae, ad aliquot septas constrictae, laeves, atro-brunneae, plus minusve uniformiter omnino coloratae.

Holotypus: J.K. 4055 (IMS).

Isotypus: J.K. 4055 (NY).

Hyphae 1.5-4 μm diam., mostly superficial, septate, branched, light to dark brown. *Conidiophores* and *Conidia* absent. *Chlamydo spores* mostly apical, rarely intercalary, single or in chains, rarely branching, filamentous, straight or curved, mostly widest at the tips, tapering towards the base, 95-370 (-500) \times (8-) 9-16 μm (\bar{x} = 206 \times 12 μm ; n = 33), 5.5-8 μm wide at the base, with 11-43 (-64) transverse septa, rarely with longitudinal or oblique septa, constricted at some of the septa, smooth, dark brown, more or less uniform in color throughout (Figs. 1-6).

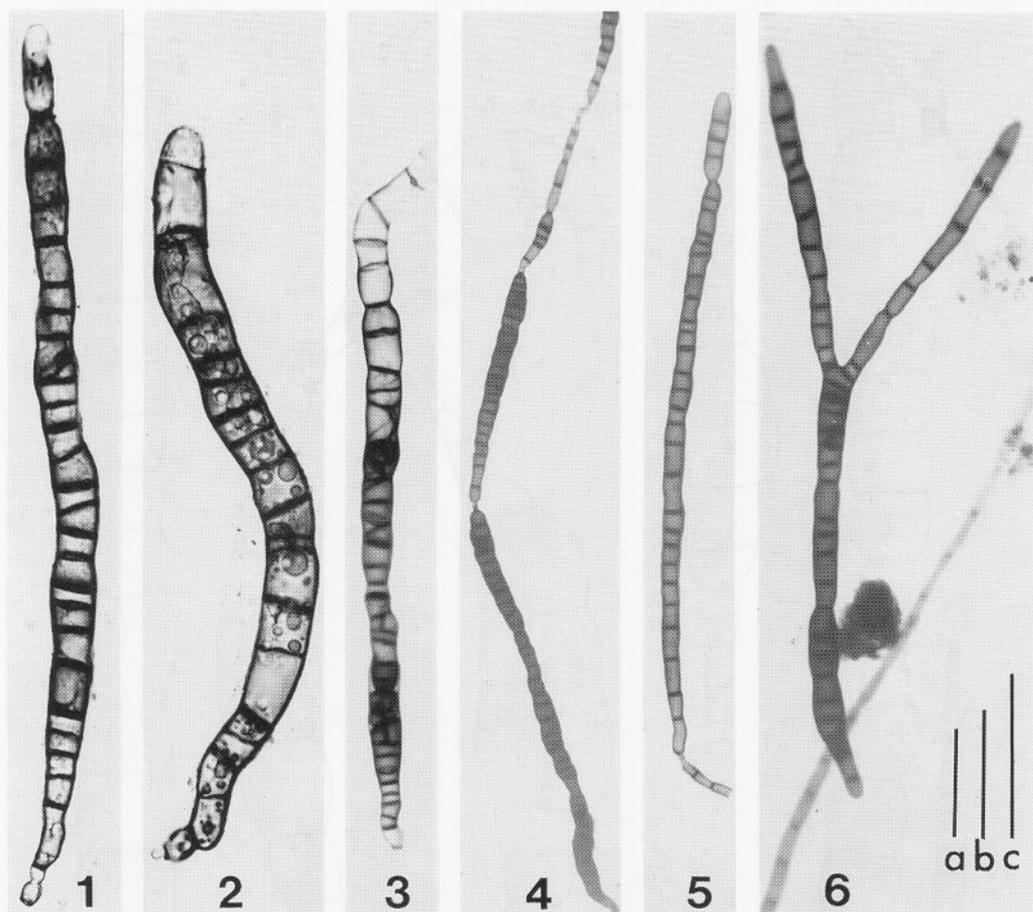
Substrata: Wood and bark of roots of *Rhizophora mangle* (Rhizophoraceae).

Distribution: Caribbean (Bahamas, Belize, Martinique, Tobago, U.S. Virgin Islands); Pacific Ocean (Hawaii).

Material examined (all collections on *Rhizophora mangle*): MARTINIQUE, Les Trois Ilets, 14°32'N, 61°02'W, 20 Dec. 1979, on washed-up prop root, together with *Leptosphaeria australiensis* (Cribb and J.W. Cribb) G.C. Hughes and *Periconia prolifica* Anastasiou, J.K. (J.K. 4055, holotype: IMS; isotype: NY). BAHAMAS, Great Abaco Island, 13 Feb. 1970, seedling grown until 14 Feb. 1977 in the laboratory, together with *Verruculina enalia* (Kohlm.) Kohlm. and Volkm.-Kohlm., I. Friedmann (J.K. 3838); same island, Treasure Cay, 26°40'N, 77°17'W, 3 Nov. 1977, dead intertidal branch, together with *L. australiensis* and *Trichocladium alopallonellum* (Meyers and R.T. Moore) Kohlm. and Volkm.-Kohlm., J.K. (J.K. 3874). BELIZE, Blue Ground Range, 16°48'30"N, 88°08'30"W, 4 June 1989, intertidal prop root, together with *Lulworthia* sp., J.K. and B.V.K. (J.K. 5284); TOBAGO, Bucco Bay, 11°10'N, 60°48'45"W, 7 Nov. 1984, dead submerged prop root, together with *Hapsidascus hadrus* Kohlm. and Volkm.-Kohlm. and *Dactylospora haliotrepha* (Kohlm. and E. Kohlm.) Hafellner, J.K. and B. V.-K. (J.K. 4656); U.S. VIRGIN ISLAND, St. John, Hurricane Hole, 18°21'15"N, 64°42'W, 11 Sep. 1978, dead submerged prop root, together with *T. alopallonellum*, J.K. (J.K. 3919); same location and data, dead submerged branches (J.K. 3924, J.K. 3944); HAWAII, Oahu, Kaneohe Bay, Heeia State Park, 21°26'38"N, 157°48'38"W, 27 Jan. 1992, dead intertidal root, together with *L. australiensis*, J.K. and B.V.-K. (J.K. 5451).

Discussion

Xylomyces rhizophorae appears to be a widely distributed species and is probably found wherever its host, *Rhizophora mangle*, occurs. The brown mycelium and chlamydo spores blend into the reddish-brown wood and bark of



Figs. 1-6. *Xylomyces rhizophorae*, chlamydospores from different islands in the Caribbean and Pacific Ocean; all taken with brightfield optics. 1. St. John, U.S. Virgin Islands, J.K. 3924; Bar a. 2. St. John, J.K. 3944; Bar a. 3. Great Abaco Island, Bahamas, J.K. 3874; Bar b. 4. Martinique, J.K. 4055, chlamydospore chain; Bar c. 5. Oahu, Hawaii, J.K. 5451; Bar b. 6. Tobago, J.K. 4656, branched chlamydospore. Bar b. Bars: a = 25 μ m, b = 50 μ m, c = 100 μ m.

the host. Because of its covert appearance, *X. rhizophorae* is easily overlooked and may be more common than the collections indicate. The fungus is frequently growing in old tunnels of shipworms and gribbles.

The new species can be easily distinguished from the five freshwater species. Chlamydospores have consistently more septa and are thinner than those of *X. chlamydosporis* and *X. elegans* Goh, W.H. Ho, K.D. Hyde and K.M. Tsui (Goos *et al.*, 1977; Goh *et al.*, 1997). They are also longer than *X. punctatus* Goh, W.H. Ho, K.D. Hyde and K.M. Tsui and *X. pusillus* Goh, W.H. Ho, K.D. Hyde and K.M. Tsui (Go *et al.*, 1997). The chlamydospores of *X. giganteus* Goh, W.H. Ho, K.D. Hyde and K.M. Tsui are distinctly wider (25-50 μ m) than

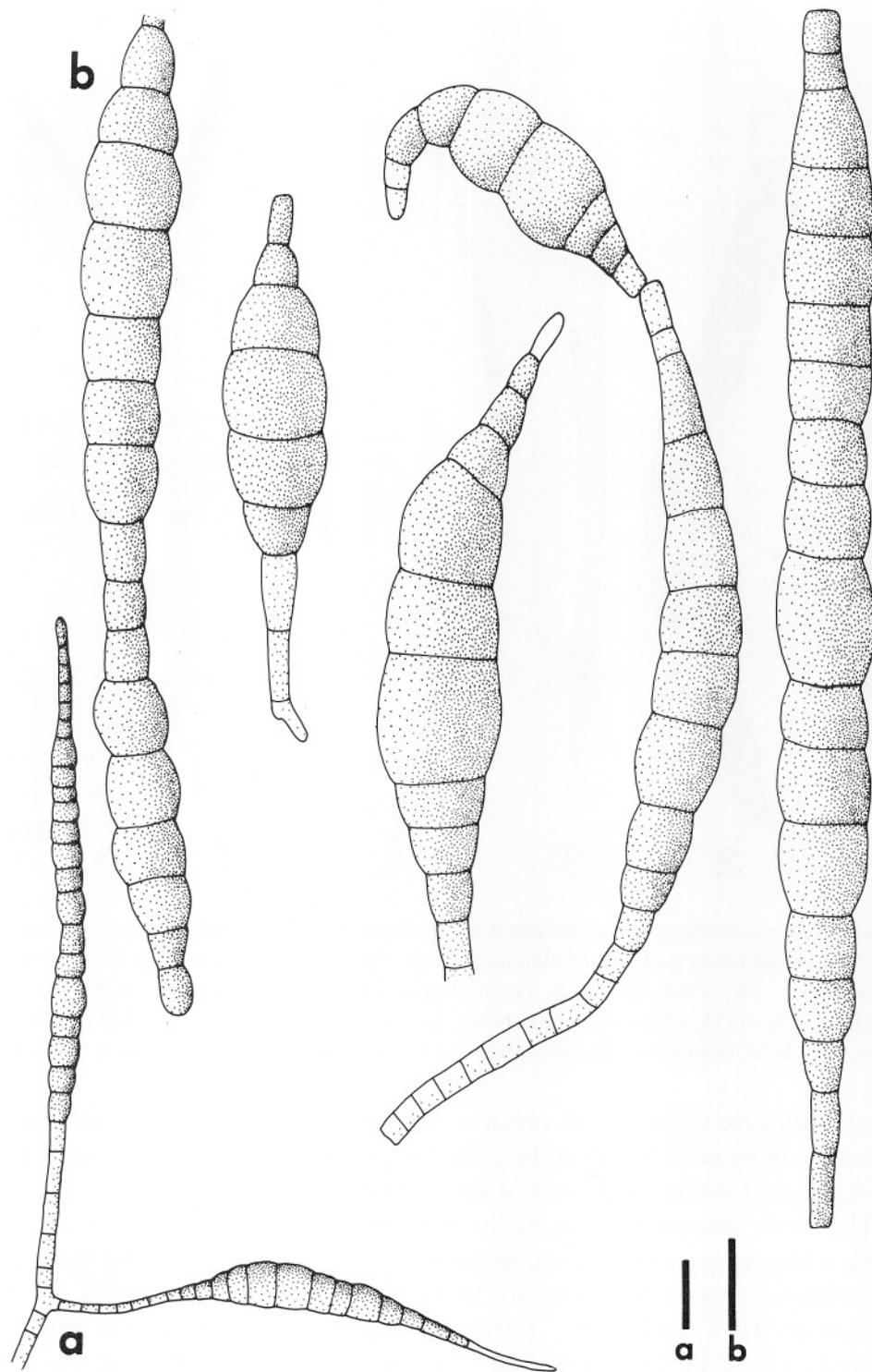


Fig. 7. *Xylomyces chlamyosporis*, chlamyospores from a test panel submerged for 8 months at a saltwater location in Alabama, J.K. 2493. Bar: a = 40 μ m, b = 30 μ m.

those of *X. rhizophorae*. A sixth species, *X. foliicola* R.F. Castañeda and W.B. Kendr. (Castañeda Ruiz and Kendrick, 1990), was discussed by Goh *et al.* (1997). The latter authors were unable to obtain type material but concluded, based on the description, that the species was atypical for the genus. Furthermore, *X. foliicola* is not aquatic, but occurs in a terrestrial habitat on decaying oak leaves.

Xylomyces chlamydo sporis was described by Goos *et al.* (1977) from a non-saline site of the Saugatucket River, a tidal stream in southern Rhode Island. Although the fungus was able to grow in culture at salinities of up to 22.15 ‰, it was not collected in the lower estuary at six sites of increasing salinity during the 3-yr. sampling period (Goos *et al.*, 1977). We were therefore surprised when a fungus from a wood panel submerged for 8 months at a saline location (Bay Minette, Alabama) appeared to be *X. chlamydo sporis* (Goos *et al.*, 1977). This panel (J.K. 2493) was part of a test program conducted by the W.F. Clapp Laboratories of the Battelle Memorial Institute and sent to us for examination. No salinity data are available for this site. *Lignincola laevis* Höhnk was also present on this panel, while *L. laevis*, *Lulworthia* sp. and *Passeriniella obiones* (P. Crouan and H. Crouan) K.D. Hyde and Mouzouras occurred on an adjacent panel. These are all obligate marine fungi and therefore indicative of high salinities. The hyphomycete from Alabama (Fig. 7) was almost identical to *X. chlamydo sporis*, as chlamydo spores were 5-19 septate and measured 95-420 × 26-42 μm (\bar{x} = 210 × 34 μm, n = 27) versus (3-) 6-14 septate and (110-)165-455 × 25-45 μm (\bar{x} = 276 × 35 μm, n = 38) in *X. chlamydo sporis* (Goh *et al.*, 1997). Future collections are needed in order to ascertain if *X. chlamydo sporis* is adaptable to fresh- and saltwater in the field, or if the marine form is a different physiological race or species.

Acknowledgements

We thank Imre Friedmann for collections of *Rhizophora* seedlings, The Battelle Memorial Institute for a wood panel, and Laura White and Henry Page for assistance with the preparation of the manuscript.

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