

Spiromastix saturnispora, a new species from Indonesian soil

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Spiromastix saturnispora, isolated from a soil sample collected from central Java in Indonesia, is described and illustrated as a new species. The new species was compared with the type of *Spiromastix*, *S. warcupii*, and is similar in having brownish ascomata with a peridium of a loose network of delicate hyphae, peridial appendages which are curved in the manner of a scimitar and never completely coiled, and the absence of an anamorph. The ascospores of *S. saturnispora* are characterized as large oblate, $3.2\text{--}4.8 \times 2.5\text{--}3 \mu\text{m}$, punctate, and with an equatorial rim, which serves to distinguish the species from *S. warcupii* and other known species.

Key Words— ascomycete; Onygenales; soil-borne fungus; *Spiromastix saturnispora*.

The genus *Spiromastix* (Onygenaceae, after Currah, 1985, 1988, 1994) was erected by Kuehn and Orr (1962) for a fungus which is characterized by brownish ascomata, delicate peridial hyphae with unbranched, thick-walled, curved or incompletely looped appendages, and oblate, minutely punctate ascospores. *Spiromastix* lacks an anamorph. The type species, *S. warcupii* Kuehn et Orr, was originally isolated from wheat-field soil in Australia by J. H. Warcup. In a letter to Kuehn, Warcup commented that the fungus is quite common in Waite soil (Waite Agricultural Research Institute, Adelaide, South Australia). The distribution of this species is presumably common in tropical and subtropical regions, because it has subsequently been found in African and Indonesian soils (fide CBS, List of Cultures, Fungi and Yeasts, 33rd edition, 1994).

In a study on the occurrence of onygenalean fungi in Southeast Asian soils, we recently obtained several isolates of *S. warcupii* from Indonesian and Malaysian soils. Among these onygenalean collections, one isolate of *Spiromastix* turned out to be sufficiently different from all known species of the genus (Kuehn and Orr, 1962; Currah and Locquin-Linard, 1988; Guarro et al., 1993) to warrant recognition as a new taxon. The most distinguishing feature of this isolate is large oblate ascospores with an equatorial rim.

Taxonomy

Spiromastix saturnispora Uchiyama, Kamiya et Udagawa, sp. nov. Figs. 1–8

Coloniae in agar cellulose plus minusve restrictae, planae, tenues, ex mycelio vegetativo submerso constantes, granulares, ascomatibus abundantibus for-

mantes, brunneo-griseae vel vinoso-bubalinae, mycelio laxe floccoso albo obtectae; reversum incoloratum vel flavo-album vel bubalinum.

Ascomata superficialia, discreta vel confluentia, globosa vel subglobosa, $100\text{--}240 \mu\text{m}$ diam, primum alba, deinde brunneo-grisea vel vinoso-bubalina; hyphae peridii hyalinae, irregulariter ramosae, contortae, tenues, leves, septatae, intertextae, reticulum laxum formantes; appendices ex hyphis peridialibus orientes et in externa extendentes, brunneae, non ramosae, arcuatae vel plus minusve sinuatae, non septatae, incrassatae, leves, $16\text{--}30 \times 1\text{--}1.5 \mu\text{m}$. Asci non catenati, 8-sporei, pyriformes vel ellipsoidei, $8\text{--}14.5 \times 5.5\text{--}9 \mu\text{m}$, brevistipitati, hyalini vel dilute flavi, evanescentes. Ascosporae primum hyalinae, postea flavo-brunneae, oblatae, $3.2\text{--}4.8 \times 2.5\text{--}3 \mu\text{m}$, crista aequatorio incrassato praeditae, cum superficie minute punctatae.

Mycelio vegetativo ex hyphis ramosis, levibus vel minute incrassatis, septatis, $1\text{--}2 \mu\text{m}$ diam composito. Anamorphosis abest.

Holotypus BF54422: colonia exiccata in cultura ex solo prati, Candi Pram Banan, in Java, Indonesia, 2.ii.1995, a S. Uchiyama et S. Kamiya isolata et ea collectione fungorum, Musei et Instituti Historiae Naturalis Chiba (CBM) conservata.

Etymology: from *saturnius*=Saturnian, and *sporus*=spore; referring to the faint similarity of the spores to the planet Saturn.

Colonies on cellulose agar growing rather restrictedly, attaining a diameter of 27–29 mm in 21 days at 25°C, plane, thin, with vegetative mycelium submerged, granular in appearance due to the production of abundant ascomata, Brownish Grey (M. 8C2, after Kornerup and Wanscher, 1978) or Vinaceous Buff (Rayner, 1970), over-

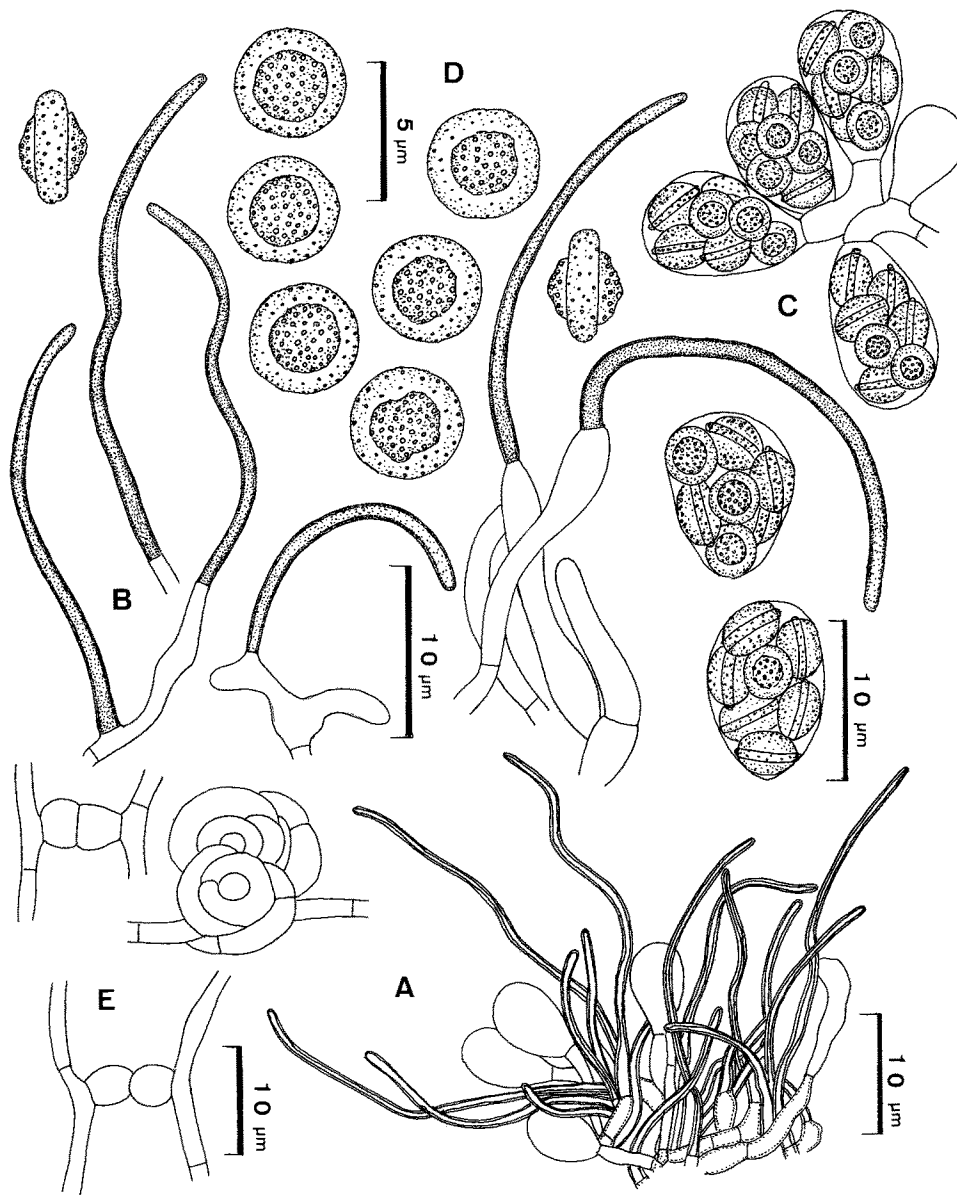


Fig. 1. *Spiromastix saturnispora*, BF54422.

A. Margin of ascoma showing peridial hyphae and appendages. B. Appendages. C. Asci. D. Ascospores. E. Ascomatal initials.

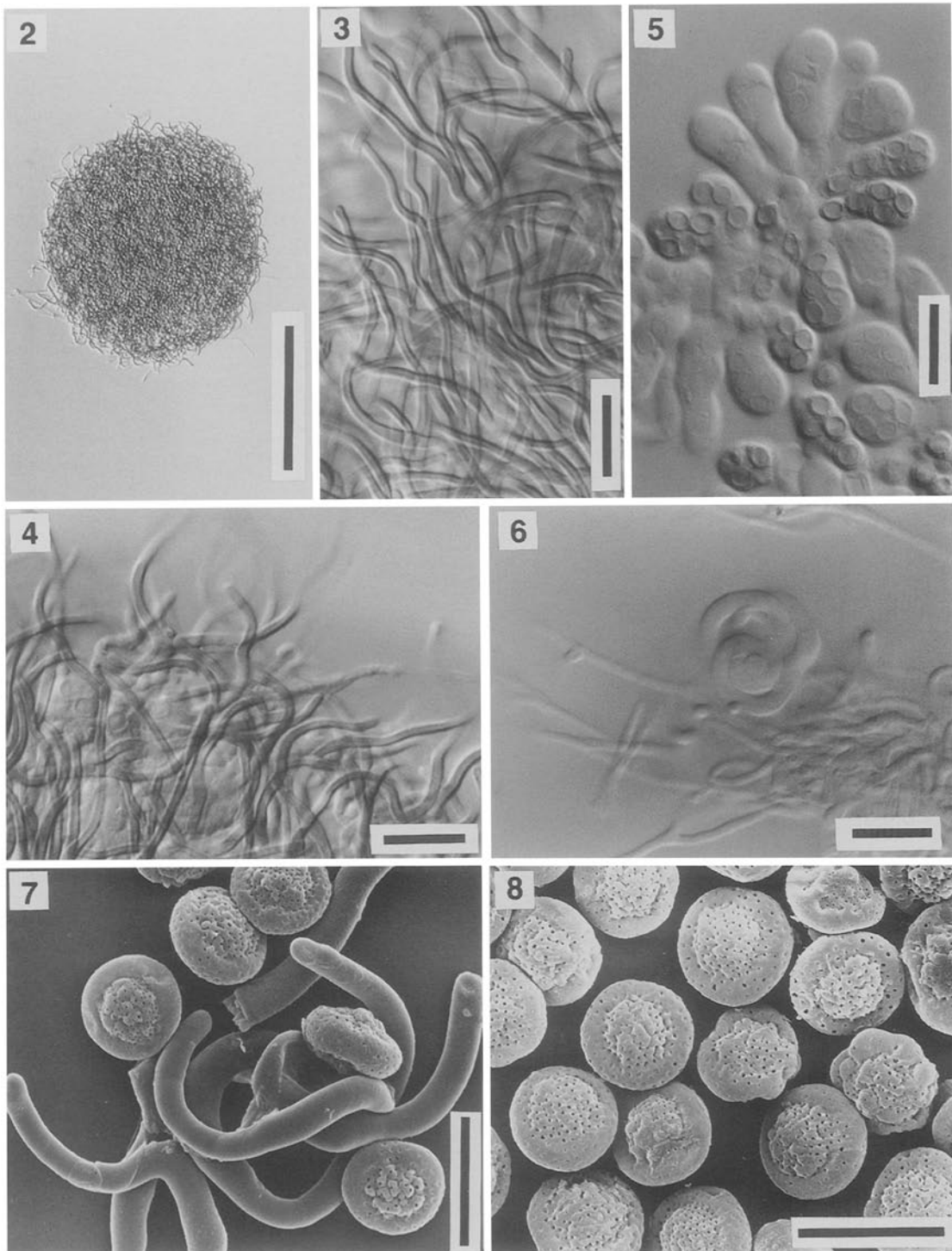
grown by a loose flocculent white mycelium; reverse uncolored to Yellowish White (M. 4A2) or Buff (R).

Colonies on PYE growing more rapidly, attaining a diameter of 32–37 mm in 21 days at 25°C, somewhat floccose, wrinkled and radially sulcate, centrally raised up to 5 mm or more high, consisting of a compact basal felt, White; ascomata absent; reverse Brownish Orange (M. 6C5) or Cinnamon (R).

Colonies on potato-carrot agar (PCA) growing slowly, attaining a diameter of 24–25 mm in 21 days at 25°C, floccose, centrally raised, more or less zonate, consisting of a very thin mycelial felt, producing abundant ascomata, White to Brownish Grey (M. 6C2) or Vinaceous Buff (R); margins broad, submerged; reverse Greyish Orange (M. 6B3) or Rosy Buff (R).

Colonies on diluted Sabouraud agar growing restrictively, attaining a diameter of 21–23 mm in 21 days at 25°C, superficially resembling those on PCA, White to Brownish Grey (M. 8D2) or Pale Purplish Grey (R); reverse uncolored to Pale Yellow (M. 4A3) or Buff (R).

Ascomata superficial, discrete or confluent in small clusters, globose to subglobose, 100–240 µm in diam including the appendages, at first white, becoming brownish gray or vinaceous buff in age, maturing within 28 days. Peridial hyphae hyaline, irregularly branched, contorted, thin-walled, smooth, septate, interwoven, 1–3 µm in diam, forming a loose network, ending in 1–2 slender appendages; appendages arising from the basal swollen cell of peridial hyphae and extending outwards, brown, unbranched, curved or somewhat sinuous, asep-



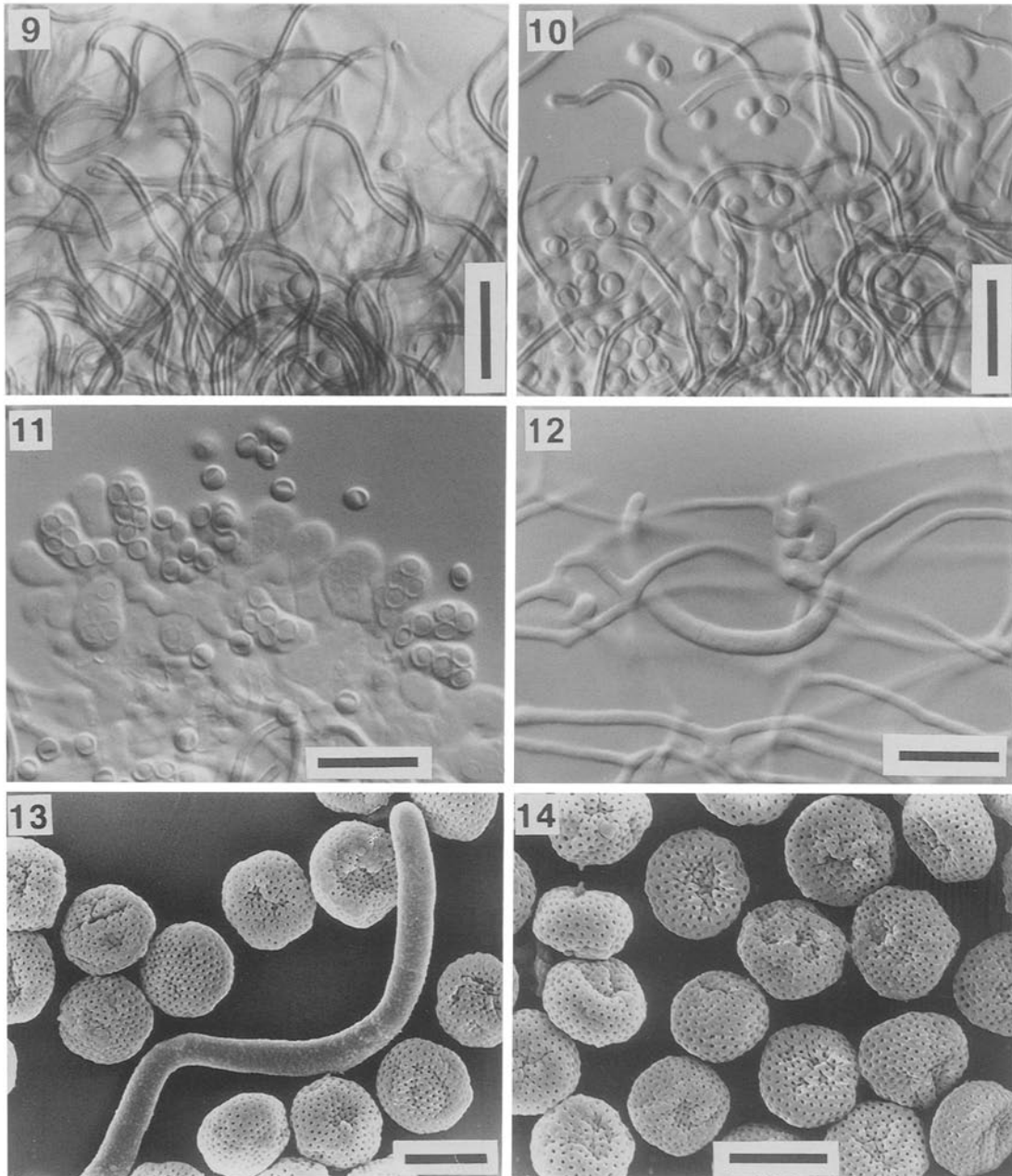
Figs. 2-8. *Spiromastix saturnispora*, BF54422.

2. Ascoma. 3. Appendages. 4. Peridial hyphae and appendages. 5. Asci. 6. Ascumatal initial. 7. Appendages and ascospores (SEM). 8. Ascospores (SEM).

Scale bars: 2=100 μm ; 3-6=10 μm ; 7, 8=5 μm .

tate, thick-walled, smooth, $16-30 \times 1-1.5 \mu\text{m}$, neither coiled nor swollen at the apex. Asci singly arising from croziers, 8-spored, pyriform to ellipsoidal, $8-14.5 \times 5.5-9 \mu\text{m}$, short-stipitate, hyaline to pale yellowish, evanes-

cent. Ascospores at first hyaline, yellowish brown in age, oblate, globose in face view, $3.2-4.8 \times 2.5-3 \mu\text{m}$ (with the external rim), provided with a prominent equatorial rim approximately $1.2 \mu\text{m}$ thick and $0.6-$



Figs. 9–14. *Spiromastix warcupii*, BF 47272.

9. Appendages. 10. Peridial hyphae and appendages. 11. Asci. 12. Ascomatal initial. 13. Appendage and ascospores (SEM). 14. Ascospores (SEM).

Scale bars: 9–12 = 10 μm ; 13, 14 = 2 μm .

0.8 μm wide, minutely punctate.

Vegetative mycelium consisting of hyaline, branched, delicate, smooth to finely roughened, septate, 1–2 μm diam hyphae; racquet hyphae sometimes present; anamorph not seen; ascomatal initials arising as a side knob on a hypha, developing by fusion of apical segments of the two initials and becoming irregularly coiled or contorted, then surrounded by hyphae arising from the neighboring cells.

Weakly keratinolytic.

At 37°C, growth and ascomatal production rapidly occur.

Specimen examined: BF54422 (holotype), in dried culture isolated from meadowy soil, Candi Pram Banan, north of Jogjakarta, Central Java, Republic of Indonesia, 2 February 1995. The holotype has been deposited with the Natural History Museum and Institute, Chiba, Japan (CBM).

Other specimens examined for a comparison: *Spiromastix warcupii* Kuehn et Orr strains ATCC 14964,

isolated from soil in Australia, December 1959, by J. H. Warcup; BF 47272, isolated from meadowy soil, Malacca, Malaysia, 11 March 1994, by Uchiyama and Kamiya; and BF49343, isolated from soil in paddy field, near Candi Borobudur, Jogjakarta, Central Java, Indonesia, 14 March 1994, by Uchiyama and Kamiya (Figs. 9-14).

Spiromastix saturnispora can be distinguished readily from the other known species in this genus by its large oblate ascospores with an elevated rim on the longitudinal axis, while those of the other species are small ($2.5\text{--}3.0 \times 2.0\text{--}2.5 \mu\text{m}$ in *S. warcupii* (Figs. 13, 14); $2.5\text{--}3.5 \times 2.0\text{--}2.2 \mu\text{m}$ in *S. tentaculata* Guarro, Gené et de Vroey; and $2.8\text{--}4.0 \times 2.0\text{--}2.5 \mu\text{m}$ in *S. grisea* Currah et Locquin-Linard) and devoid of a rim or equatorial crests of any kind. The ascospore surface ornamentation in *S. grisea* is only equatorially punctate, and the ascospores of *S. tentaculata* are marked with irregularly pitted furrows. Furthermore, the new species is also distinct from *S. grisea* and *S. tentaculata*, which have helical appendages with 2-8 turns and appendages with inflated ends, respectively.

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