

## LINDQUISTIA, A NEW HYPHOMYCETE GENUS<sup>1</sup>

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### RESUMEN

Se describe un interesante hifomicete coprófilo, *Lindquistia indica* gen. & sp. nov., aislado de estiércol de mono de la India. Está asociado con ascostromas jóvenes de un hongo identificado como *Podosordaria leporina* (E. & E.) Dennis.

We are delighted to contribute this paper to a volume intended to honour one so distinguished as Professor Dr. J. C. Lindquist whose contributions to mycology are so well known.

In the course of our studies on the taxonomy and ecology of coprophilous fungi an interesting fungus was isolated from the dilution plates of monkey dung collected at the deer park, Madras. The fungus formed small white colonies with scanty aerial mycelium and soon produced white, erect synnemata-like structures. This, on subsequent transfer to fresh potato dextrose agar slants and plates, produced a stromatic ascomycete which could be identified as *Podosordaria leporina* (Ellis & Everh.) Dennis. At first, while still on the dilution plates, the fungus with its typical synnemata and conidial structures was taken to be a Hyphomycete; but subsequent study of the fungus in pure culture revealed that the fungus is *Podosordaria leporina* with its conidial state and also that the synnema-like structures were but the young and developing ascostromata. Fully developed stromata with mature perithecia were produced after 3-4 weeks of inoculation on to fresh medium.

*Podosordaria leporina* is a well known fungus and has been studied by several students (Seaver *et al.*, 1927; Koehn, 1971; Krug & Cain, 1974) and it has also been reported from India (Mukerji *et al.*, 1969. as *Poronia leporina* Ellis & Everh.) The perfect state of this fungus is

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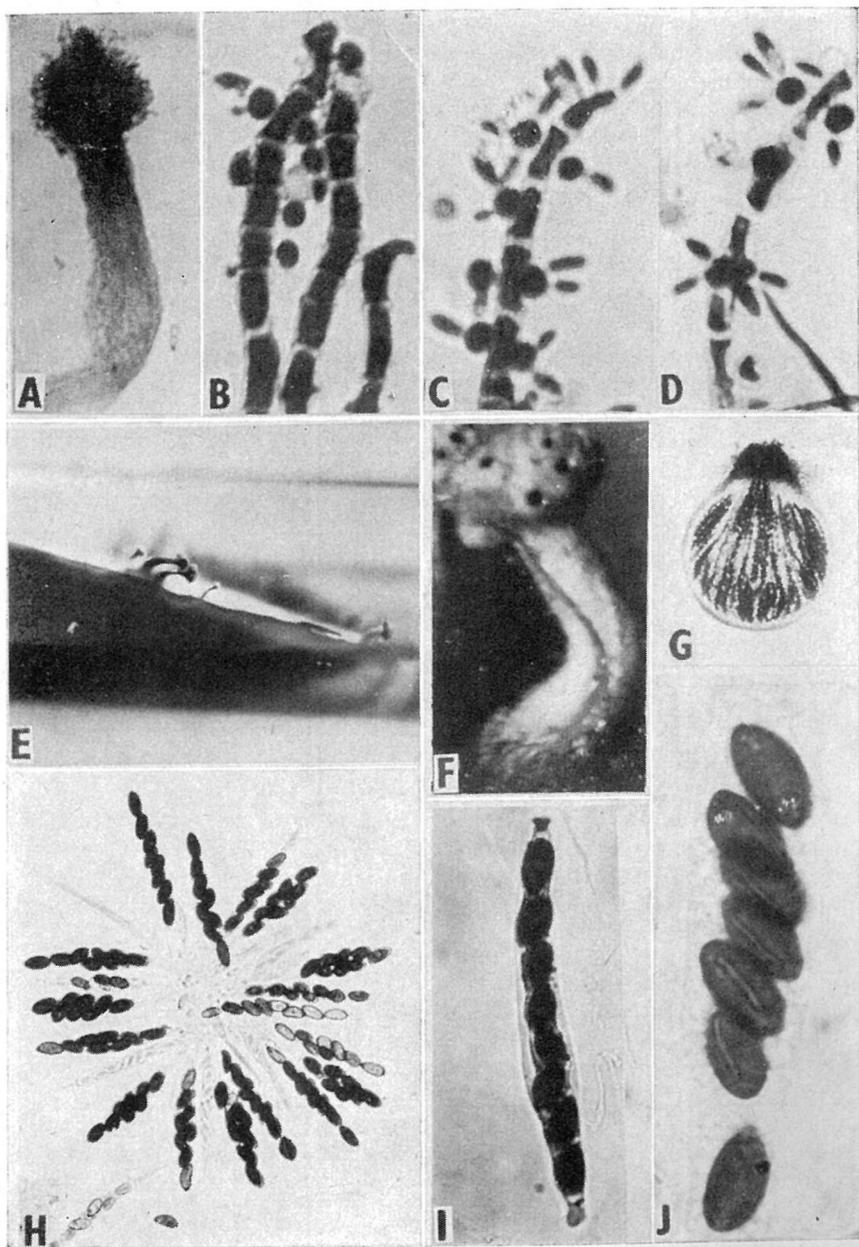
well studied and described in the literature. However, little is known about its conidial state and is the main subject of this paper. A brief description of the perfect state is also appended.

#### THE PERFECT STATE

*Stromata*: light brown, long, erect, clearly differentiated into a stalk portion and a head portion, 2-5 mm long, 0.3-0.7 mm wide at the base of the stalk, 0.3-1.0 mm wide in the middle portion of the stalk and 0.3-1.2 mm wide in the region of the stalk just below the head. Head subglobose to hemispherical, 0.8-1.8 mm in diam. with a rough outline due to erumpent perithecial necks, and with 5-20 black spots on the outer surface corresponding to the protruding ostiolar necks of the perithecia within (Plate I E, F). *Perithecia*: globose to subglobose, with a short protruding neck and ostiole, light brown to reddish, 5-20 in number, embedded within the prosenchymatous stromal head, maturing successively and  $412-515 \times 329-412$  (mean  $463 \times 360$ )  $\mu$  (Plate I G). *Asci*: 8-spored, occasionally 4, 6 or 7-spored, cylindrical-clavate, short-stipitate, with an amyloid (J+) funnel-shaped apical apparatus, and  $103-140 \times 12-21$  (mean  $120 \times 15.6$ )  $\mu$  (Plate I H, I). *Ascospores*: one-celled, obliquely uniseriate, ellipsoid, flattened on one side (?laterally compressed), light yellowish brown when young, turning dark brown (almost black) and opaque at maturity, with a long germ slit (7.8-11.7  $\mu$ ) on the edge of the flattened side, lacking a mucilaginous sheath and  $14.3-18.2 \times 7.8-10.4$  (mean  $16.3 \times 8.8$ )  $\mu$  (Plate I J). *Paraphyses*: long, filiform, septate, unbranched,  $100-162 \times 5-8 \mu$ .

#### THE CONIDIAL STATE

The conidial state of this fungus is recognisable on freshly inoculated medium after 6-8 days through the production of white to cream-coloured (with pinkish tinge) synnema-like structures (actually these are the young ascostromata) scattered on the colony. These synnema-like structures are soon differentiated into a basal unbranched portion and an apical head portion which is the actual conidiiferous stalk portion. The stalk is composed of compact and closely interwoven parallel strands of hyphae which become free and form a loose network in the head region. The young stromata with mature conidial structures are 1-2.7 mm long, 185-310  $\mu$  thick in the middle portion of the stalk and 350-560  $\mu$  in diameter in the head portion (Fig. 1 A; Plate I A). The production of conidia is restricted to the capitate part of the stroma where the hyphae constituting a loose network bear numerous conidiogenous cells with conidia, along their length. These hyphae are septate, short-celled, thinwalled, 3.9-5.2  $\mu$  wide and bear 1-3 conidiogenous cells per cell (Fig. 1 B-E; Plate I B, C, D). The conidiogenous cells are ampulliform, globose to subglobose, 2.6-3.9 (mean 2.9)  $\mu$  in diameter, produced as lateral protuberances on the subtending hyphae and bear 5-8 conidia each at maturity (Fig. 1 C-E; Plate I C, D.). The co-



nidia are cylindrical to somewhat obovoid (rarely fusiform), 1-celled, hyaline singly, but light pinkish to cream-coloured in mass, thinwalled, smooth, dry, and  $3.3-6.5 \times 2.0-2.6$  (mean  $5.2 \times 2.5$ )  $\mu$ . They arise holoblastically and singly and successively from different loci on the conidiogenous cells (Fig. 1 B, C, E, H; Plate I B, C)<sup>1</sup>. At maturity, the cells of the hyphae bearing conidiogenous cells and conidia disarticulate after the conidia and conidiogenous cells are shed (Fig. 1 F). Sometimes these disarticulated hyphal bits can be seen with a few conidiogenous cells and conidia still attached to them; the disarticulated hyphal cells are  $5.2-6.5 \mu$  in diameter and appear thick-walled (Fig. 1 G).

#### CONIDIOGENESIS

Conidiogenesis is holoblastic and several conidia develop singly on the conidiogenous cells and arise successively on different loci. The conidiogenous cell develops as a small lateral protuberance on the fertile hypha by a process of budding, enlarges and develops into a 1-celled, ampulliform, globose to subglobose conidiogenous cell. Ultimately, the entire structure crumbles resulting in the liberation of conidia, conidiogenous cells and the disarticulated hyphal segments.

#### TAXONOMY

The conidial state described here cannot be accommodated in any of the genera of the hyphomycetes known to us and we therefore propose a new genus *Lindquistia*, named in honour of Professor Dr. J. C. Lindquist, to take it.

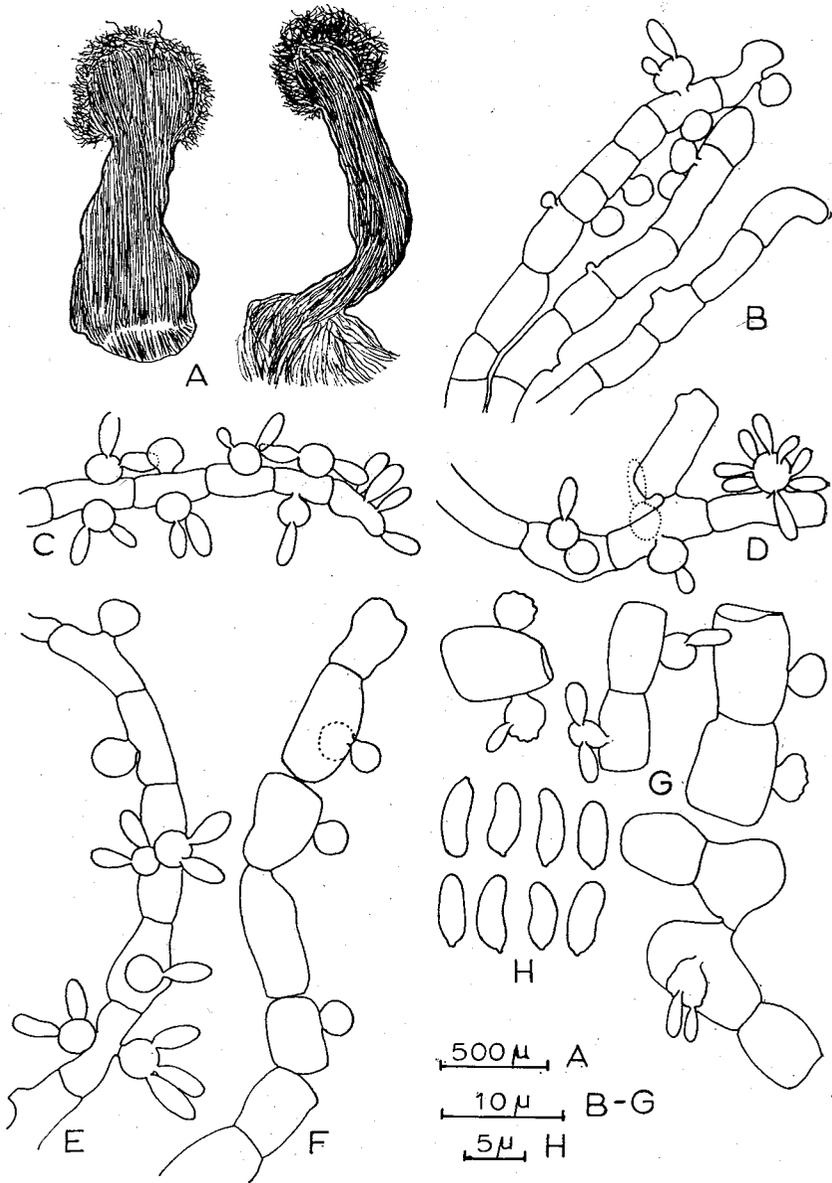
#### LINDQUISTIA gen. nov.

Hyphomycete producing blastoconidia. Fertile hyphae simple or branched, hyaline, septate, bearing conidiogenous cells laterally. Conidia several on each conidiogenous cell, holoblastic, solitary, arising successively from different loci, hyaline, 1-celled, dry. Cells of fertile hyphae falling apart at maturity, often with conidiogenous cells and conidia.

<sup>1</sup> Occasionally, conidia are also produced directly from the hyphal cells instead of on the conidiogenous cells and these are mostly restricted to apical portions of the hyphae.

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Fig. 1. A-H *Lindquistia indica*. — A. Two young ascostromata with conidiferous heads; B. Fertile hyphae bearing young and fully developed conidiogenous cells; C-E. Fertile hyphae bearing conidiogenous cells in various stages of conidiogenesis. Note the conidia developing directly on the fertile hypha in C; F. Disarticulation of the fertile hypha at maturity; G. Disarticulated hyphal segments with conidiogenous cells and conidia; H. Conidia.



**LINDQUISTIA** Subramanian & Chandrashekara gen. nov.

*Hyphomycetes cum blastoconidiis. Hyphis fertilis simplicibus vel ramosis, hyalinis, septatis, cum cellulis conidiogenis lateralibus. Conidiis aliquot per cellula conidiogena, holoblasticis, solitariis ad locis dissimilis exorientibus, hyalinis, 1-cellularis, siccis. Cellulae hyphis fertilis decidunt n maturtate, saepe cum cellulae conidiogena conidiaque. Species typica: Lindquistia indica* Subramanian & Chandrashekara.

Type species: *Lindquistia indica* sp. nov.

**Lindquistia indica** sp. nov.

Fertile hyphae confined to capitate part of young ascostroma, simple or branched, hyaline, thin-walled when young, often thick-walled later, septate, bearing conidiogenous cells laterally, variable in length, 3.9-5.2  $\mu$  wide. Conidiogenous cells simple, ampuliform, globose to subglobose, 2.6-3.9 (mean 2.9)  $\mu$  in diam. and bearing 5-8 conidia. Conidia holoblastic, solitary, arising singly and successively from different loci on each conidiogenous cell, cylindrical to obovoid, 1-celled, hyaline singly, cream-coloured to pinkish in mass, smooth, dry, 3.3-6.5  $\times$  2.0-2.6 (mean 5.2  $\times$  2.5)  $\mu$ .

*Type:* isolated from dilution plates of monkey dung collected at the deer park, Madras, Tamil Nadu, India, K. V. Chandrashekara, 10. VI.1974, Herb. M. U. B. L. N<sup>o</sup> 2341.

**Lindquistia indica** Subramanian & Chandrashekara sp. nov.

*Hyphis fertilis ad partem capitatam juvene ascostroma restrictis, simplicibus vel ramosis, in juventute tenuitunicatis, saepe demum crasse-tunicatis, septatis cum cellulis conidiogenis lateralibus, longitudine variabile, 3,9-5,2 diam. Cellulis conidiogenis simplicibus, ampulliformibus, globosis vel subglobosis, 2,6-3,9 (media 2,9) diam., 5-8 conidia ferens. Conidiis holoblasticis, solitariis invisemque, ad locus dissimilis exorientibus, in quoque cellula, cylindricis vel obovoides, unicellularis, hyalinis, in massa cremeis vel roseis, laevis, siccis, 3,3-6-5  $\times$  2,0-2,6 (media 5,2-2,5) . Typus ad cultura dilutam fimo simii in horto cerevis in Madras, Indiae, leg. K. V. Chandrashekara, 10.VI.1974, in Herbario MUBL conservatus est.*

Plate 1. A-D *Lindquistia indica*. — A. Young ascostroma with conidiiferous head.  $\times$  50; B. Fertile hyphae bearing young and fully developed conidiogenous cells.  $\times$  1400. C-D. Fertile hyphae bearing conidiogenous cells in various stages of conidiogenesis. Note conidia developing directly from the fertile hypha in C.  $\times$  1400.

E-J. *Podosordaria leporina*. — E. Ascostromata on P.D.A. in an agar slant.  $\times$  4. F. Single ascostroma magnified. Note the black spots on the head corresponding to the ostioles of the perithecia within.  $\times$  35. G. Perithecium.  $\times$  55. H. A cluster of asci with ascospores.  $\times$  180. I. Single ascus showing 8 ascospores and an amyloid apical apparatus. Mounted in Melzer's reagent.  $\times$  410. J. Ascospores showing germ slit. 9 910.

The conidial state of *Poronia oedipus* (Mont.) Mont. as described by Jong and Rogers (1969) and that of *P. johorensis* (Morgan-Jones & Lim) Morgan-Jones as described by Morgan-Jones and Hashmi (1973) are similar to *Lindquistia indica* and are indeed congeneric with it.

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