

STUDIES ON RHIZOSPHERE FUNGI—II*

by K. NATARAJAN, *University Botany Laboratory, Madras 5*

(Communicated by C. V. Subramanian, F.N.A.)

(Received 28 December 1970; after revision 16 February 1971)

In this paper four new species of ascomycetous fungi, viz. *Chaetomidium fragilis*, *Gymnoascus alatospora*, *Pseudonectria reticulospora* and *Thielaviella octosporus*, isolated from the rhizosphere of some crop plants, are described.

Chaetomidium fragilis sp. nov.

(Text-fig. 1 and Plate VII, fig. C)

Colonies on PDA spreading, brownish black. Ascocarp globose, brown, covered with loose mass of hairs $42.3-85.6 \mu$. Hairs long, unbranched, light brown, minutely roughened, fragile, ending in rounded hyaline tip, septate and $1.3-2.1 \mu$ wide. Asci club-shaped, 8-spored, evanescent and $21.0-28.0 \times 14.0-21.0 \mu$. Ascospores irregularly arranged, brown, ovate and $8.4-11.2 \times 5.6-7.0 \mu$.

Isolated from the rhizosphere of *Pennisetum typhoides* (variety HB 1) grown in Madras University Botany Laboratory garden soil, October 27, 1966.

The present fungus differs from other known species of *Chaetomidium* (Seth 1967, 1968) in having long fragile hairs on the ascocarp and ovate ascospores, and hence it is described here as a new species.

Latin diagnosis: Coloniae in PDA extendentes bruneolaenigrae. Ascocarpus globosum, brunneum, massa laxa pilorum tectum $42.3-85.6 \mu$. Pili longi, non ramosi, modice brunnei minute asperati, fragiles, in rotundo apice hyalino terminantes, septati, latitudinis $1.4-2.1 \mu$. Asci clavati octosporas habentes, evanescentes, ascosporae irregulariter dispositae, $21.0-28.0 \times 14.0-21.0 \mu$. Ascosporae brunneae, ovatae $8.4-11.2 \times 5.6-7.0 \mu$.

Typus lectus e rhizosphaera *Pennisetum typhoides* (variety HB 1) in India, 27-10-1966, a K. Natarajan et positus in herbario MUBL sub numero 2247.

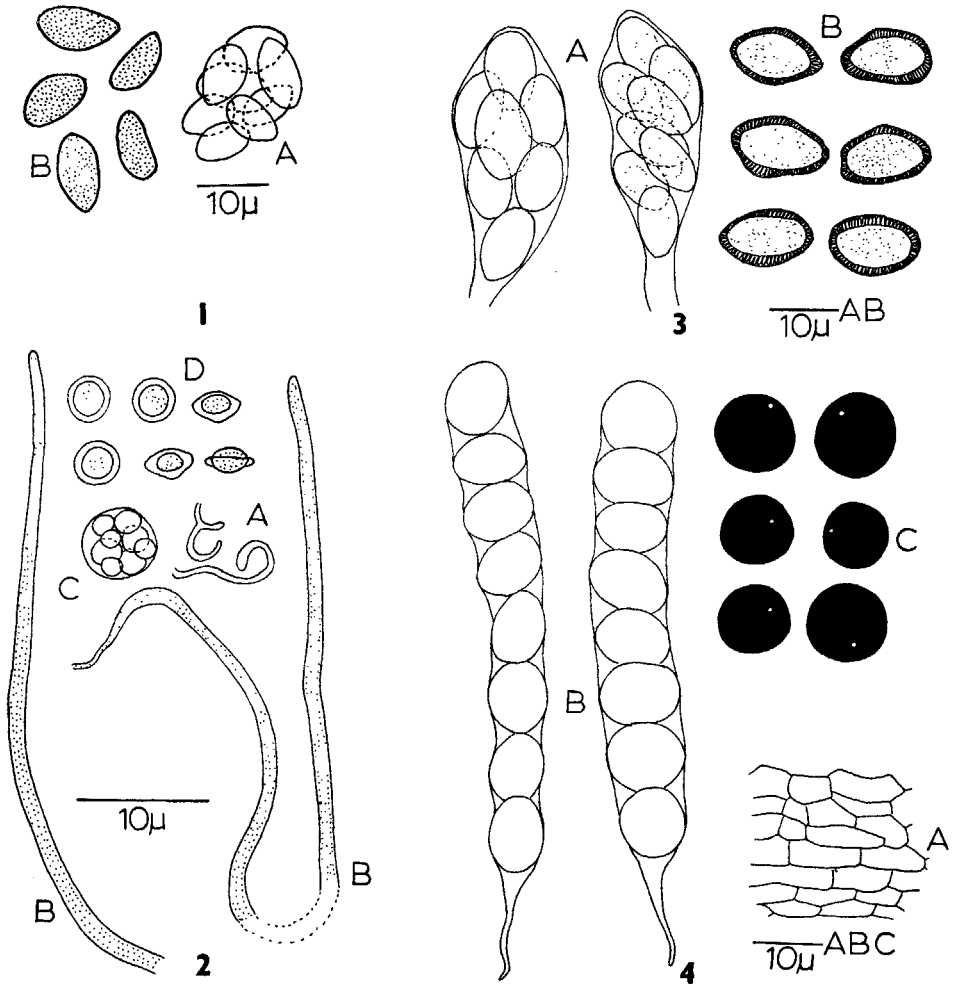
Gymnoascus alatospora sp. nov.

(Text-fig. 2 and Plate VII, fig. D)

Colonies on PDA slow-growing, reddish brown. Ascocarp globose, dark brown, $112.8-338.4 \mu$ in diameter (excluding appendages). Peridial hyphae

* Memoir No. 103 from the Centre of Advanced Study in Botany. Part of the thesis of the author approved for the degree of Doctor of Philosophy by the University of Madras, 1970.

different from the vegetative hyphae, smooth, brown, non-septate, unbranched, anastomosed and $0.5-1.0 \mu$ in diam. Appendages produced at the periphery of the ascocarp, thick-walled, unbranched, elongate, smooth, rigid at maturity, brown, paling towards apex, straight, up to 150.0μ long and $2.1-2.8 \mu$ wide. Asci globose, hyaline, 8-spored, evanescent and $19.5-22.0 \mu$. Ascospores brown, one-celled, smooth, lenticular, with a hyaline wing along the periphery of the spore and $4.2-5.6 \times 2.8-3.5 \mu$.



FIGS. 1-4. 1, *Chaetomidium fragilis* (A, ascus; B, ascospores); 2, *Gymnoascus alatospora* (A, peridial hyphae; B, appendages; C, asci; D, ascospores); 3, *Pseudonectria reticulospora* (A, asci; B, ascospores); 4, *Thielaviella octosporus* (A, ascocarp wall; B, asci; C, ascospores).

Isolated from the rhizosphere of *Vigna sinensis* grown in paddy field soil, August 1, 1967.

The present fungus differs from other known species of *Gymnoascus* in having winged ascospores, and hence it is described here as a new species.

Latin diagnosis: Coloniae in PDA tarde crescentes, rubellae-brunneae. Ascocarpus globosus, atro-brunneus, 112.8–338.4 μ . Hyphae peridiales, dissimiles ab hyphis vegetativis, leves, brunneae, non septatae, non ramosae, anastomosatae, 0.5–1.0 μ diametro. Appendices formatae in peripheria ascocarpi, crassis parietibus, non ramosae, elongatae, leves, rigidae in maturitate brunneae, rectae, usque ad 150.0 longae et 2.1–2.8 μ latae. Asci globosi, hyalini, octospori, evanescentes 19.5–22.0 μ . Ascosporae brunneae, unicellulares, leves, lenticulares, cum ala hyalina, 4.2–5.6 \times 2.8–3.5 μ .

Typus lectus e rhizosphaera *Vigna sinensis*, in India, 1-8-1967, a K. Natarajan et positus in herbario MUBL sub numero 2248.

Pseudonectria reticulospora sp. nov.

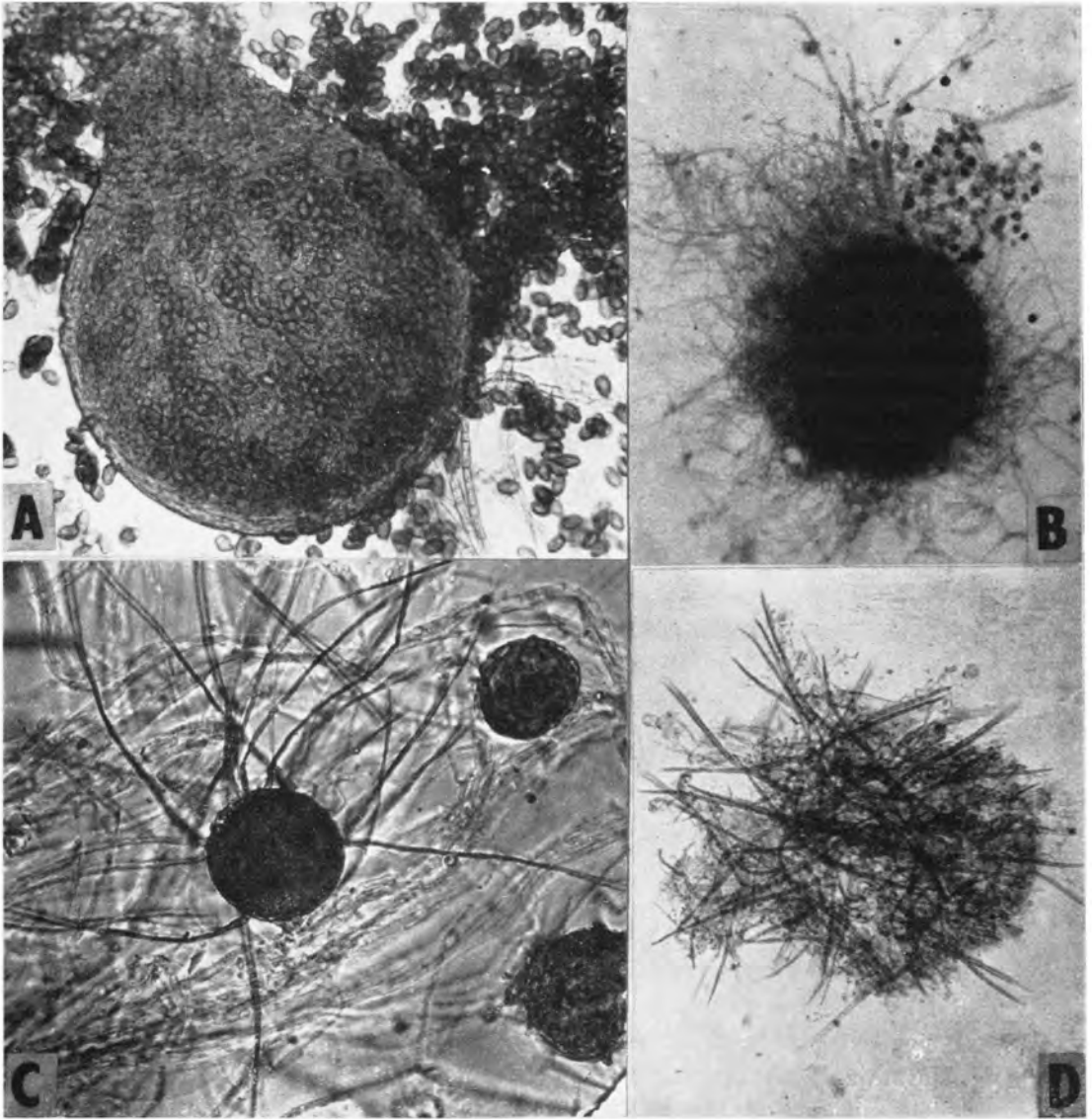
(Text-fig. 3 and Plate VII, fig. A)

Colonies on PDA fast-growing, floccose, brown. Perithecia superficial, smooth, red, globose to subspherical with papilliform beak and 211.5–380.7 \times 155.1–282.0 μ . Peridium thick, reddish brown, membranous, translucent. Asci broadly clavate, with very thin wall and short stalk, 8-spored and 16.8–42.0 \times 7.0–15.4 μ . Ascospores hyaline when young, light brown at maturity, elliptical, one-celled, with a thick wrinkled exospore, reticulate and 12.6–15.4 \times 8.4–9.8 μ .

Isolated from the rhizosphere of *Vigna sinensis* grown in paddy field soil, July 14, 1968.

The present fungus resembles the genera *Neocosmospora* and *Pseudonectria* in having bright coloured separate perithecia and single-celled ascospores. The genus *Neocosmospora* is characterized by having smooth membranous translucent perithecia with cylindrical asci in which the spores are uniseriately arranged. The fungus resembles Udagawa's (Udagawa 1963) Japanese strain of *N. vasinfecta* in certain features, but differs from it in having clavate asci in which the ascospores are irregularly arranged. The present fungus can be placed in the genus *Pseudonectria*, established by Seaver in 1908 for forms which have smooth or minutely roughened, membranous perithecia and cylindrical to clavate asci with irregularly distributed ascospores. It is described here as a new species of *Pseudonectria* since it differs from all the present known species of *Pseudonectria*.

Latin diagnosis: Coloniae in PDA cito crescentes, floccosae, brunneae. Perithecia superficialis, cum rostro papilliformi 211.5–380.7 \times 155.1–282.0 μ , levis rubra, globosa vel sub sphaerica. Peridium crassum, rubellum-brunneum, membranosum, translucidum. Asci late clavati, parietibus tenuibus, et petiolis brevibus, octospori 16.8–42.0 \times 7.0–15.4 μ . Ascosporae hyalinae in



FIGS. A-D. A, perithecium of *Pseudonectria reticulospora*, $\times 450$; B, ascocarp of *Thielaviella octosporus*, $\times 400$; C, ascocarp of *Chaetomidium fragilis*, $\times 400$; D, ascocarp of *Gymnoascus alatospora*, $\times 400$.

initio, brunneae in maturitate, ellipticae, unicellulares. cum exospora crassa. rugosa reticulata, $12.6-15.4 \times 8.4-9.8 \mu$.

Typus lectus e rhizosphaera *Vigna sinensis*, in India. 14-7-1968, a K. Natarajan et positus in herbario MUBL sub numero 2249.

Thielaviella octosporus sp. nov.

(Text-fig. 4 and Plate VII, fig. B)

Colonies in PDA adpressed, at first white, later turning yellow. Ascocarps immersed, globose to subglobose, non-ostiolate, $180.0-252.0 \times 144.0-180.0 \mu$ with a thick wall (up to 14.0μ thick). Ascocarps surrounded by a thick weft of septate, yellow hyphae, up to 1.4μ wide. Asci cylindrical with a short stalk, thin-walled, evanescent, 8-spored, $79.8-91.0 \times 9.8-11.2 \mu$. Ascospores uniseriate, globose to subglobose, at first hyaline, turning brown and when finally mature black with a single germ pore; globose spores $9.8-11.2 \mu$ in diam., subglobose spores $11.2-12.6 \times 9.8-11.2 \mu$.

Isolated from the rhizosphere of *Brassica juncea* grown in Madras University Botany Laboratory garden soil, June 15, 1968.

The present fungus has features of the genus *Thielaviella* Arx and Mahmood (Arx and Mahmood 1968) in having thick-walled ascocarps with cylindrical asci, but it differs from the only known species of this genus, *T. humicola*, in the following characters: The ascocarp wall of *T. humicola* is composed of a few layers of hyaline thin-walled cells, whereas in the present fungus the wall is composed of a few layers of dark brown cells. The asci in *T. humicola* are 4-spored, whereas in the present fungus they are 8-spored. The ascospores of *T. humicola* are broadly ellipsoid, whereas in the present fungus the spores are globose to subglobose. Hence this fungus is described here as a new species.

Latin diagnosis: Coloniae in PDA appressae, primo albae drinde lutescentes. Ascocarpi immersa, globosa vel subglobosa, non-ostiolata, $180.0-252.0 \times 144.0-180.0 \mu$, cum pariete crasso ad 14.0μ . Ascocarpi circumoincta crasso wefto septati, luteae hyphae ad 1.4μ latae. Asci cylindrati, brevi stipe, tenui pariete, evanescentes, octospori, $79.8-91.0 \times 9.8-11.2 \mu$. Ascosporae uniseriatae, globosae vel subglobosae, primo hyalinae brunnescentes et in maturitate nigrae cum uno solo germine. Sporae globosae $9.8-11.2 \mu$, subglobosae sporae $11.2-12.6 \times 9.8-11.2 \mu$.

Typus lectus e rhizosphaera *Brassica juncea*, in India, 15-6-1968, a K. Natarajan et positus in herbario MUBL sub numero 2250.

The cultures are also being deposited at the Commonwealth Mycological Institute, Kew, England, and Centraalbureau voor Schimmelcultures, Baarn, Netherlands.

ACKNOWLEDGEMENTS

I am thankful to Prof. C. V. Subramanian for guidance and to Rev. Fr. T. N. Siqueira, S.J., for correcting the Latin diagnosis. I am also thankful to the University Grants Commission for awarding a Junior Research Fellowship during the tenure of which this work was carried out.

REFERENCES

- Arx, J. A. von, and Mahmood, T. (1968). *Thielaviella humicola* gen et sp. nov. from Pakistan. *Trans. Br. mycol. Soc.*, **51**, 611-613.
- Seth, H. K. (1967). *Chaetomidium subfmetri* sp. nov. from Wales. *Trans. Br. mycol. Soc.*, **50**, 45-47.
- (1968). *Chaetomidium trichorobustum* sp. nov. from Germany. *Nova Hedwigia*, **16**, 429-432.
- Udagawa, S. (1963). *Neocosmospora* in Japan. *Trans. mycol. Soc., Japan*, **4**, 121-125.