Drechslera oryzae is an important pathogen of rice producing a disease known as "brown spot" or "sesame leaf spot". It is also known to directly infect the grains and cause great damage. The fungus is known to produce large amounts of biologically active metabolites such as auxins[8] and toxins[9,10]. There is a possibility that the toxins played a part in the suppression of growth of *C. lunata* and auxins caused mycelial swellings. That auxins can induce mycelial swellings is proved in the following experiment: PDA plates with different concentrations of indole acetic acid (IAA) [1, 10, 100 and 1,000 μg/ml] were inoculated with mycelial discs of *C. lunata* and incubated at 28°. All concentrations of IAA tested induced mycelial swellings in *C. lunata*. The swellings appeared in two days at 1,000 μg/ml, 3 days at 100 μg/ml and in 4 days at lower concentrations. Parallel studies on the effect of *D. oryzae* metabolite were made by incorporating in PDA the filter-sterilized culture filtrate of the fungus and inoculating it with *C. lunata*. The mycelium growing in this medium produced swellings after 4 days, morphologically similar to those induced by IAA.

It is obvious from the present studies that the pathogenic fungus *D. oryzae* is inhibited by saprophytes *A. tenuis* and *Pseudomonas* sp. The usefulness of the saprophytes in monitoring the phylloplane microflora to control leaf disease caused by *D. oryzae* is indicated from the present data, but *in vivo* studies are needed before specific recommendations can be made.

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N. R. JAYANTHI.

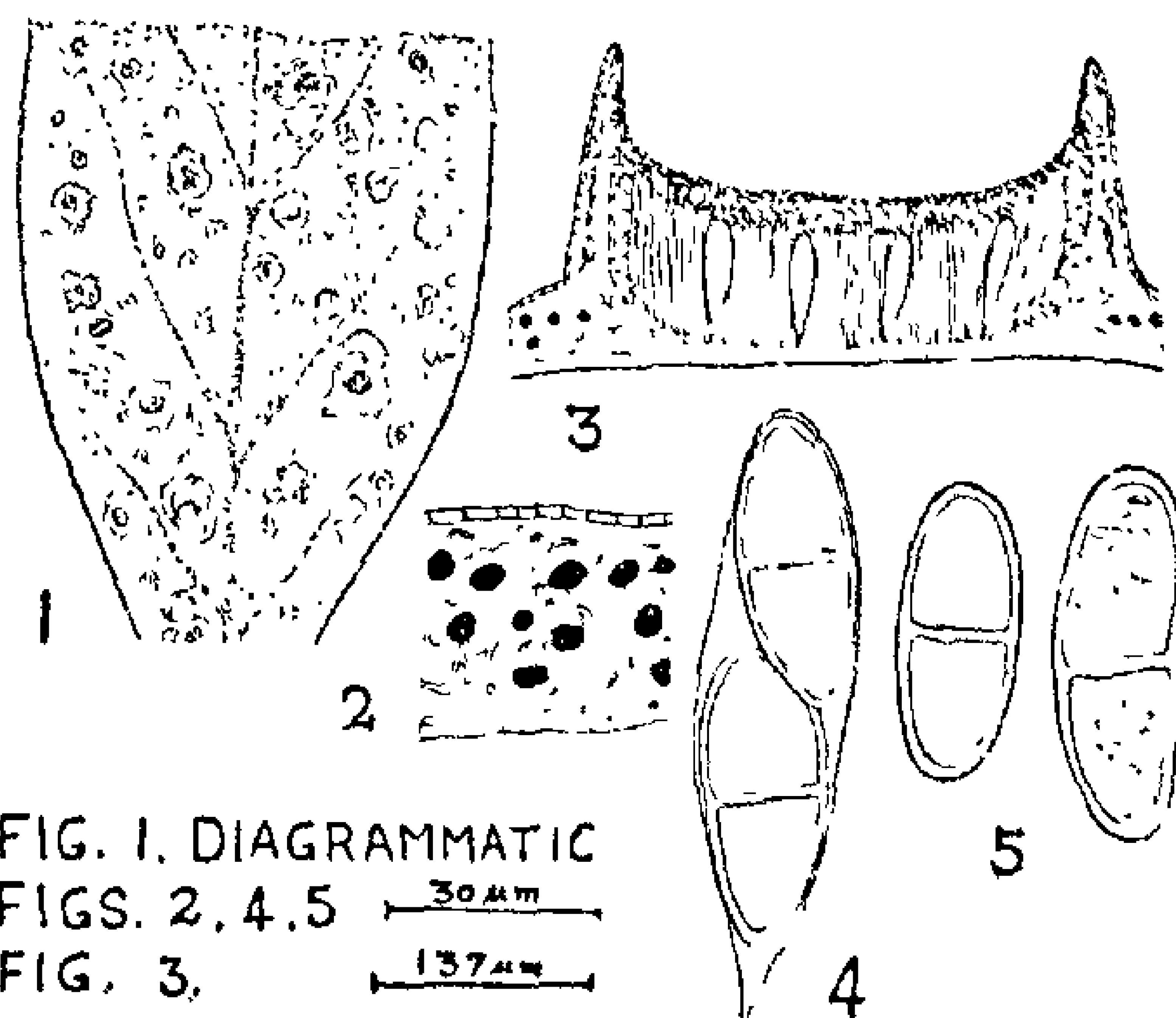
1. Fokkema, N. J., In *Ecology of Leaf Surface Microorganisms*, Eds. T. F. Preece, and C. H., Dickinson, A.P., New York, 1971, p. 278.
2. Mishra, R. R. and Srivastava, V. B., *Mycopathol. Mycol. Appl.*, 1971, 44, 289.
3. Sullia, S. B., *Proc. Indian Acad. Sci.*, 1969, 69, 295.
4. Barnes, G., In *Ecology of Leaf Surface Microorganisms*, Eds. T. F. Preece and C. H. Dickinson, A.P., New York, 1971, p. 537.
5. Van den Heuvel, J., In *Ecology of Leaf Surface Microorganisms*, Eds. T. F. Preece and C. H. Dickinson, A.P., New York, 1971, p. 537.
6. McBridge, R. P., In *Ecology of Leaf Surface Microorganisms*, Eds. T. F. Preece and C. H. Dickinson, A.P., New York, 1971, p. 545.
7. Sarkar, S. K. and Samaddar, K. P., *Proc. 65th Indian Sci. Congr.*, Section Agri. Sci., p. 57 (Abstr.).
8. Mahadevan, A. and Chadramohan, D., *Bull. Indian Phytopathol. Soc.*, 1966, p. 91 (Abstr.).
9. Lindberg, G. D., *Phytopathology*, 1971, 61, 420.
10. Nakamura, M. and Oku, H., *Ann. Takamina Lab.*, 1960, 12, 266.

LICHEN GENUS *ASTEROTHYRIUM* MÜLL. ARG IN INDIA

DURING the course of taxonomic investigations on the lichens of Manipur, an interesting foliicolous lichen—*Asterothyrium pittieri* Mull. Arg. (Asterothyriaceae)—has been discovered as a new record for Indian lichen flora, and is therefore illustrated and described. The genus comprises eight species (Santesson[1]), which are distributed in tropical regions of Malaysia, America and Africa. The present finding of the taxon from Indian region is of great phytogeographical interest.

Asterothyrium pittieri Müll. Arg., *Bull. Soc. Bot. Belgique.*, 1891, 30, 71; *Sant. Symb. Bot. Upsal.*, 1952, 12 (1), 326 (Figs. 1–5).

Thallus crustaceous, formed of small circular to irregular algiferous thallus patches, upto 1·5 mm in diam., whitish grey, smooth, 15–35 μm thick; cortex formed of single layered plectenchymatous cells, 4–9 × 2–4 μm; algal cells green, 9–12 × 6–9 μm.



FIGS. 1–5. *Asterothyrium pittieri* Mull. Arg. Fig. 1. Habit. Fig. 2. V.s. through a portion of thallus showing details. Fig. 3. V.s. through apothecium. Fig. 4. 2-spored ascus. Fig. 5. Spores.

Apothecia dark brown, immersed but erumpent, circular, 0·2–0·25 mm in diam., epruinose, easily shed off and leave behind empty thalli with a hollow in the middle; margin thin, prominent, grey, formed

of remnants of the ruptured fungal tissue; exciple thin, colourless, laterally, 12–18 μm thick, cells ± elongated, I+ vinose-red, outside covered by 15–18 μm thick corticate mat of brown fungal tissue devoid of algal cells; hypothecium and basal exciple yellowish, 9–12 μm thick; epithecium yellowish brown; hymenium colourless, 90–100 μm thick, I−; asci 2-spored, 60–90 × 21–30 μm; spores colourless, transversely 1-septate, ellipsoid to oblong, thick walled, sometimes constricted in the middle, 45–60 × 15–24 μm, I+ vinose-red; paraphyses simple with brown apices, 1·5 μm thick.

The species is distributed in the pantropical parts of the world. In our specimen the protoplasmic contents of some spores are broken into smaller parts and thus appear muriform but lack longitudinal and transverse divisions. In fact the spores are transversely 2-celled. Hence, the present taxon should not be confused with the genus *Gyalectidium* Mull. Arg. possessing muriform spores. This type of development in the spores may most probably be due to adverse ecological conditions.

Specimen examined: Manipur–Karang, Kabrulakha area, *Singh* 54461 (CAL).

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Botanical Survey of India, Howrah, K. P. Singh.

September 28, 1978.

1. Santesson, R., "Foliicolous lichen I, A revision of the taxonomy of the obligately foliicolous, lichenized fungi," *Symb. Bot. Upsal.*, 1952, **12** (1), 1.

EXOCELLULAR LIPASE PRODUCTION BY A SOIL STREPTOMYCETE

During a soil screening programme, an actinomycete was isolated which produced exocellular lipase in the culture medium. Taxonomically the strain was designated as *Streptomyces* sp. L_4.

Preliminary screening for the lipolytic activity of the soil isolates was done using a medium[1] containing peptone 10·0, NaCl 5·0, $CaCl_2$ 2·0, agar 20·0 g/l and 4·7 ml Tween 80 per litre (pH 7·0). The appearance of cloudy zones around the colonies in plates indicated precipitation of Ca-salts of free fatty acids. Strains with this type of zones were isolated and grown in broth. The broth contained[2] polypeptone 7·5, meat extract 7·5, soluble starch 10·0, NaCl 3·0 and $MgSO_4$, $7H_2O$ 1·0 g/l (pH 7·2). Final screening was done by cup assay method using the Tween 80 agar medium. Among the different strains isolated, *Streptomyces* sp. L_4 produced a cloudy zone of 80 mm diameter on the third day of its growth at 28° C.

The broth was filtered and the crude enzyme was precipitated[3] by 60% ammonium sulphate saturation. The precipitate was collected after centrifugation (12,000 rpm for 20 min). This was then dissolved in deionised water and dialysed against deionised water in cold for 4 days using egg membrane. The activity of the dialysed product was measured by titrimetric method using olive oil as substrate[4]. 50% pure olive oil emulsion using gum acacia and sodium benzoate as stabiliser was activated with human blood serum at 37° C for 1 hr. The "Control" tube contained 0·5 ml Mg acetate (0·01 M) + 1 ml tris buffer + 3 ml of serum activated olive oil. The "test" tube contained all the above solutions and the substrate mixed with 1 ml of the enzyme solution. All the tubes were incubated at 37° C for 1 hr after thoroughly shaking the mixture. After incubation 3 ml of 95% ethanol was added to each tube to terminate the reaction. All the tubes were shaken well and to each of them 4 drops of indicator solution (0·5 g phenophthalein and 1 g of thymolphthalein in 100 ml of 95% ethanol) was added. The contents were then titrated against 0·1 N NaOH solution in a microburette. The total protein in 1 ml of the enzyme solution was estimated by the micro-kjeldahl method. Unit of activity was defined as μ moles of fatty acids formed per hour and specific activity was calculated as μ moles of fatty acids formed/hour/mg protein. The enzyme was found to be fairly stable at low temperature and can be stored at − 5° C for a long period without much decrease in its activity. The optimum pH of activity is 8.

Table I

Production of lipase by Streptomyces *sp.* L_4

Steps	Activity μ/ml/hr	Protein mg/ml	Specific activity	Yield (%)
Culture broth	1250	416·6	3	100
Ammonium sulphate pptn (60% saturation)	760	122	6·2	58·6
Dialysis	360	14·5	24·13	28·8

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