FIG. 1. Jamun leaf showing blisters caused by *A. anna*.

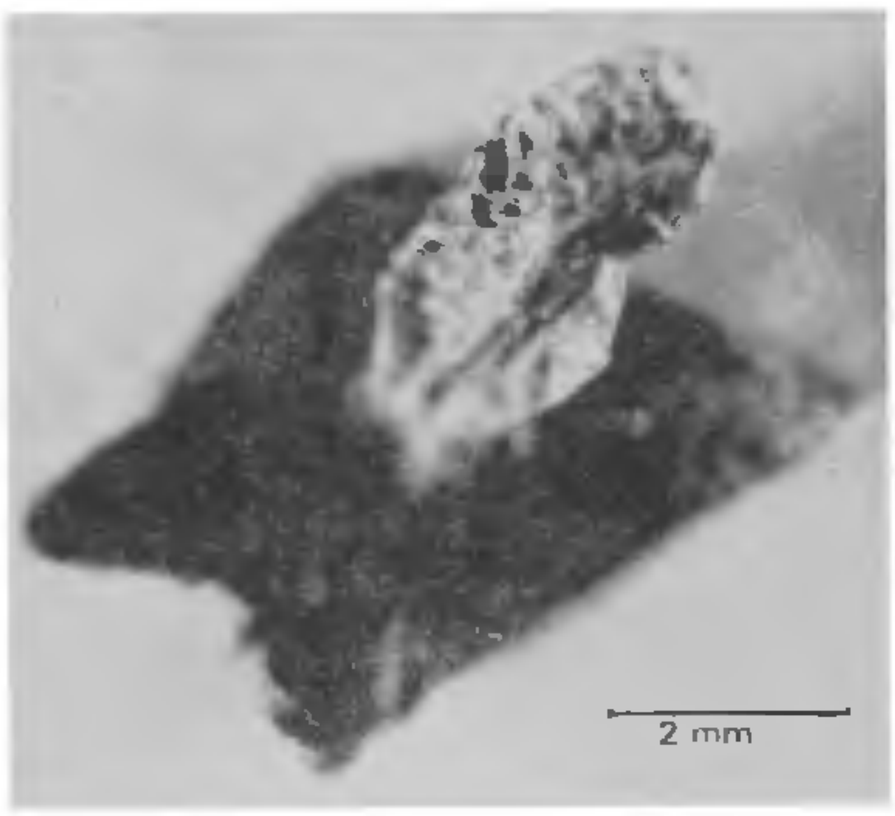

FIG. 2. Pupal cocoon of *A. anna*.

From the field collected pupae, two species of para sites, *Elasmus hyblaeae* ferriere (Elasmidae : Hymenoptera) and *Pediobius anomalus* (Gahan) (Eulophidae : Hymenoptera) were found parasitizing to a tune of 34%. Each parasitized cocoon showed only one round exit hole.

The leaf miner was identified by J. D. Bradley and the parasites were identified by B. R. Subba Rao and Z. Bouveck of British Museum, London, to whom acknowledgements are due.

August 4, 1980.

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STREPTOMYCES DAYALBAGHENSIS SP. NOVO

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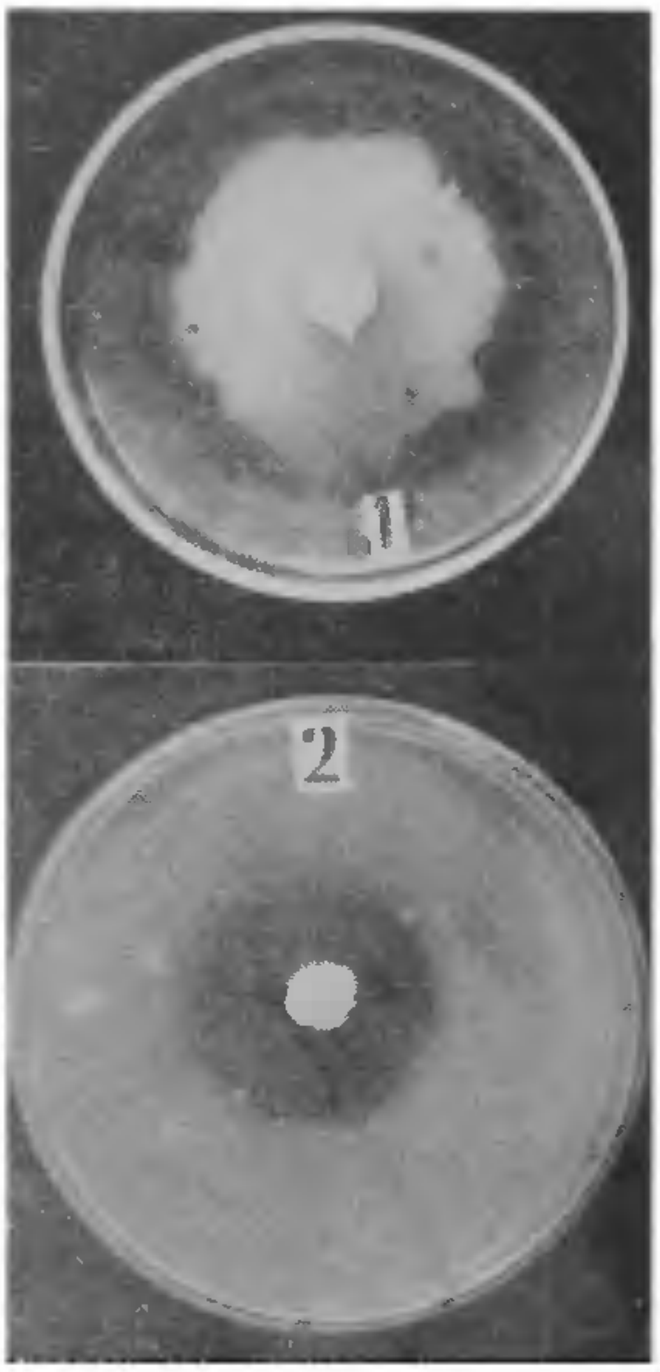
DURING a preliminary screening of the soil samples collected from various localities of Agra region, for the isoation of antibiotic producing actinomycetes, a new sp. of *Streptomyces* (isolate No. *d*–21), which was designated as *S. dayalbaghensis*, was found to be strongly antagonistic to *Colletotrichum gloeosporioides* (Penz.) causing anthracnose in mango and leaf spots and anthracnose on citrus, papaya, sugarcane, etc., and *C. falcatum* (Went.) causing red rot in sugarcane (Figs. 1–2).

The materials and methods used were similar to those of the previous communication[11] and ISP procedures[12]. The actinomycete (*d*–21) is a chromogenic type, producing soluble pigment on natural media, is melanin positive, reduces nitrate, slowly hydrolyses starch and quickly liquefies gelatin, brings about the slow coagulation but rapid peptonisation of milk and shows no cellulytic activity. It utilizes rhamnose, raffinose, glucose, sucrose, maltose, galactose, lactose and glycerol as the carbon sources, whereas mannitol, starch and xylose were poorly utilized.

The vegetative mycelium is white and monopodially branched forming compact growth in agar media. Aerial mycelium is abundant, white (1–A–1)[7] to pinkish white (2–A–1) turning to rosy pinkish grey (1–A–2) in colour (Table I). Sporophores are long straight, in most cases with primitive spirals and occasionally open or closed hooks on most of the media. Sporophores are loose and no verticels are observed. Spores in chains (Fig. 3) are cylindrical to elongate, 1·4–2·9 × 1·4–3·4 μ, with smooth surface configuration as seen under electron microscope (Fig. 4).

Biological Activity

The activity of the isolate *d*–21 was further tested by streak method against other micro-organisms. The culture was inoculated by spore suspension as a broad streak about the edge of the petri plate on potato dextrose agar medium. After three days of incubation at 28° C (± 2° C) temperature the different



FIGS. 1–2. *S. dayalbaghensis* antagonistic to 1—*C. falcatum* (Went), 2—*C. gloeosporioides* (Penz.).

micro-organisms were streaked at right angle to the actinomycete streak. The inhibition zone, if formed, was measured. Thus it was found that isolate *d*–21 was also active against *Alternaria brassicae, A. brassicicola, A. triticina, A. raphani, A. solani, A. alternata, Ascochyta rabiei, Aspergillus flavus, A. nidulans, Botrytis cinerea, Botryodiplodia theobromae, Colletotrichum capsici, C. lindemuthianum, Curvularia pallescens, C. lunata, Chrysoporium purinosum, Cercospora canescens, Fusarium oxysporum, Fomes noxius, Gleosporium fumigatus, Gliocladium fimbriatum, Helminthosporium maydis, H. gramineum, Macrophomina phaseoli, Memnoniella echinata, Pestalotia macrospora, Rhizopus oryzae, R. nigricans, Syncephalastrum racemosum, Trichoderma viride, Escherichia coli, Staphylococcus aureus, Pseudomonas pyocyanea, Lactobacillus leichmannii* and also against a few actinomycetes, *viz., Streptomyces griscus, S. albus, S. carcinomycicus.*

Properties of Antibiotic Substance

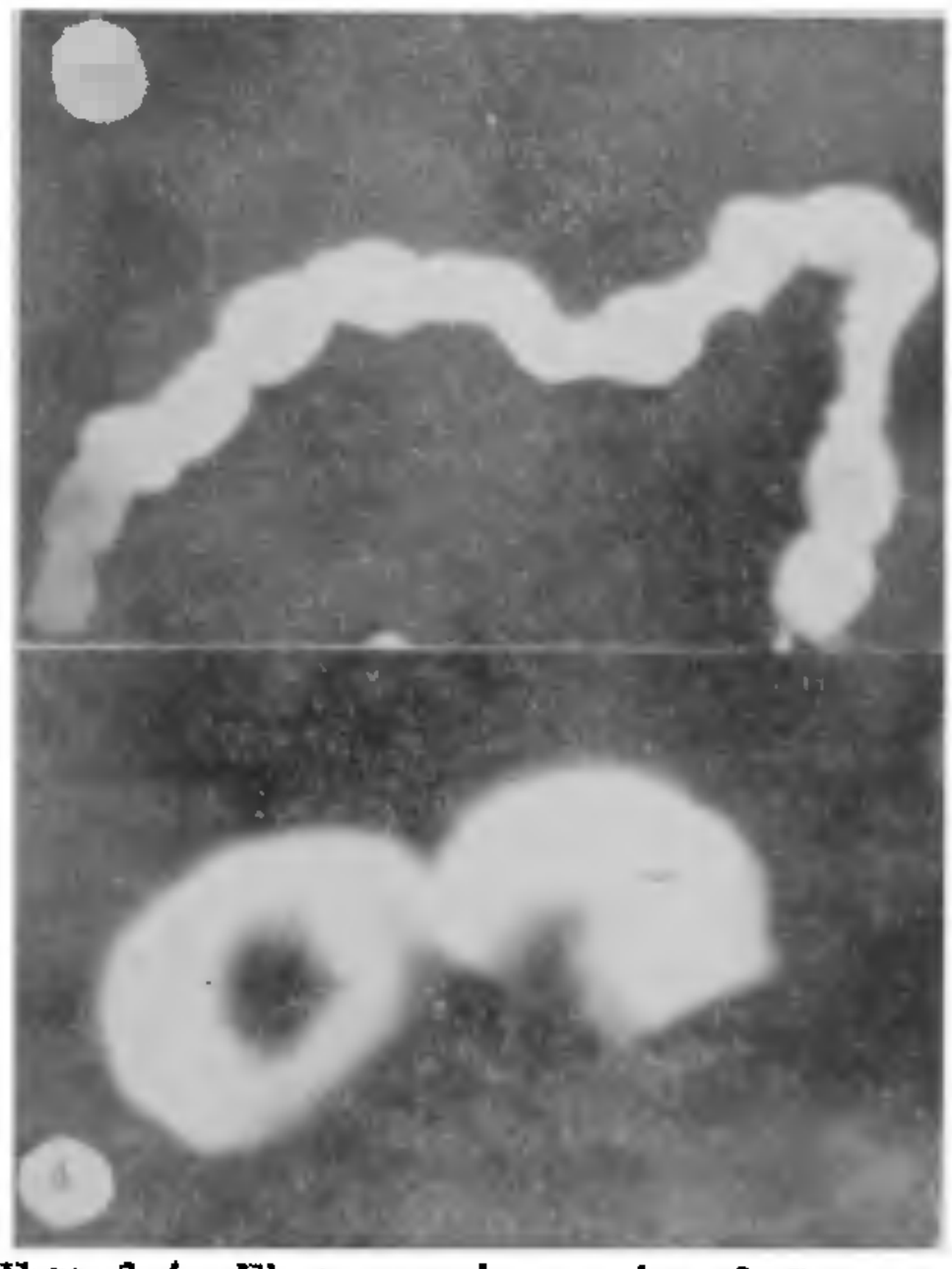
The antibiotic produced by the *Streptomyces* sp. (*d*–21) is thermolabile. It loses its activity at 60° C and over, or in aqueous solution. On storage the activity is lost rapidly at temperature (30–35° C). The antibiotic can be stored without any appreciable loss in activity upto 40 days at pH 7·0 at 7° C. The antibiotic is soluble in *n*-butanol, methanol, acetone, benzene and chloroform and moderately so in water and petroleum ether.

The antibiotic substance produced by the isolate (*d*–21) was of a non-polyenic nature containing $-NH_2$ group and C=O group.

Discussion

The *Streptomyces* sp. (isolate No. *d*–21) described above was found to differ from the species described in *The Actinomycetes*, Vol. 2[16], *Bergey's Manual* (8th ed.) and those reported recently[3,5,8,9,10,13,15]. The culture does, however, resemble *S. fradiae* (Waksman and Curtis) and *S. longispororuber*[14] (Krassilnikov) Waksman. It differs from *S. fradiae* by its melanoid pigment, its inability to grow on cellulose medium and in growth characters on nutrient agar. The culture *d*–21 appears to be closely related with *S. longispororuber*. But, however, it differs from the latter in its production of blackish brown soluble pigment on tyrosine agar and in its utilization of sucrose, rhamnose and raffinose but inability to utilize xylose and mannitol and also in its antibiotic activity. *S. longispororuber* is strongly antagonistic to bacteria whereas *d*–21 was strongly antifungal, slightly antibacterial, antiactinomycetous and antiviral in activity.

Since utilization of carbon sources, antibiotic production and formation of melanoid pigment are



FIGS. 3–4. Electron micrograph of *Streptomyces dayalbaghensis* grown on oat meal agar. Fig. 3. Spore chain (10000 ×). Fig. 4. Single spores showing smooth wall configuration (30000 ×).

TABLE I

Cultural characters on various media

Media	Growth	Vegetative mycelium	Aerial mycelium	Reverse of colony	Remark
1. Sucrose nitrate	Excellent	White to yellowish white (9–B–2)	Rosy white to pink (1–A–2)	Light brown (4–F–11) with yellow margin	Oil droplets present
2. Oat meal (ISP)	Excellent	Dull white (1–A–1)	Rosy white to pinkish grey (2–A–2)	Pale yellow (9–F–5)	Oil droplets present
3. Glycerol asparagine (ISP)	Moderate	Creamish white (2–A–1)	Seashell pink (1- A–7)	Yellowish white (9–B–1)	..
4. Nutrient agar	Good	White (2–A–7)	White to pinkish white (3–B–1)	Whitish brown (10- E–6)	..
5. Inorganic salt starch agar (ISP)	Good	Creamish white (2–A–1)	Seashell pink (1–A–7)	Yellowish white (9–B–1)	+ hydrolysis of starch
6. Yeast malt extract (3SP)	Good	White (1–A–1)	Greyish pink (11–D–8)	Creamish white (10–A–1)	Light brown soluble pigment
7. Tryptone yeast extract (ISP)	Good	White (1–A–1)	Pinkish brown (12–A–5)	Dark brown (48–A–4)	Blackish brown soluble pigment
8. Gelatin agar	Good	White (1–A–1)	White to creamish white (9–A–1)	Buff colour (10–C–6)	+ liquefaction

considered important taxonomic criteria[1,2,4,6,16], *Streptomyces* sp. (*d*–21) is regarded as a new species closely related with *S. longispororuber* and designated as *S. dayalbaghensis* sp. novo because of its origin in Dayalbagh locality at Agra. That the strain *d*–21 did not agree with any other *Streptomyces* sp. has been confirmed with reference to Centraalbureau Voor Schimmelcultures, Netherlands. A type strain of this species has been sent for record in C. B. S. type culture collection (Ref. No. M 207/79).

The authors wish to express their thanks to Director, CDRI, Lucknow, for electron micrography, to the Director, CBS, Baarn, Netherlands, to Prof. B. D. Baijal for their valuable suggestions and University Grants Commission for financial help.

September 29, 1980.

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A NEW SPECIES OF *PHOMA* FROM INDIAN ALKALINE-POND SOIL

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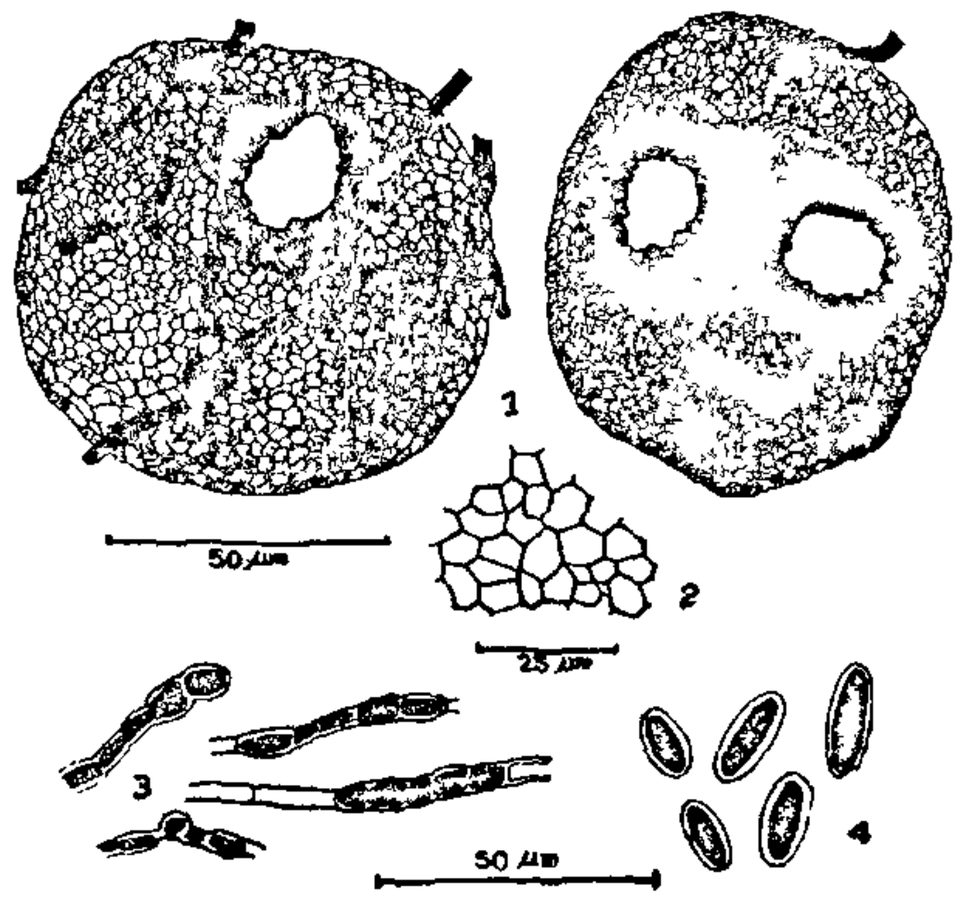
During the course of tax-ecological studies of fungi inhabiting alkaline soil and water, the authors came across a few species of *Phoma*, one of which appeared new and is described here.

Phoma ushtrina sp. nov.

Coloniae planae, in agaro czapekii trade crescentes, post dies 10 ad temperaturam 28 ± 1° C juxque ad 4·5 cm. diam. attingentes; mycelium ex hyphis hyalinis tenuibus septatis plerumque inflatis constitutum; pycnidia abundantia pallide usuqe fusco-brunnea erumpentia, sphaerica vel subsphaerica, ostiolata, 117–533 × 130–572 μm; conidia hyalina ovalia, 2·6–6 × 1·3–3·0 μm, in massis roseolis gelatinosis ejecta,

Hab. e solo alkalino (pH 8·5) isolata, December 1977, ex area Telibagh, Lucknow, India. Typus : Cultura exsiccata in Department of Botany, Lucknow University, Lucknow, India; subcultura in Commonwealth Mycological Institute, Kew, Surrey, England (IMJ 229626).

Colonies flat, growing slow on Czapek's Dox agar attaining a diameter of 4·5 cm in 10 days at 28 ± 1° C.



Figs. 1–4. Fig. 1. Pycnidia. Fig. 2. Pycnidial wall cells. Fig. 3. Swollen and thick walled cells of hyphae. Fig. 4. Conidia.

Mycelium hyaline, slender, septate, cells of most of the hyphae are swollen. Pycnidia abundantly produced, light to dark brown in colour, erumpent, spherical to subspherical, 177–533 μm × 130–572 μm, ostiolate. Conidia hyaline, oval 2·6–6 μm × 1·3–3·0 μm, discharged in pinkish gelatinous mass.

Isolated in December 1977 from alkaline-pond soil (pH 8·5) collected from Telibagh area, Lucknow. Type, in the form of dried culture, deposited in the Department of Botany (Mycology Section), Lucknow University, Lucknow, India. A subculture has also been deposited in Commonwealth Mycological Institute, Kew, Surrey, England, as IMI 229626.

Though the present fungus has some resemblances with *Phoma capitulum* Pawar *et al.*[1], it is distinct from this form in general appearance of the colony, in having abundant swollen hyphal cells and also in shape and size of pycnidia and size of conidia.

The authors are thankful to Director, Dr. A. Johnston and Dr. E. Punithalingam of Commonwealth Mycological Institute, Kew, Surrey, England, for their help in the identification of the form described and to Dr. Edith K. Cash, New York, for Latin translation. The second author (JKM) is grateful to the University Grants Commission, New Delhi, and College (SJNDC) authorities for the award of Teacher Research Fellowship.

October 4, 1980.

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