The minimal molecular weight of the haemocyanin of *C. ligulata* is 25,420 (Table II), estimated upon the basis of its copper content ($0{\cdot}25 \times 10^{-2}$). One molecule of oxygen combines with a functional unit of haemocyanin containing two atoms of copper[3]. On this basis, the minimal molecular weight of the functional unit of haemocyanin of *C. ligulata* would be 50,840. From Table II it is clear that the functional units of gastropod haemocyanins are almost similar.

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ISOLATION & BIOLOGICAL ACTIVITY OF A STRAIN OF *STREPTOMYCES GANMYCICUS* AND STABILITY OF THE ANTIBIOTIC SUBSTANCE PRODUCED BY IT

THIS paper deals with a new strain of *Streptomyces ganmycicus* antagonistic to *Colletotridchum graminicola* (Ces.) Wilson inciting anthracnose in sorghum.

Morphology and Cultural Characteristics

An actinomycete (Isolate No. S–15) was isolated from the soil of cultivated fields of Sikandra at Agra adopting dilution plate technique[6] on Thenton's agar[1].

The actinomycete (S–15) is a chromogenic type, produces soluble pigment on natural media, is melanin positive and shows acidic reaction in milk. It slowly liquifies gelatin, hydrolyses starch and reduces nitrate completely. It utilizes best the glucose, maltose and rhamnose as the carbon sources, whereas arabinose and xylose were poorly utilized.

Vegetative mycelium is white, non-septate and monopodially branched forming tough textured growth on solid media. Aerial mycelium is abundant, rosy white to grey in colour, sporophores as extended long and open spirals. Spores in chains (Fig. 1), are oval to short cylindrical, $1{\cdot}0–1{\cdot}6 \times 1{\cdot}6–2{\cdot}2\,\mu$, wall spiny when examined under electron microscope (Fig. 2). The isolate S–15 was placed in section "Spira" and "Grey" series[3].

The strain S–15 resembles *S. ganmycicus* in surface configuration of spores, which is considered a constant and reliable taxonomic criterion for the classification of *Streptomyces* species[4,5,7]. However there are some differences between the two in cultural characteristics. In sucrose-nitrate medium S–15 does not produce pale yellow soluble pigment like *S. ganmycicus*. Similarly on starch agar, vegetative mycelium in *S. ganmycicus* is yellowish brown[2] whereas it is whitish brown in S–15. Therefore Isolate S–15 has been considered as a new strain of *Streptomyces ganmycicus* Hesoya and Soeda. The validity of identification has been confirmed by reference to the Central bureau voor Schimmelcultures, Baarn, The Netherlands.

Biological Activity

The new strain of *S. ganmycicus* was found to possess marked antagonistic activity against *Colletotrichum graminicola*. The activity of the strain 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 room temperature the different micro-organisms were streaked at right angle to the actinomycete streak. The inhibition zone if formed was measured. Thus it was found that the new strain of *S. ganmycicus* was also active against *Altenaria alternata*, *A. brassicae*: *Aspergillus erythrocephalus*,

A. flavus, A. flavipes, A. fumigatus, A. nidulans, A. niger, A. sydowii, A. tamerii, A. terrus; *Chaetomium spirale*; *Cladosporium cladosporoides*; *Cochliobolus specifier*; *Cunninghamella echinulata*; *Curvularia prasadi, C. tuberculata, C. verruculosa*; *Drechslera halodes, D. hawaiiensis, Drechslera* state of *Cochliobolus sativus, Drechslera* state of *Trichometasphaerea holmii*; *Fusarium concolor, F. equiseti, F. fusaroides, F. heterosporium, F. moniliforme, F. oxysporum, F. semitectum*; *Mucor hiemalis*; *Nodulosporium griseobrunneum*; *Penicillium citrinum, P. luteum, P. spiculisoporum, P steckii*; *Stachybotrys atra*; *Trichothecium roseum*; *Trichoderma lignorum Bacillus subtilis and Staphylococcus* sp.

Stability of the Antibiotic Substance

The antibiotic produced by the new strain of *S. gammycicus* is thermolabile. It loses its activity at temperatures of 50° C and above or when diluted with water. Upon storage the activity is also lost, the loss being more rapid at high temperature (30–35° C). pH of the culture broth also influences its activity. It is lost both at higher (8·5) and lower (4·5) ranges but more rapidly in the acidic side. The antibiotic can be stored without any appreciable loss in its activity for 36 days at pH 7·6 and temperature range 0–7° C.

The antibiotic is readily sholuble in *n*-butanol and differs from carzinomycin produced by *S. gammycicus*. The antibiotic produced by S–15 is a non-polyenic, polymeric product of amino sugars containing $-NH_2$ and $-OH$ groups.

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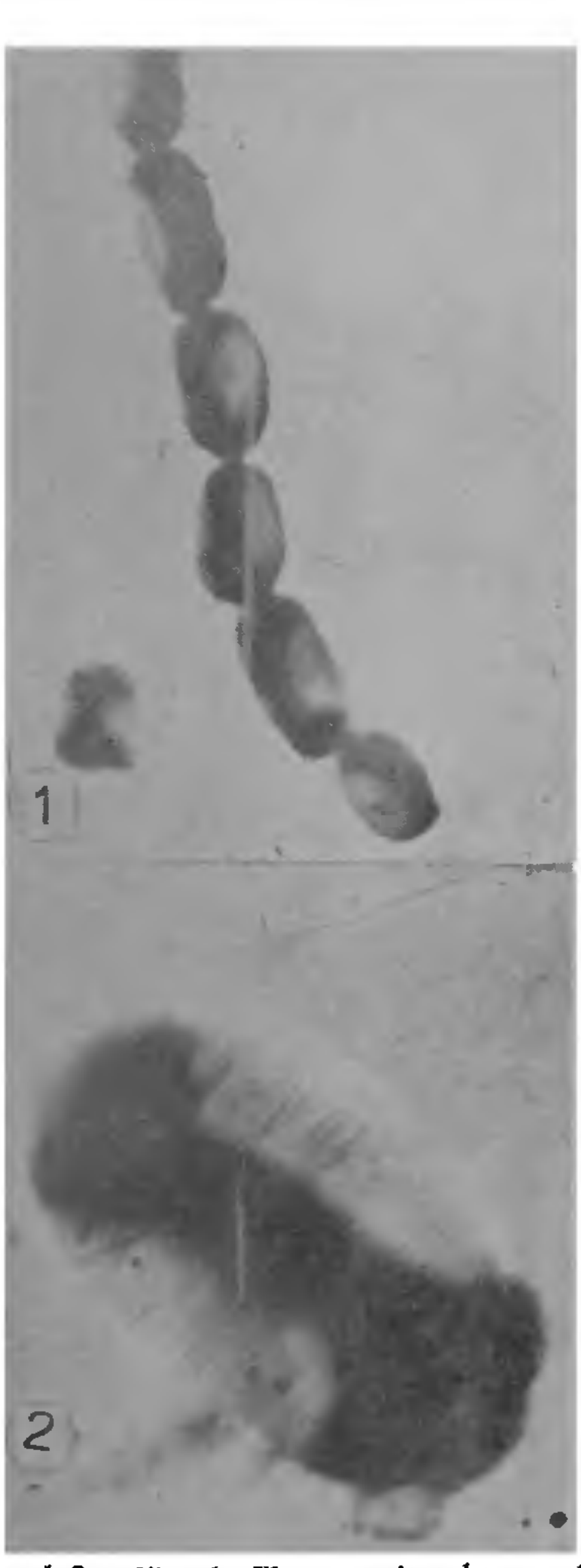

FIGS. 1–2. Fig. 1. Electron microphotograph of a new strain of *S. gammycicus* showing a spore chain. Fig. 2. Electron microphotograph of *S. gammycicus* showing a spore with spiny wall.

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