

### AN ANTIMICROBIAL [ANTIBIOTIC] FROM A SPECIES OF *BACILLUS*

In an attempt of study the antagonism among the soil microorganisms, a bacterium showing good antimicrobial activity was encountered. The bacterial colony, on Nutrient agar medium was waxy, yellowish-white in colour with fimbriate edges. It was identified with the help of Bergy's manual as an aerobic, gram-positive *Bacillus* sp. producing abundant endospores.

After the preliminary test on its antagonistic activity against a fungus, viz., *Microsporum canis* on Sabouraud glucose agar (SGA), the following test organisms were screened to evaluate the activity of the bacterium:

**Bacteria:** *Staphylococcus aureus*, *Streptococcus pyogenes*, *Proteus vulgaris*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Salmonella typhimurium*.

**Fungi:** *Rhizopus stolonifer*, *Mucor* sp., *Pythium* sp., *Trichophyton mentagrophytes*, *Microsporum gypseum*, *M. canis*, *Epidermophyton floccosum*, *Chaetomium globosum*, *Aspergillus niger*, *A. oryzae*, *A. nidulans*, *A. fumigatus*, *Penicillium* sp., *Fusarium solani*, *Gliocladium fimbriatum*, *Alternaria solani*, *Trichoderma viride*, *Rhizoctonia solani* and *Sclerotium* sp.

**Yeasts:** *Candida albicans* and *Saccharomyces cerevisiae*.

The test organisms were inoculated on either side of the bacterial streak on Nutrient agar plates for bacteria and on SGA plates for fungi and yeasts. Plates were incubated at 37°C for 48 hr and at room temperature for one week for bacteria and fungi and yeasts respectively. The activity of the bacterium was assessed visually depending upon the extent of growth inhibition observed in each case. Microscopic observations on the changes in the morphology of the fungi were carried out according to the method described elsewhere<sup>1</sup>.

Out of a total of 27 bacteria (gram -ve and +ve), fungi and yeasts tested, all except *Sclerotium* sp. were inhibited. Another noteworthy observation is the inhibition of *Pythium* sp., as against the report earlier on the inefficacy of a bacterial antibiotic on this fungus<sup>2,3</sup>. The *in situ* test to evaluate the morphology microscopically revealed the malformation and stunting of the mycelium, heavy anastomosing and lack of conidiation. Typical stunting of mycelia with bulbous hyphal tips and absence of spores as comparable to the results obtained for polyene antibiotics<sup>4</sup> were observed in the case of the saprophytic fungi tested in this work.

Among the antibiotics isolated from members of Eubacteriales, mycobacillin and bacillomycin from *B. subtilis* have been active against *Aspergillus niger*,

human pathogenic and a few bacteria<sup>5</sup>. Similarly, those from *B. circulans* and *B. leptosporus* have been reported to be more active on bacteria than on fungi or yeasts<sup>6</sup>. However, the bacterium, isolated in our work, has exhibited a broad range of activity, suggesting that it could be used as effective antagonist against several other microbes as well. Further work on the isolation and characterization of the active principle from this bacterium, in order to differentiate it chemically from those reported already in the literature, is in progress.

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### ON DDT-INDUCED 'RADICULAR PROLIFERATION' IN *PHASEOLUS MUNGO* LINN.

THE effect of hormones, chemicals and growth regulators on morphogenesis of seedlings including germination and chlorophyll synthesis has been studied extensively<sup>1-3</sup>. However, the effect of insecticides in the above regard has not been well investigated<sup>4</sup>. We report here an interesting morphogenetic effect of insecticide DDT on the seedlings of *Phaseolus mungo* Linn.

During our preliminary experiments on the effect of DDT on the various aspects of early morphogenesis in the seedlings of *P. mungo*, we noticed certain abnormal seedlings showing the absence of typical taproot-like radicle; instead, the seedlings showed several roots of almost equal size arising at the base of plumule

—an instance of 'radicular proliferation' (Fig. 1). In order to verify if a correlation exists between this interesting abnormality and the concentration of the insecticide, further experimentation was carried out as follows.

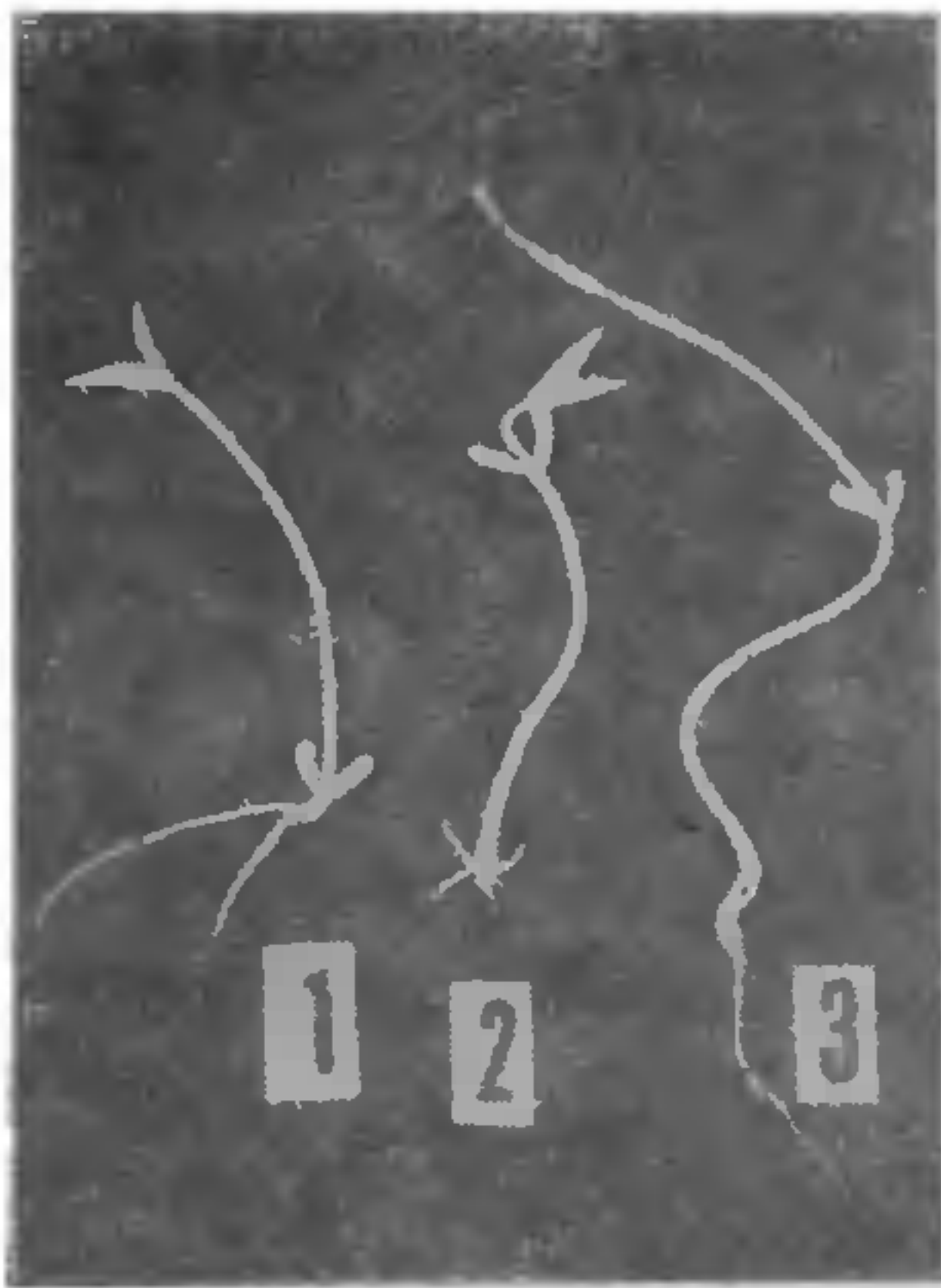


FIG. 1. Seedlings of *Phaseolus mungo* showing 'radicular proliferation' upon treatment with insecticide DDT (1 and 2). Alongside (3) a 'normal' seedling not treated with the insecticide may be seen, showing typical taproot-like radicle. Seedlings were photographed 3 days post-treatment.

The seeds of *P. mungo* were surface-sterilized in 0.1% mercuric chloride, washed with water and sown in petridishes with filter papers moistened with distilled water. The seedlings were treated with different amounts of insecticide 24 hours after germination. Numerical analysis on the seedlings was carried out on the third day post-treatment. Seedlings were grown in natural light and dark rhythm during experimentation. The numerical data were treated statistically<sup>5</sup>.

The data on incidence of radicular proliferation in *P. mungo* as a function of concentration of DDT are given in Table I. An increase in the quantity of the insecticide generally enhances the incidence of the abnormality. A positive correlation ( $r = +0.882$ ) has been obtained with regard to the relation between the incidence of abnormality and DDT concentration. The correlation coefficient, however, is not satisfactory due perhaps to the non uniformity of the suspension of DDT. Nevertheless, the present demonstration of the phenomenon of 'radicular proliferation' *per se* is interesting. Earlier, this has been demonstrated under the treatment of coumarin in *Phaseolus radiatus*<sup>6</sup>. Thus the present report happens to be the first demonstration of the event in dicot seedling with an insecticide. Besides causing radicular proliferation, the

present insecticide has also been observed to show a general growth-depression effect on the seedling.

TABLE I

Incidence of abnormality of radicular proliferation in the seedlings of *Phaseolus mungo* Linn. under DDT-treatment (Values are mean  $\pm$  S.D. of 4 replications each)

Concentration of insecticide (ppm)	Incidence (Number of abnormal seedlings % total number)
Control 0	Nil
5	10 $\pm$ 3
10	10 $\pm$ 1
20	8 $\pm$ 2
30	20 $\pm$ 5
40	18 $\pm$ 3
50	22 $\pm$ 10

The growth retardant coumarin has been suggested to cause random reorientation of mitotic spindle in the radicle of monocot seedling<sup>7,8</sup>. The 'radicular proliferation' under coumarin treatment in the dicot *P. radiatus* has been suggested to result from 'abnormal splitting' of the meristem<sup>6</sup>. The causomechanisms of the present phenomenon are under investigation.

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