molecules of the dichromate ions formed in the reaction are equal to those of the chromium sulphate used up and (*ii*) the ratio of the gram molecules of manganese sulphate to that of dichromate formed is very nearly equal to 3.

The reaction takes place fairly rapidly in the beginning but slows down later. The rate of the reaction increases on increasing (*i*) the mass of manganese dioxide, (*ii*) the concentration of chromium sulphate and (*iii*) the temperature, but it decreases when coarser particles are used and the pH of the chromium sulphate solution is decreased. The rate becomes very rapid when manganese dioxide in the colloidal state is used.

On plotting the values of $K_m = 2{\cdot}3/t \log a/a-x$, against $v = x/t$, straight lines are obtained which intersect the axis of v on the negative side. These results indicate that the mechanism of the reaction under investigation is probably the same or similar to the catalytic decomposition of nitrous oxide on the surface of platinum catalyst studied by Hinshelwood and Prichard.[1] It has also been found that straight lines drawn for reactions, carried out with solutions of chromium sulphate of the same concentration and manganese dioxide of particles of different sizes, determined roughly by the mesh of the sieves used, are coincident. These observations show that both b and k in the equation[2]

$$V = \left(a + \frac{1}{b}\right) K_m - \frac{k}{b}$$

are constant, as required by the theory.

Detailed results are being communicated for publication elsewhere.

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1 *J.C.S.*, 1925, **127**, 327.
2 Hinshelwood, *loc. cit.*

Effect of β-Indolyl 3-Acetic Acid and Phenyl Acetic Acid on the Growth of Some Members of the Family *Saprolegniaceae*

IT was first shown by Neils Nielson that under certain conditions of culture, a growth substance is formed by *Rhizopus suinus* and *Absidia ramosa* which influences cell-elongation in *Avena*. Later on, it was found that besides these two fungi a number of others also produced growth-substance. As shown by Kogl and Kostermans[1] this substance is β-Indolyl acetic acid which can also be isolated from urine (Kogl, Haagen Smit and Erxleben). It is a decomposition product of tryptophane. The physiological effects of β-Indolyl acetic acid on higher plants are about the same as those of auxin, but there are certain differences which may be due to the fact that it does not become oxidised so easily. It accelerates and retards cell-elongation in coleoptiles and roots, initiates growth in secondary meristematic tissues as well as formation of callus and roots and causes inhibition of bud-development. Crocker, Zimmermann, Hitchcock and Wilcoxon working at the Boyce Thomson Institute, have in recent years, shown that 32 different substances in all especially aromatic acids and esters are able to bring about a series of effects similar to those which are also brought by auxin and β-Indolyl acetic acid.

With a few exceptions, very little work has been done so far on the effect of various growth substances on the filamentous fungi. Leonian[2, 3] has shown that there are produced by corn roots and certain unicellular algæ substances of the nature of auxins which promote growth and reproduction of *Phytophthora cactorum* when added to ordinary nutrient media. Leonian and Lilly[4] tested about one hundred fungi with regard to the effect of β-Indolyl acetic acid (hetero-auxin) on their growth and came to the conclusion that the higher concentrations of this substance proved toxic and the lower ones failed to induce any stimulation. Wolf[5] studied the effect of α-naphthelene acetic acid on the growth of *Saprolegnia ferax* and *Achlya bisexulis* and found that a definite

inhibition of growth occurred in the presence of this synthetic growth-promoting substance.

In the present work the effect of β-Indolyl acetic acid and phenyl acetic acid (obtained from B.D.H.) has been studied on the growth of the following members of the family Saprolegniaceæ:—*Achlya dubia* Coker, *Pythiopsis intermedia* Coker, *Aphanomyces camptostylus* Drechs., *A. Cladogamus* Drechs., and *Thraustotheca clavata* (deBary) Humph. A synthetic medium with 0·1 gm. K_2HPO_4, 0·1 gm. $MgCl_2$, 1·0 gm. NH_4NO_3, 0·05 gm. cystin and 1·0 gm. of dextrose in one litre of distilled water was employed in these experiments. The concentrations of β-Indolyl acetic acid and phenyl acetic acid used, ranged between one part in 10 millions to one part in 5,000. The fungi were grown in scrupulously clean triplicate pyrex culture tubes each of which contained about 12 c.c. of the solution and were kept at 25° C. The relative growth of the fungi was measured from the vertical rise of the fungal colony on the third, fifth and seventh day after inoculation.

It has been found that in all cases lower concentrations (1:10 millions and 1:1 million) of the two growth substances induced no acceleration of growth, while concentrations higher than these caused a gradual inhibition, till with the concentration 1:5,000 the growth was even less than one-fourth of the growth in the controls in each case.

It is therefore concluded that these two growth substances, which have been found to stimulate growth in the higher plants, are of no value to these fungi as growth stimulants and rather inhibit the growth in higher concentrations.

The writer is indebted to Dr. R. K. Saksena for some valuable suggestions and criticisms.

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July 22, 1939.

1 *Z. Physiol Chem.*, 1934, **113**, 228.
2 *J. Agr. Research*, 1935, **51**, 277.
3 *Bot. Gaz.*, 1936, **96**, 554.
4 *Am. J. of Botany*, 1937, **24**, 135.
5 *Ibid.*, 1937, **24**, 119.

Occurrence of Xenia in Pearl Millet (*Pennisetum typhoideum*) Stapf and Hubbard

The colour of the grain in the Indian varieties of pearl millet is whitish blue or bluish green of different intensities. The author, however, found two types of grain differing in colour, golden yellow and light bluish green, in a small sample of seed of an African variety he obtrained from Nawnagar in 1934. The two kinds of grain were sorted out and sown separately in two different localities at Palitana during the following season in 1935. While the bluish greens all bred true, giving only earheads with bluish green seeds, among the yellows some bred true to yellow grain, while others segregated into yellow and bluish green seeds in the same earhead. The actual segregation in nine plants given below was a rough 3:1 of yellow to bluish green.

Totals for 9 families	Yellow grain 46,499	Bluish green grain 15,062

Close to the place where the yellow grained plants were grown, there were a few plants grown in pots of an Indian variety of pearl millet with bluish green seeds. Three months after planting when the earheads were ripening in the Indian variety of pearl millet, there were observed on the earheads of this variety a few grains of a distinct golden yellow colour. Since this Indian variety was previously known to breed true to bluish green seeds, the yellow grains occurring in them were suspected to be the result of natural cross pollination from the yellow grained type of the African millet growing nearby. At harvest these yellow grains, 41 in number, were collected and planted separately in the following year. In every case the grain proved to be of hybrid origin as the plant resulting from it produced earheads with both yellow and bluish green seeds occurring in them. The segregation of golden yellow to bluish green were in different proportions some of which were a clear 3:1, others 9:7, and still others with an indefinite 2 to 2·5:1. The genetics of the grain colour has now been worked out and it is found to involve three factors.