

INFLUENCE OF CARCINOGENS ON YEAST

SEVERAL polyploidogenic organic compounds, e.g., camphor, colchicine, acenaphthene and other related derivatives, have been employed to produce cells with chromosome complements several times higher than the normal. Treatment with camphor, after the first dosage has been found to induce in the cells of *Saccharomyces cerevisiae*, a strain of brewery yeast, an increase in their volume to about twice that of the normal; a second treatment was found to result in a supergigas race with thrice the volume of the normal.¹

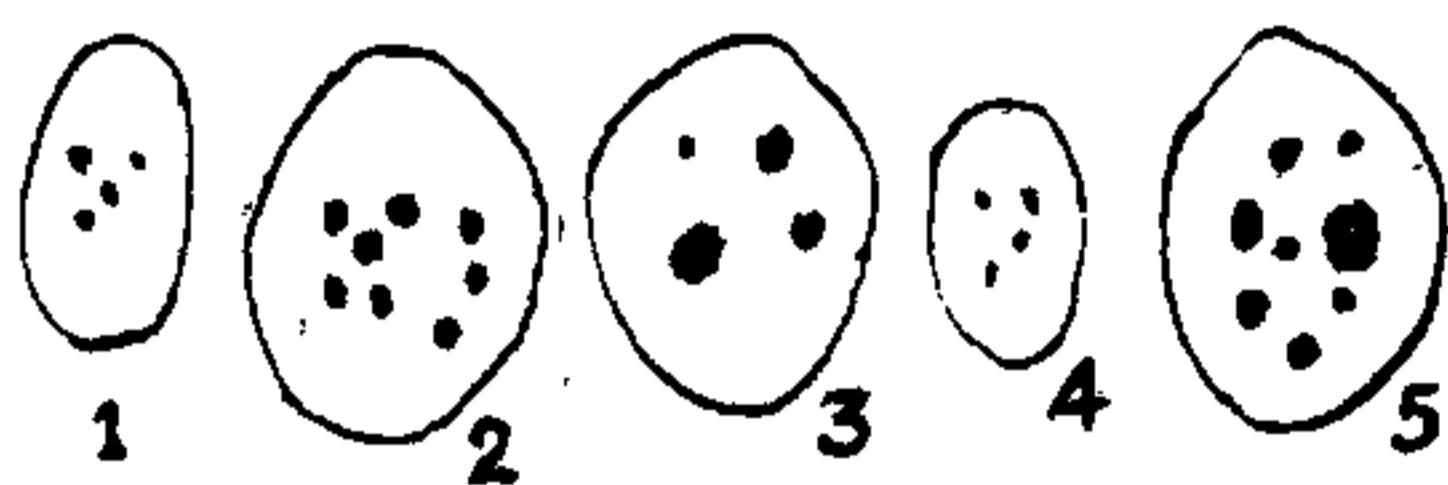
The present work has been undertaken to determine the effect of a few of the available carcinogens, fluorene, fluoranthene, retene and chrysene, on a strain of industrially important distillery yeast (N.C.T.C. 3019). Alcoholic solutions of these compounds (5 mg./ml.) were employed; in the case of the sparingly soluble chrysene, the solution attained saturation since

a portion of the substance remained undissolved. The retene solution was slightly yellowish; that of chrysene exhibited a slight pinkish fluorescence; other solutions were colourless.

The yeast which has a high tolerance of alcohol was plated out on wort agar and the alcoholic solution of the carcinogen (0.5 ml.) was placed in cups equidistantly placed in the plate; one of the petri-dishes received only the pure solvent, absolute alcohol. The method employed was very similar to the familiar "Cup assay" technique now extensively used in the assay of antibiotics.

The colonies developed after five days' incubation at room temperature (23-24° C.) were examined under the microscope for size and cell inclusions. Smears were fixed in carnoy and stained with toluidine blue in accordance with a reproducible schedule standardised in these laboratories. Examination of the permanent slides revealed that retene-treated yeasts showed a significantly high accumulation of nuclear material; this phenomenon was clearly observable, if to a smaller extent, in the case of chrysene-treated cells.

Organisms once treated were respectively subjected to a second dosage of the same chemical, employing the "Cup assay" technique. After five days' incubation at room temperature, the organisms were examined in the same way as described above. The retene-treated cells, to the extent of about 25 per cent. were found to contain, large-sized heavily stained bodies; fluoranthene-treated cells showed a similar effect but to a less pronounced extent. Fluorene-treated cells did not show any effect. Chrysene-treated organisms, on the other hand, attained a large size (twice that of the normal) and became endowed with heavily stainable nuclear bodies; the number and size of these bodies in the cell increased (see Fig. 1). These cells after plating on wort



1. Alcohol. 2. Retene. 3. Fluoranthene.
4. Fluorene. 5. Chrysene.

agar, gave rise to cells which retain the same characteristics* as regards cell inclusions. The biochemical performance, that is, the alcohol-producing capacity of these treated strains of yeasts, are now being investigated.

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* Supplied three of the carcinogens employed in these investigations.

1. Bauch, R., *Ber. deutsch. bot. ges.*, 1942, 60, 42-63.

PITH IN SUGARCANE

THE central core of the stems of dicotyledonous plants, known as 'medulla' or 'pith', is composed of parenchymatous tissue surrounded by a ring of vascular bundles and serves as the place of storage of reserve food materials like starch. Monocots, however, do not contain a well-defined pith since the vascular bundles are not disposed in the form of a ring but are scattered throughout the ground tissue. In sugarcane the term pith is used in a special sense and connotes the chalky white opaque tissue which develops longitudinally in the centre of the stem. It generally consists of parenchymatous cells and sometimes includes a few of the centrally situated vascular bundles also. Depending upon the variety, development of pith commences even when the canes are six or seven months old. The formation of this tissue is followed, after some time, by death and at times disintegration of the constituent cells later on, resulting in the development of a longitudinal hollow. Thus pith formation in sugarcane reduces the storage tissue and consequently the tonnage and yield of sugar. Hence it is a very undesirable character in any cane variety. An attempt was, therefore, made to quantitatively estimate the amount of pith in some sugarcane varieties at the Agricultural Research Station, Anakapalle during 1943-44 and 1944-45, and the results of the latter year are summarised in this short note.

From a ratoon experiment including four varieties (co. 419, co. 421, co. 523 and co. 527) and three treatments (plant crop first ratoon and second ratoon) samples were taken for purposes of this study. Twenty canes, in all, were selected at random from each treatment and variety. This was a composite sample and canes from each subplot were not separately studied. Each cane was cut at the centre of every internode giving a number of cane pieces, each of which had a node at the centre and two halves of internodes on its either side. The diameters of the top cut end (that half, which had the bud) of each cane bit and that of the pith visible at its surface were measured in two directions. The diameter of the internode and that of the pith was arrived at by averaging the two values (obtained by measuring the diameter in two ways, across and along the bud). The volumes of the different internodes and the pith in the same were calculated by applying the formula $\pi r^2 L$ where L was the length of the top internode. (It was assumed that (1) the internode was cylindrical and (2) the pithy core had a uniform volume throughout any particular internode.) In each case the volume of pith was expressed as a percentage of the volume of the entire cane.

The conclusions from the summarised data presented in the tables, appended separately, are as follows:—

In the varieties under study co. 523 had the highest amount of pith (17.22 per cent. pith to total volume of cane) followed by co. 527 (10.74 per cent.), co. 421 (8.56 per cent.) and co. 419 (3.66 per cent.) in the order of mention. The differences between the percentage volumes of pith in the four varieties were statistically significant. (2) Among treatments,