study has shown that the cleavage reaction between acid iodides and ethers proceeds in all probability through a preliminary formation of an oxonium compound between the ether and the acid iodide.

Secondary ethers have been found to be much more readily cleaved into alkyl iodides and esters than are primary ethers. The substitution of chlorine in the α-position in aliphatic acid iodides has been found to diminish their ability to cleave ethers. The tendency of acetyl iodide, chloroacetyl iodide and dichloroacetyl iodide to split primary ethers was found to be diminished by increasing substitution of chlorine. Trichloroacetyl iodide showed no tendency to cleave either primary or secondary ethers at ordinary temperatures even in the presence of zinc iodide as a catalyst, though evidence of the formation of an oxonium compound was obtained. Similarly, substitution of chlorine in the α-position in aliphatic ethers greatly increased their resistance to cleavage by acid iodides.

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IS THE NUTRILITE FOR "GEBRÜDE MAYER" YEAST OF UNIVERSAL BIOLOGICAL IMPORTANCE?

Sir:

We have obtained a considerable body of evidence that a single unknown hydroxy acid with molecular weight about 200 is the responsible agent for a remarkable growth stimulation of "Gebrüde Mayer" yeast.[1] Furthermore, what appears to be this same acid has been found universally in a great variety of living tissues.

The tissues extracted include (1) rice polish (Spermatophyta), (2) Aspergillus niger (Fungi), (3) Spirogyra and Oscillatoria, mixed (Algae), (4) Bacillus subtilis (Schizophyta), (5) Planarian worms (Plathylminthes), (6) Earthworms (Annulata), (7) Oysters (Mollusca), (8) Sea urchin eggs (Echinodermata), (9) Crabs eggs (Arthropoda), (10) Beef liver (Chordata), (11) Milk (Chordata). Not only was a growth stimulating substance present in every extract but on fractional electrolysis in an eight-compartment cell the activity in each case migrated under our experimental conditions to a cell with P_H value of about 4 and was usually completely removed from cells having a P_H of 5 or more.

[1] The criticism of Richards [*J. Biol. Chem.*, **96**, 416 (1932)] that our results may have been due to inorganic materials is not valid inasmuch as the article cited [THIS JOURNAL, **53**, 4171 (1931)] states that the activity was lost on ignition (p. 4176). Yeast nutrition like mammalian nutrition is undoubtedly affected by traces of elements of less frequent occurrence, but the effect of unknown organic materials is of entirely different order of magnitude and operates over an incomparably larger range.

The diffusion constant of the active substance (using rice polish and beef liver as sources) indicates that its molecular weight is about 200. The acid (rice polish was the source) has no primary or secondary amino group (nitrous acid anhydride treatment). It has been esterified with both methyl and ethyl alcohols. The esters are not basic (fractional electrolysis), hence the acid is not amphoteric. The presence of several hydroxy groups is indicated by (1) complete destruction of the active substance by treatment with dimethyl sulfate in the cold, (2) complete nonvolatility of the methyl ester at a pressure of 10^{-3} mm., (3) solubility of the esters in water and comparatively slight solubility in ether. The activity is not destroyed by hydrogenation following the methods of Roger Adams *et al.*, indicating that the substance is not olefinic and contains no aldehyde nor ketone group nor aromatic nucleus.

The possibility of the universal occurrence of a single acid substance of the character we have indicated opens up some very interesting questions. There is fragmentary evidence that the same acid may function in the growth stimulation of certain bacteria, molds and mushrooms and that it is one of the substances involved in the growth stimulation of other yeasts such as Wildiers' and No. 578 (American Type Culture Collection). The presence of this acidic substance in soils and composts suggests the possibility that it may function in the stimulation of the growth of green plants. It is synthesized by the mold Aspergillus niger, and seems to be more widely and evenly distributed in tissues than any known vitamin.

Because of their rather far reaching interest we wish at present to emphasize the tentative character of our conclusions [THIS JOURNAL, **53**, 4171 (1931)].

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NEW BOOKS

Quantitative Chemical Analysis. An Intermediate Textbook. By FRANK CLOWES and J. BERNARD COLEMAN. Revised by D. STOCKDALE and J. DEXTER. Thirteenth edition. P. Blakiston's Son and Co., Inc., 1012 Walnut St., Philadelphia, Pa., 1931. xiv + 605 pp. Illustrated. 14.5 × 23 cm.

Analytical Factors and their Logarithms. By EARLE RADCLIFFE CALEY, M.Sc., Ph.D., Assistant Professor of Chemistry in Princeton University. John Wiley and Sons, Inc., 440 Fourth Ave., New York, 1932. v + 112 pp. 13 × 20 cm. Price, $2.00.

The first of these volumes, originally published forty-one years ago as a laboratory textbook, is now a rather complete manual on the art of quantitative analysis. The book is divided into eight parts: (I) (65 pages) general processes; (II) (58 pages) simple gravimetric estimations; (III)