flow of one solvent through a series of mixers and separators containing a second solvent. In this case it can be shown that:

$$p_r = \frac{xv_a{}^{r-1}k^r t^{r-1}}{\{kV + v(1-k)\}^r (r-1)!} \exp\left[-\frac{kv_a t}{\{kV + v(1-k)\}}\right], \quad (4)$$

where v is the volume of the first solvent in each vessel, v_a is the feed-rate of the second solvent and the other symbols have the same significance as in (1).

Under these conditions the peak concentration of solute passes along at a uniform rate which is directly proportional to the distribution coefficient (defined as the ratio of concentration in 'moving' phase to that in 'static' phase).

This continuous system bears analogies with partition chromatography. It has been shown to be less efficient for separating solutes than discontinuous systems operated on a similar plan.

The derivation of equations (1), (3) and (4) and a detailed description of this work will be given elsewhere.

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Amino-acids in *Rhodotorula gracilis* Rennerfelt

BY cultivating *Rhodotorula gracilis* on media of varying composition, it is very easy to obtain yeast with different amounts of fat and protein[1]. A yeast rich in protein and poor in fat is obtained in a nitrogen-rich medium. In a nitrogen-poor medium, the yeast will be poor in protein and rich in fat. The protein content of the yeast may vary between 13 and 50 per cent of the dried matter. It seemed probable that such a large variation of the amount of yeast protein could change qualitatively the composition of the protein. We have investigated the amino-acid composition of yeast with low and high amounts of protein.

The yeast was cultivated in Erlenmeyer flasks (750 ml.) containing 300 ml. liquid medium. Two media were used. The first contained 7·5 gm. asparagine and 60 gm. dextrose (nitrogen/dextrose = 0·023); the second 1 gm. asparagine and 40 gm. dextrose per litre (nitrogen/dextrose = 0·005). Both media contained the essential nutrient salts[1]. The yeast was cultivated with continuous shaking for seven days at 25° C. The yeast from the first medium contained 7·6 per cent nitrogen and 8·7 per cent fat, whereas the yeast from the second medium contained 2·8 per cent nitrogen and 49·8 per cent fat.

The amino-acids were determined after hydrolysis with hydrochloric acid[2] by means of paper chromatography[3]. The chromatogram (Munktell O.B. paper) was two-dimensional with pyridine–amyl alcohol[4] as first solvent and *m*-cresol[3] as second solvent. This combination gives a very good distribution of the amino-acids even with leucine, *iso*-leucine and phenylalanine.

Tryptophane, which is destroyed by hydrolysis, was proved to be present by treatment of the yeast with perchloric acid[5], which produced with the tryptophane a yellow-green fluorescent compound. The intensity of the fluorescence in the presence of potassium dichromate in ultra-violet light is a measure of the amount of tryptophane. The accompanying table shows the results obtained.

Amino-acid	Yeast containing 7·6 per cent nitrogen	Yeast containing 2·8 per cent nitrogen
α-Alanine	+	++
β-Alanine	+	−
Arginine	+	+
Aspartic acid	+	+
Cystine	+	+
Glutamic acid	+	++
Glycine	+	+
iso-Leucine	+	+
Leucine	+	+
Lysine	+	+
Phenylalanine	+ ?	+ ?
Proline	+	+
Serine	+	+
Threonine	+	+
Tryptophane	++	+
Tyrosine	+	+
Valine	+	+
Histidine	+	+

It is seen from the table that practically the same amino-acids are found in both yeasts. The only difference is that β-alanine is present in the protein-rich yeast but not in the protein-poor yeast. There is, however, a difference in the amounts of the amino-acids. The protein-rich yeast contains more tryptophane, whereas the protein-poor yeast contains a higher amount of α-alanine and of glutamic acid.

It may be assumed that the reason for the high amount of α-alanine and glutamic acid in the fat-rich and protein-poor yeast is the decreased metabolism of this yeast. Both α-alanine and glutamic acid are intermediate products of amino-acid conversion, and it seems probable that they accumulate by decreased metabolism when the transamination processes take place more slowly. The presence of β-alanine in the protein-rich yeast is probably connected with greater formation of vitamin in this yeast.

Thus the differences in amino-acid composition of protein-rich and protein-poor yeast are small and may be explained by the reduced metabolism of the protein-poor yeast.

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Zinc in Nuclear Desoxyribose Nucleoprotein

SINCE 1938 I have been engaged in a general study of the distribution of zinc in normal and malignant tissues, and this work has been briefly reported from time to time[1]. In the early part of the work, polarographic analyses for zinc content were made on human tissues, and although some neoplasms were found to have a much higher zinc concentration (expressed as grams zinc/gram dry-weight of tissue) than the corresponding normal tissue, others showed