DIFFERENCES BETWEEN YEAST AND RAT-LIVER AMINO ACID-SPECIFIC "SOLUBLE" RIBONUCLEIC ACIDS SHOWN BY COUNTERCURRENT DISTRIBUTION*

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Species differences between "soluble" RNAs have been reported (Benzer and Weisblum, 1961; Berg, Bergmann, Ofengand, and Dieckmann, 1961; Rendi and Ochoa, 1961; Webster, 1961). Benzer and Weisblum, for example, reported that yeast arginine-activating enzyme transfers radioactive arginine to yeast "soluble" RNA but not to E. coli "soluble" RNA. In this note, we wish to describe differences between yeast and rat-liver "soluble" RNAs shown by the countercurrent distribution technique (Doctor, Apgar and Holley, 1961; Apgar, Holley and Merrill, 1962).

In the experiment shown in Figure 1, yeast and rat-liver "soluble" RNAs were distributed separately, but concurrently, in the two halves of a 200-tube countercurrent fractionator, in order to have the conditions of the two distributions as nearly identical as possible. The distribution patterns obtained from the two RNAs are quite different. The tyrosine-RNA from yeast has a distinctly higher partition coefficient than the tyrosine-RNA from rat liver. The alanine-RNAs show the reverse relation, with the alanine-RNA from yeast having the lower partition coefficient. The lysine-RNA from rat liver is heterogeneous, with one of the two peaks corresponding approximately to the position of the lysine-RNA peak from yeast. The threonine-RNAs have nearly the same position.

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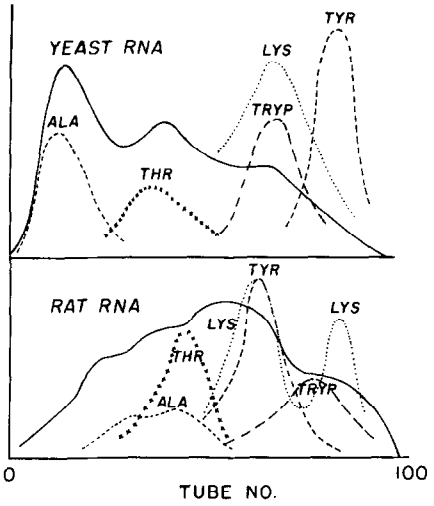

Fig. 1 - Results of 100-transfer countercurrent distributions of yeast and rat-liver "soluble" RNAs carried out in a solvent system composed of formamide, isopropanol, and phosphate buffer (Doctor, Apgar and Holley, 1961). The positions of amino acid-acceptor activity for L-alanine (ALA), L-lysine (LYS), L-threonine (THR), L-tryptophan (TRYP), and L-tyrosine (TYR) are shown.

It is interesting that differences in distribution behavior do not correspond to differences detected by amino acid-activating enzymes. Rat-liver tyrosine-activating enzyme does not distinguish between yeast and rat-liver tyrosine RNAs, though the RNAs differ greatly in distribution behavior. On the other hand, rat-liver threonine-activating enzyme easily distinguishes between the threonine RNAs,* which differ little in distribution behavior.

These results suggest that the species differences are quite complex, some differences affecting countercurrent distribution behavior and other differences affecting the interaction of the RNAs with amino acid-activating enzymes.

*Rat-liver RNA is completely labelled by rat-liver threonine-activating enzyme under conditions which give almost no labelling of yeast RNA. The difference is not due to the presence of an inhibitor in the yeast RNA since yeast RNA does not interfere with the labelling of rat-liver RNA. With much larger amounts of enzyme, yeast RNA is labelled with threonine.

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