arsenic pollution, so that, even if the amount of arsenic from detergents were not a hazard by itself, this amount coupled with the amount from other sources may be sufficient to lead to "40 ppm in bass." Finally, it seems to us a poor choice to allow the arsenic content in detergents to reach the levels we noted; especially when the technology exists to prevent the addition of arsenic in these widely used products. We suggest that in a time when pollution of all kinds in our environment is of obvious concern, why persist in adding to the system a potentially serious pollutant when it can be eliminated at the source?

In reply to Sollins, it was not our intent to imply that the arsenic found in detergents was introduced by the enzyme material. In response to the statement that the mandatory limit for arsenic may be raised to 200 ppb, it should be clear that this is not offered. On the contrary, the federal government and indeed several states are now closely looking at the environmental impact of many metals. Included at the head of the list of possible pollutants are lead, arsenic, and cadmium.

We suggest that failure to remove such potential pollution (and our report used the word potential) where possible, will lead to greater federal regulation which would require that it be shown that products (like detergents) will not contribute to pollution. We stand by our closing contention that a potential danger does exist and warrants further study.

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1. H. A. Schroeder and J. J. Balassa, *J. Chronic Dis.* **19**, 85 (1966).

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RNA Hybridization: Competition between Species

Hansen, Spiegelman, and Halvorson (*1*) state that the equation

$$\frac{1}{1-F}=\frac{C'}{C_T}\cdot\frac{C_T}{C}\cdot\frac{A^*}{A}+1 \quad (1)$$

"may be summed from species 1 to species *i*, where *i* is the number of competing species.

$$\sum_1^i\frac{1}{1-F} = \frac{C'}{C_T}\left[\sum_1^i\frac{C_T}{C}\cdot\frac{A^*}{A}\right]+1 \quad (2)$$

Division of both sides by *i* gives

$$\frac{1}{1-F} = \frac{C'}{C_T}\,(\text{average slope})+1 \quad (3)$$

This is also a straight line with an intercept of 1." The summation from 1 to *i* of Eq. 1 does not yield Eq. 2. Division of both sides of Eq. 2 by *i* does not give Eq. 3; and Eq. 3 is not a straight line.

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Reference

1. J. N. Hansen, G. Spiegelman, H. O. Halvorson, *Science* **168**, 1291 (1970).

7 August 1970

The numeral 1 in Bolch's equation 2 should clearly be an *i*. To demonstrate, Bolch's equation 1 becomes, upon summation for each species of RNA from 1 to *i*,

$$\sum_1^i\left(\frac{1}{1-F}\right)_i = \sum_1^i\left[\frac{C'}{C_T}\cdot\frac{C_T}{C_i}\cdot\frac{A^*_i}{A_i}+1\right] \quad (1)$$

After separation of the right side into a summation and the sum *i*, C'/C_T can be factored out to give

$$\sum_1^i\left(\frac{1}{1-F}\right)_i = \frac{C'}{C_T}\left[\sum_1^i\frac{C_T}{C_i}\cdot\frac{A^*_i}{A_i}\right]+i \quad (2)$$

Dividing both sides by *i* gives a normalized expression with an intercept of 1.

$$\left(\frac{1}{1-F}\right)_{obs} = \frac{C'}{C_T}\cdot(\text{average slope})+1 \quad (3)$$

The left side of the equation has been denoted $[1/(1-F)]_{obs}$ because it is an experimentally obtainable quantity, since by definition, *F* is the fraction of uncompeted RNA counts at any C'/C_T. The slope is denoted as an average slope because it is the sum of the slopes for all *i*, divided by *i*. The slope is a constant, because it is the product of two constants C_T/C_i and A^*_i/A_i; C_T/C_i is the reciprocal of the fraction of total competing RNA consisting of species *i* and is fixed for any RNA mixture, and A^*_i/A_i is the reciprocal of the fraction of saturation for each respective species of labeled RNA in the absence of competing RNA. Since the concentration of labeled RNA is held constant throughout a competition experiment, A^*_i/A_i is also constant. Equation 3 is therefore correct, and is written in the standard form for a straight line with $1/(1-F)$ and C'/C_T as the variables.

In the legend to Fig. 9b (*1*), the equation should read "$1/A=(K/A^*C')+(1/A^*)$." The first sentence in the legend to Fig. 9 (*1*) should read: "Theoretical competition curves of homogeneous labeled RNA and an identical homogeneous competing RNA." In (*1*) on page 1296, column 3, second paragraph; the sixth sentence should read "When we solve for *F*, it seems that about 29 percent of the predominant radioactive species present in 8-minute RNA are absent from 80-minute RNA."

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Reference

1. J. N. Hansen, G. Spiegelman, H. O. Halvorson, *Science* **168**, 1291 (1970).

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RNA Hybridization: Competition between Species

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