

## COMMUNICATION TO THE EDITOR

### High-Sulfur Seed Proteins

DEAR SIR:

The recent discovery in this laboratory of a high-sulfur protein in rice suggests that such components may occur in minor proportions in seed proteins generally, rather than as occasional unusual constituents. If this is true, further study of their possible functional properties may be desirable. To focus attention on this possibility, we are reporting preliminary data on the rice protein and comparing it with other reported high-sulfur seed proteins.

A soluble protein fraction containing about 13% of the total N was extracted from defatted rice flour by means of a 5% sodium chloride solution. From this extract a "globulin" fraction was precipitated by 0.3 saturation with ammonium sulfate. Re-extraction of the precipitate with 2.5% sodium chloride and treatment with ammonium sulfate as before yielded a precipitated globulin. After extensive dialysis to remove inorganic salts, and lyophilization, the yield was 1.5% of the total protein. The globulins so obtained from a commercial California Pearl rice flour and two samples of high-protein Caloro rice of known history gave the following analyses (dry basis):

	N %	S %	N/S
Commercial flour	17.8	3.09	13.2
Caloro No. 1	17.8	2.83	14.5
Caloro No. 2	18.1	2.81	14.7

The globulin from the commercial flour also contained 0.3% carbohydrate, 0.39% ash, <0.01% phosphorus, and 7.9% of total N as amide N. Starch-gel electrophoresis showed two main components and eight or nine minor ones.

Further segregation was achieved by adjusting a solution of this globulin in 0.5% acetic acid (pH 3.2) with sodium hydroxide to pH 4.0 and pH 7.0 successively. The precipitate separated at each pH and the residual soluble material were recovered after dialysis and lyophilization.

Analytical values, dry basis, were:

	N %	S %	N/S
Precipitate at pH 4.0	60	18.0	2.86
Precipitate at pH 7.0	10	17.3	2.84
Soluble at pH 7.0	30	17.3	3.69

The starch-gel electrophoretic pattern of fraction 1 consisted of two closely spaced dense bands followed by two faint bands. Fraction 3 gave one predominant band and several weaker ones, all differing from those of fraction 1. Fraction 2 gave an intermediate pattern. Further work on purification and characterization is in progress.

This presence of a relatively soluble, high-sulfur protein in rice flour does not appear to be an isolated occurrence. Sulfur figures for proteins from wheat (1), oats (2), barley (3), and peanuts (4) are compared in Table I with those for rice protein.

These soluble protein constituents appear, from the reports, to differ considerably in properties; they do not form a closely homogeneous

TABLE I  
HIGH-SULFUR SEED PROTEINS

SEED PROTEIN	N %	S %	N/S	MOL. WT.
Wheat (purothionin)	17.35	4.42	9.00	12,000
Rice	17.3	3.69	10.7	.....
Oats (gamma-albumin)	(15.0) <sup>a</sup>	(3.6) <sup>a</sup>	(9.6)	.....
Barley (beta-globulin)	(14.7) <sup>a</sup>	(3.2) <sup>a</sup>	(10.5)	100,000
Peanuts (albuminlike)	14.3	2.90	11.3	.....

<sup>a</sup> Calculated from reported amino acid composition.

ous class of substances. It does appear likely, however, that they may occur generally in minor amounts in seeds.

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May 7, 1964

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