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## COMMUNICATION TO THE EDITOR

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### ISOLATION OF A CRYSTALLINE SELENIUM-CONTAINING ORGANIC COMPOUND FROM PLANT MATERIAL

*Sir:*

Horn, Nelson and Jones<sup>1</sup> and Franke and associates,<sup>2,3</sup> in connection with their study of the diseases of farm animals apparently caused by selenium in grain, have shown definitely that the selenium is present in an organic form intimately associated or combined with protein. It is important to ascertain the chemical nature of this organic selenium compound and to determine the manner in which it is tied up in the plant, and for several years we have been attempting to isolate it. We have now succeeded, after many failures, in obtaining a crystalline selenium compound having the properties of an amino acid. This substance has been obtained repeatedly from different lots of the same source material in the form of well-defined, elongated prisms. Analyses show it to have the percentage composition: C, 33.38; H, 5.83; N, 10.98; Se, 20.62; S, 4.20; O, 24.99 (by difference).

These analytical results correspond to the empirical formula  $C_{21}H_{44}N_6Se_2SO_{12}$ . The compound gives a strong ninhydrin reaction, and all of its nitrogen is in the amino form. Its equiva-

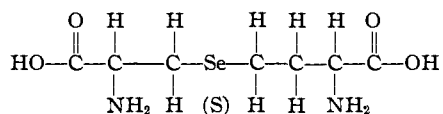
(1) M. J. Horn, E. M. Nelson and D. Breese Jones, *Cereal Chem.* **13**, 126 (1936).

(2) K. W. Franke, *J. Nutrition*, **8**, 609 (1934).

(3) K. W. Franke and E. P. Painter, *ibid.*, **10**, 599 (1936).

lent weight is 130.5. It decomposes at 263–265°. It is insoluble in alcohol and organic solvents, and is difficultly soluble in water. The selenium in the compound is notably stable.

The fact that all the nitrogen is in the amino form suggests a compound of a simple type. By substituting selenium for sulfur, the simple formula,  $C_7H_{14}N_2O_4Se$ , is derived, which suggests that we may be dealing with an isomorphous combination of two compounds,  $C_7H_{14}N_2O_4Se$  and  $C_7H_{14}N_2O_4S$ , in the ratio of 2 to 1, respectively. Such an assumption is in agreement with the structural formula



Whatever its structure, it appears that we are dealing with a naturally-occurring new type of amino acid of unusual scientific and economic interest.

This report is wholly preliminary. Further work is in progress and the results will be published later in greater detail.

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M. J. HORN  
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## NEW BOOKS

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**Calculations of Quantitative Analysis.** By CARL A. ENGELDER, Ph.D., Professor of Analytical Chemistry, University of Pittsburgh. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1939. viii + 174 pp. 15.5 × 23.5 cm. Price, \$2.00.

This book contains three hundred problems divided into fifteen groups of twenty problems each. The odd-numbered problems are provided with answers and are intended for home assignments. The even-numbered problems are without answers and are intended for class

work, quizzes, or examinations. At the beginning of each section is a short discussion of theory, followed by several examples of typical problems and their solutions. At the end of the book are several tables useful to the student of analytical chemistry.

This book should find ready use in many courses where sufficient emphasis is placed on the solving of problems as a means of learning stoichiometry and other phases of analytical chemistry.

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