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Isolation of (−) S-Methyl-L-Cysteine from Beans *(Phaseolus vulgaris)*

THE recent isolation[1,2] of S-methyl-L-cysteine sulphoxide from two crucifers, turnips and cabbage, and the chromatographic evidence[3] for its occurrence in many related plants suggested the possibility that methyl cysteine should also occur in plants. In addition, preliminary evidence has clearly indicated that the turnip can readily form the sulphoxide from methyl cysteine. A careful examination[3] of the protein and non-protein fractions of several crucifers revealed no methyl cysteine. Previous work[4] on the non-protein amino-acids of bean seeds showed a ninhydrin-reactive spot which gave an iodoplatinate test[5] indicative of the sulphur amino-acids. This material was found on a two-directional chromatogram (phenol : butanol–acetic acid) in a position corresponding to that of methyl cysteine and close to that of γ-amino-butyric acid. This compound has been isolated and identified as (−) S-methyl-L-cysteine.

Dry kidney bean seeds were ground and extracted with 50 per cent alcohol. The extract was treated with mercuric acetate, and the resultant precipitate was separated and decomposed with hydrogen sulphide. After removal of mercuric sulphide, the solution was passed through a column of sulphonic acid ion exchange resin ('Dowex 50-*X*4') in the acid form and the column was washed. The amino-acids which were retained by the resin were fractionated by displacement chromatography with 0·10 *N* ammonia[6]. The fractions containing the unknown material were contaminated with glutamic acid and asparagine. These three compounds were separated by chromatography on a paper roll[7] using 70 per cent ethanol. The unknown material was purified by three crystallizations from 95 per cent ethanol. Approximately 150 mgm. were obtained from 5 kgm. of beans. The isolate was found to be identical with synthetic (−) S-methyl-L-cysteine with respect to infra-red spectra, optical rotation $[\alpha]_D^{25°} = -26°$ ($c = 2·5$), decomposition point (about 220° C.), and paper chromatography in phenol, butanol–acetic acid and collidine–lutidine ($R_F = 0·71$, 0·27 and 0·38, respectively). The elementary analysis of the isolate was C, 35·6; H, 7·0; N, 10·2; S, 23·5. The calculated values are C, 35·6; H, 6·67; N, 10·37; S, 23·7.

The presence of methyl cysteine in legumes and its sulphoxide in crucifers suggests that these two related compounds may have a widespread occurrence in plants. This possibility, coupled with the preliminary evidence of their interconversion, may foreshadow an interesting metabolic role for the methyl cysteine–methyl cysteine sulphoxide system in plants.

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