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S19

Fluorescence EXAFS of Biological Systems at SRS

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A fluorescence detection system consisting of five scintillation detectors has been commissioned recently on an EXAFS station at the world's first dedicated X-ray synchrotron radiation source (SRS). This facility has been established to measure the X-ray fluorescence excitation spectrum of specimens containing small amounts of metal atoms with absorption edges between 1 Å and 3.1 Å. Results recently obtained on copper containing enzymes are presented.

S20

Metal Ion Uptake by Plants of Genus Alyssum

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Some plants of the genus Alyssum are able to accumulate nickel(II). It has been observed that increase in nickel content is accompanied by an increase in the level of malonic and malic acids in the leaves [1]. Indeed crude extracts obtained from the leaves showed the presence of the nickel salts of the above mentioned acids. However, it has been shown these plants also contain a considerable amount of free amino acids, which in principle should also act as ligands of the nickel(II) ion [2]. R. J. P. Williams has suggested that only the presence of ligands containing nitrogen donors can explain the selective uptake for example of nickel(II) over cobalt(II) [3]. We decided therefore to study the mechanism of uptake, transport and accumulation of metal ions by these plants, using the copper(II) ion as a probe. This is because the copper(II) ion can be studied through ESR, a technique which can be applied directly to whole samples (roots, leaves, plants *etc.*) thus avoiding the formation of artefacts.

When the cut roots of the plant are introduced for 1' into a 10^{-4} *M* $CuSO_4$ solution and washed with distilled water the spectrum 1a is observed (Fig. 1).

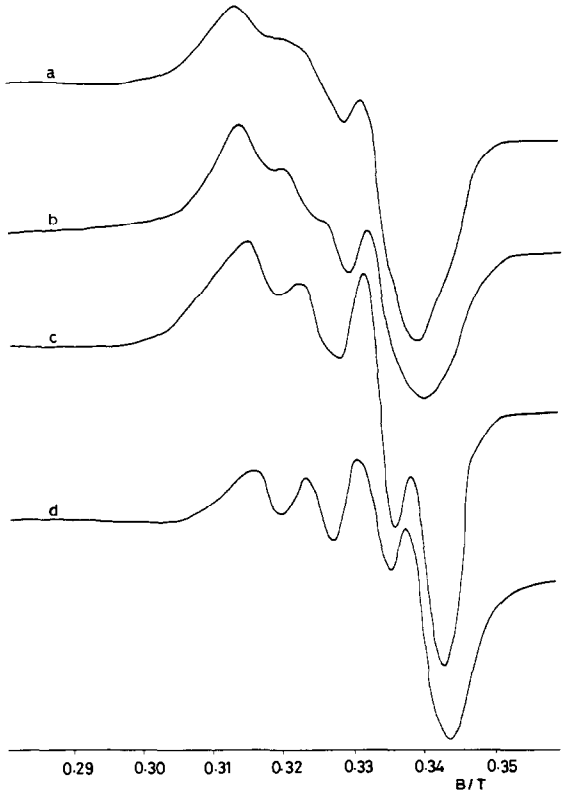

Fig. 1. ESR spectra of plant roots of genus Alyssum after immersion for 1' in 10^{-1} *M* $CuSO_4$ solution followed by immersion in distilled water for (a) 30 s, (b) 1 h, (c) 6 h, (d) 24 h.

This spectrum can be interpreted as the superimposition of the isotropic spectrum of freely rotating aqueous copper(II) with an anisotropic spectrum typical of immobilized copper(II) [4]. This spectrum does not change with time even if the roots are kept in water. If however the roots of an entire plant are