02. STRUCTURAL MOLECULAR BIOLOGY

02.1-12 STRUCTURAL STUDIES OF D-XYLOSE ISOMERASE FROM S. RUBIGINOSUS AT 2.5A RESOLUTION.

E. L. Carrell. The Institute for Cancer Research, The Fox Chase Cancer Center, Philadelphia, Pa. 19111 USA.

The enzyme D-xylose isomerase catalyzes the conversion of D-xylose to xyulose and D-glucose to fructose and is known to require divalent metal ions (Mg$^2+$, Co$^2+$, Mn$^2+$) for activity. The enzyme from Streptomyces Rubiginosus has a molecular weight of 172,840 and consists of 4 subunits of MW 43,210 each containing 388 amino acid residues. The enzyme crystallizes in space group I222 with cell dimensions a=93.86, b=99.06, c=102.90 Å. The x-ray diffraction data has been measured by automated diffractometry to a resolution of 2.5Å.

The study reveals that each subunit consists of two domains, the larger of which is made up of alternating β-sheet and α-helix in the now familiar (βα)2 folding pattern. The details of the refinement of the structure, the secondary and tertiary structure, and substrate and inhibitor binding will be presented. In addition, the role of the metal ions will be discussed.

This research was supported by USPHS grants CA-10925, CA-05697, RR-05593, and CA-22780 from the National Institutes of Health, PCM 810-6532 from the National Science Foundation, and by an appropriation from the Commonwealth of Pennsylvania.

02.1-13 CRYSTALLOGRAPHIC ANALYSIS OF GRIFFONIA SIMPLICIFOLIA LECTIN IV AND ITS COMPLEX WITH A SYMTHETIC LEWIS b BLOOD GROUP DETERMINANT. M. Vandenbolleke, L. T. J. Delbree, J. W. Quail, U. Spohr, and R. U. Lemieux, Departments of Biochemistry and Chemistry, University of Saskatchewan and Department of Chemistry, University of Alberta, Canada.

Lectin IV, isolated from the seeds of Griffonia simplicifolia, is a 58,000 molecular weight glycoprotein dimer which binds to the Lewis b human blood group determinant (αL-Fuc(1→2)3Gal(1→3)αL-Fuc(1→3)βGlcNAc). The nature of this binding has been probed chemically by synthesizing a number of modified tetrasaccharides related to the Lewis b determinant and by comparing their binding properties (Spohr, Hindsgaul, and Lemieux, Can. J. Chem., 1983, 61, 2644-2652). Further information on the recognition and binding will be obtained from the three-dimensional structure of the lectin and its complex with the Lewis b tetrasaccharide.

Crystals of the lectin and also of the complex were obtained from 38-40% saturated ammonium sulfate, 0.1M Pipes buffer, pH 6.2. The crystals are tetragonal, space group P43212 with unit cell dimensions a = 79.4Å, c = 89.1Å. Heavy-atom derivatives of the complex were obtained by cocrystallization of an iodinated derivative of the Lewis b tetrasaccharide with the lectin, and by soaking both the complex and the iodinated complex with dichloro(ethylenediamine)platinum. Intensity data were collected from crystals of the native lectin, crystals of the complex of a tetrasaccharide-lectin and also derivatives of crystals.

Analysis of these data is now in progress. (Supported by the Medical Research Council of Canada and Natural Sciences and Engineering Research Council of Canada).