

Poster Presentation

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Crystal structure of L-ribose isomerase from Cellulomonas parahominis MB426

Y. Terami¹, H. Yoshida², K. Uechi¹, G. Takata¹, S. Kamitori²

¹Rare Sugar Research Center and Faculty of Agriculture, Kagawa University, Kagawa, Japan, ²Life Science Research Center and faculty of Medicine, Kagawa University, Kagawa, Japan

Monosaccharides and their derivatives which hardly exist in nature are so-called "rare sugars". Rare sugars have significance not only in food industries but also pharmaceutical industries. We discovered a novel L-ribose isomerase from *Cellulomonas parahominis* (CpL-Rbl, 249 amino acids), which catalyzes the reversible isomerization between L-ribose and L-ribulose, L-allose and L-psicose, and D-talose and D-tagatose. Since CpL-Rbl has a broad substrate specificity, it is useful for the production of various rare sugars. To elucidate the molecular basis of unique enzymatic properties of CpL-Rbl, we determined its crystal structure. The N-terminal His-tagged CpL-Rbl overexpressed in *Escherichia coli* was purified using a nickel affinity column. Crystals of CpL-Rbl were obtained from a reservoir solution of 0.1 M sodium acetate trihydrate (pH 4.6) with 3.9 M ammonium acetate, by a hanging-drop vapor-diffusion method at 293 K (Space group C2221, $a = 76.8$, $b = 88.6$, $c = 152.3$ Å). X-ray diffraction data were collected up to 2.10 Å resolution using a Rigaku R-AXIS VII on a RA-Micro7HF rotating anode generator (40 kV, 30 mA) at 100 K. The structure was solved by a molecular replacement method with a structure of *Acinetobacter* sp L-ribose isomerase (4NS7) as a search model, and refined to R-factor of 0.227. CpL-Rbl had a cupin-type beta-barrel structure, and the catalytic site was found between two large beta-sheets with a bound metal ion (Fig. 1). There were two protein molecules in an asymmetric unit, forming a homo-dimer with a non-crystallographic 2-fold symmetry (Fig.1). Furthermore, the PISA server showed that two dimers in crystal were associated to form a stable tetramer. Complex structures with substrates, L-ribose, L-allose and L-psicose, were also successfully determined. We will discuss a broad substrate specificity and catalytic reaction mechanism of CpL-Rbl based on its three-dimensional structure.

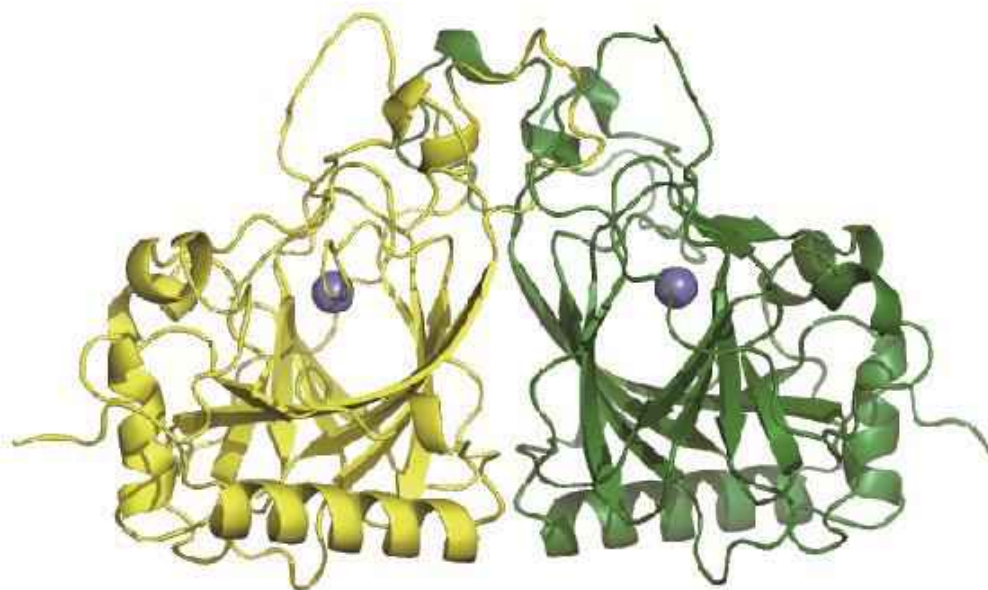


Fig. 1. Dimer structure of CpL-Rbl.

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