

Original Article

## Comparison of Molecular Packing between Two Kinds of Hen Egg-White Lysozyme Orthorhombic Crystals

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### Abstract

The crystal packing of two orthorhombic crystal forms, I and II, of hen egg-white lysozyme (E.C. 3.2.1.17, HEWL) that appeared at growth temperatures under 293 K and of 310 K, respectively, was studied. The form I crystal, whose crystal packing was newly investigated in this paper, was crystallized not only in a microgravity environment but also on Earth. The crystal packing of the space-grown crystals at 293 K proved to be very similar to those of the corresponding earth-grown form I crystals at 277 K and 293 K, but it was significantly different from that of the form II crystal grown at 310 K. These two orthorhombic crystal forms had a common repeating unit consisting of two molecules, but the molecular arrangement of this unit differed substantially between the forms. Crystal in a microgravity field seems to grow by the same mechanism as the form I crystal grown on Earth. To explain the difference seen for the form II crystals, we propose a molecular-growth mechanism for HEWL orthorhombic crystals on the basis of the hydrophobic interaction. Further, we hypothesize that the protein molecules are incorporated into the crystal nuclei to complete the common molecular contact, and so the growth unit is a monomer.