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Structure of proteins and their crystal forms

Krystyna Majcher

The paper presents possible correlation between symmetry of protein crystals and the internal symmetry of oligomeric protein molecules. Characteristic properties of protein crystals and allowed symmetry elements are discussed. It is supposed that the tendency to conserve the internal symmetry of protein molecule (if present) should be the governing rule in forming protein crystals rather then the tendency to achieve the maximal packing of molecules in crystal lattice. An oligomeric protein with symmetrical molecules should crystallize in the space group allowing the molecules to be localized in special positions on appropriate crystallographic symmetry elements (axes). However, a survey of 83 published protein crystal structures showed, that only about 50% of oligomeric proteins conforms to this supposition. For these proteins the structural identity of subunits is obvious. High resolution X-ray analyses revealed in several cases that molecules of proteins not localized on crystallographic symmetry elements are devoid of exact symmetry and their subunits are in fact non-identic al in their conformations. It seems that this non-identity is caused by forces responsible for subunit-subunit interactions or by different modes of ligand binding.