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BAG Barcelona – Plant Catalases

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Report:

Catalases have been studied for almost a century and the three-dimensional structure of six heme containing catalases have already been solved at almost atomic resolution. The only catalase clade whose structure remains undetermined is the one from plants. Catalase catalyses the degradation of small peroxides to O₂ and H₂O. However, the enzymatic mechanism remains unclear mainly because structural information about complexes is very limited. For hydrogen peroxide the speed of reaction is close to the diffusion limit, in spite the active centre been deeply buried inside the molecule. Both the folding and the subunit organization in catalases is unique. In most catalases oligomerization appears to be triggered by the entrance of the heme group.

Small tetragonal crystals (.1 mm in the largest dimension) of apo catalase (lacking the heme cofactors) from pea have been obtained and characterize as tetragonal (110.7, 110.7 203.6 Å, space group P4_x22). A data set (with a 61% completeness) was collected at the ESRF to 3.0 Å, though diffraction could be seen till about 2.5 Å resolution.

Attempts to increase the crystal sizes and the crystallization of the holoenzyme is now in progress.