

Biological Sciences Program

Written by Administrator

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The “Holy Grail” of structural biology is the determination of the molecular structure of a biomolecule without first obtaining a high-quality three-dimensional crystalline sample of the material for X-ray crystallographic analysis. X-ray crystallography has provided the basis for most of the advances in structural biology over the past eighty years through the amplification of diffracted signal afforded by a periodic crystalline structure. While this form of structural analysis is now regarded as a routine technology, it is the formation of suitable crystals of these biological molecules that presents the greatest obstacle to sustained progress. The most elusive of all crystalline samples are also amongst the most significant from a pharmacological perspective: the membrane proteins. These tend to form either nanocrystals or two-dimensional quasi-periodic structures. These systems are of such biological significance that substantial investments of resources in the development of special structural characterisation techniques are warranted.

Apart from the production and handling of suitable membrane protein samples, the Biological Sciences Program will produce and process contrast-enhanced samples for cellular imaging. Some progress has already been made in this direction by applying coherent diffractive imaging techniques to the imaging of malaria-transfected blood cells. The immediate aim is to obtain a more detailed picture of functionalities within cells by direct observation using X-ray diffractive imaging than is currently available from simple models. This is an essential step along the road to biomolecular imaging.