

SELF-ORGANIZED SUPRAMOLECULAR ARCHITECTURES

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Supramolecular chemistry aims at constructing highly complex chemical systems and advanced materials by designing arrays of components held together by intermolecular forces. The implementation of molecular recognition and information offers means for controlling the evolution and the architecture of supramolecular entities and of organized phases as they spontaneously build up from their components through self-organization. Numerous supramolecular entities of organic and inorganic nature have been generated. The investigation of their properties has made use of various physico-chemical methods. In particular, X-ray crystallography has played a major role in acquiring firm data about the structure of these species, information of crucial importance for understanding both their mode of formation and their properties. Several such self-organization processes and the entities they generate will be described.

General References

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**MAX PERUTZ-CRYSTALLOGRAPHER, CHEMIST, BIOLOGIST
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In 1936 Max Perutz began his crystallographic research in Cambridge on haemoglobin, a large protein molecule containing two α and two β subunits, each with a haem to which oxygen binds reversibly and cooperatively. Haemoglobin's function is to bind oxygen in the lungs and release it to the tissues, essential for efficiently fuelling animal cells. Max Perutz knew that x-ray analysis could reveal the protein's chemistry and structure though not for years.

It took almost 20 years to get the 5.5 Å map of met-haemoglobin, the oxygen binding form; later the deoxygenated form was solved. The subunits had essentially the same structures but their tetrameric organisation was different. Remarkably, Monod, Changeux and Wyman published about then, a model for cooperative binding based on two states: T (low affinity) and R (high affinity). These corresponded to the deoxy- and oxy or met-haemoglobins. By 1970 the deoxy and met-haemoglobins were solved at 2.8 Å, revealing how the Fe on oxygenation triggered the structural changes from the T-state to the R-state.

Max Perutz was now able to examine haemoglobin's molecular pathology. His passion for understanding haemoglobin's behaviour never weakened and he responded vigorously to any questions concerning this. There was space however for other interests - his last papers were on leucine zippers and amyloid fibres. Finally, Max Perutz for all his concentration on research, wrote and spoke out clearly on scientific and on social issues providing a splendid example of public commitment to science and society.

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