

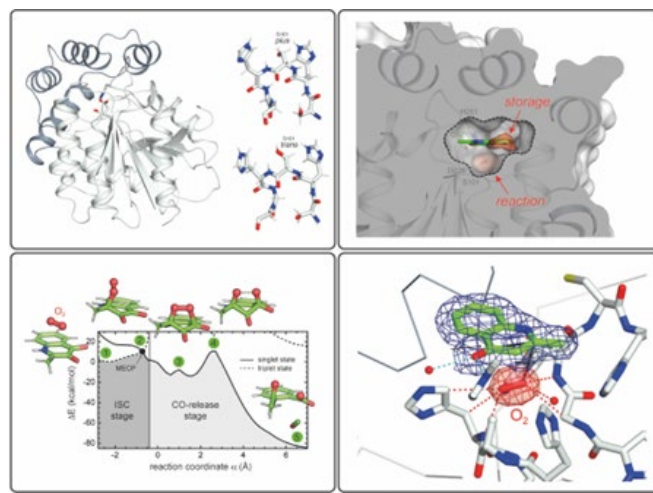
Dipartimento di Biotecnologie e Bioscienze – UNIMIB

Friday, March 15, 2024, 4:30 p.m., U3-BIOS building, room U3-09 / Webex

Evolutionary adaptation to oxygenolytic catalysis

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Abstract: The ‘great oxidation event’ that occurred about 2.4 BYA led to the permanent accumulation of O₂ in the atmosphere, putting significant evolutionary pressure on many organisms. Adaptation led to the appearance of novel enzymes able to take advantage of this new molecule and its electron-acceptor capabilities. However, other O₂-utilising enzymes evolved from classes whose original functions were unrelated to dioxygen chemistry.

A group of bacterial dioxygenases belong to the very common α/β -hydrolase (ABH) fold superfamily that typically does not catalyse oxygenation reactions. These enzymes degrade their *N*-heteroaromatic substrates in a cofactor-independent manner relying only on the simple nucleophile-histidine-acid catalytic toolbox that is well known from classical biochemistry textbooks. In this talk I will discuss our integrated approach featuring hyperbaric crystallographic work, molecular simulations and quantum mechanics calculations to explain how evolution has repurposed the ABH-fold architecture and its basic catalytic machinery to accomplish spin-restricted metal-independent oxygenation.

Host: **Marco Orlando**

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