Obtaining crystals and solving the phase problem remain major hurdles encountered by bio-crystallographers in their race to get new high-quality structures.

The crystallophore, Tb-Xo4, is a lanthanide complex formed from a molecular cage chelating a terbium atom [2]. We will present the results obtained on about fifteen proteins which show that Xo4 induces unique crystallization conditions and promotes new crystal packing showing that Tb-Xo4 acts an efficient nucleating agent. The crystalline forms promoted by the crystallophore bypass crystal defects often encountered by crystallographers such as low-resolution diffracting samples or crystals with twinning.

We will also present few examples of Tb-Xo4 phasing properties [1,2,4], showing, in particular that the crystallophore is compatible with serial crystallography approaches.

Finally, the versatility of the interactions between Xo4 and the surface of proteins explains its exceptional properties [3] making this molecule a unique tool for simultaneously solving the two major locks of biocrystallography.