**Poster**

# Crystallographic and functional studies of Kp-lin, a nano-sized protective cage from *Klebsiella pneumoniae*

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*Klebsiella pneumoniae* (Kp) is a sepsis-inducing dangerous nosocomial pathogen, which causes life-threatening infections. Its success is due to an arsenal of tools acquired through multiple resistance mechanisms [1,2]. In this work, we structurally characterised by X- ray Kp-lin, an encapsulin from *K. pneumoniae*. The crystal structure and the biophysical studies show that Kp-lin is a protein cage of 24 nm diameter with an icosahedral structural organisation which recalls that of virus capsids. Using the nomenclature adopted for viruses, protein subunits that form structural units define a triangulation number (T) as the number of structural units per face of the icosahedron. Kp-lin adopts a superstructure with T=1, in which one structural unit (composed of three monomers) create each of the 20 icosahedron faces. In an easier visualisation, 12 pentamers repeat in space with 3-fold symmetry, in a football ball-fashion. Through bioinformatic analyses, we also show that Kp-lin acts as a cargo loading cage. Indeed, it presents in the same operon a gene upstream of that encoding for Kp-lin, that encodes for a Dyp-type peroxidase (here Kp-Dyp) which shares 53.4% identity with the encapsulated DyP-type peroxidase from *Mycobacterium smegmatis* [3]. The work presented provides structural basis of compartimentalisation of Kp-Dyp peroxidase, as a protective mechanism for a sensitive enzyme.

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[2] Mulani MS, Kamble EE, Kumkar SN, Tawre MS, Pardesi KR. (2019) *Front Microbiol*. 10:539

[3] Tang Y, Mu A, Zhang Y, Zhou S, Wang W, Lai Y, et al. (2021) *Proc Natl Acad Sci U S A.* 2021;118(16):e2025658118