

Figures/Preliminary Data

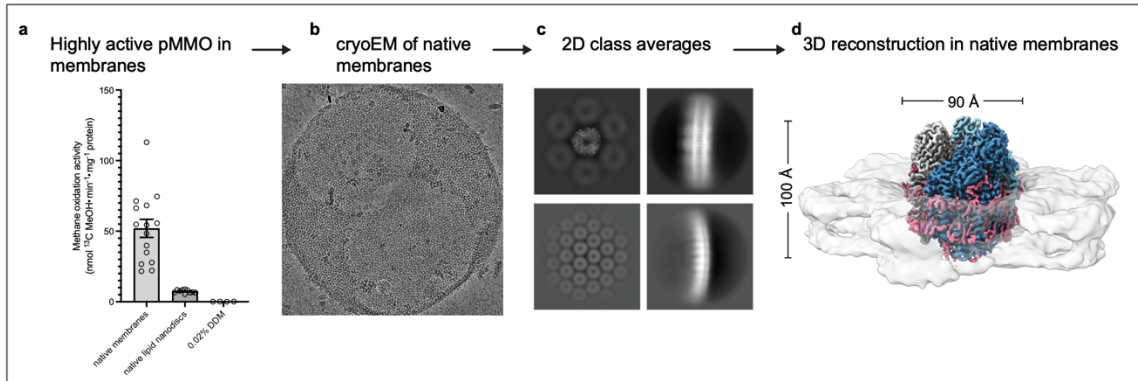


Fig. 1 | In situ single particle cryoEM of *M. capsulatus* (Bath) pMMO in native membranes.

a) High methane oxidation activity of pMMO in native membranes as compared to purified samples. **b)** Representative cryoEM micrograph of pMMO in native membranes, showing individual particles. **c)** 2D class averages showing side-on and top-down views of pMMO in membranes, including hexagonal pMMO arrays. **d)** 3D reconstruction of pMMO in the native membrane array showing the C3 symmetrical protomers of pMMO in blue, light blue, and gray. Lipid densities and densities not corresponding to the pMMO subunits are colored pink, and the low-resolution densities corresponding to the surrounding pMMOs in the hexagonal array are shown in transparent gray. Results are in review for publication.

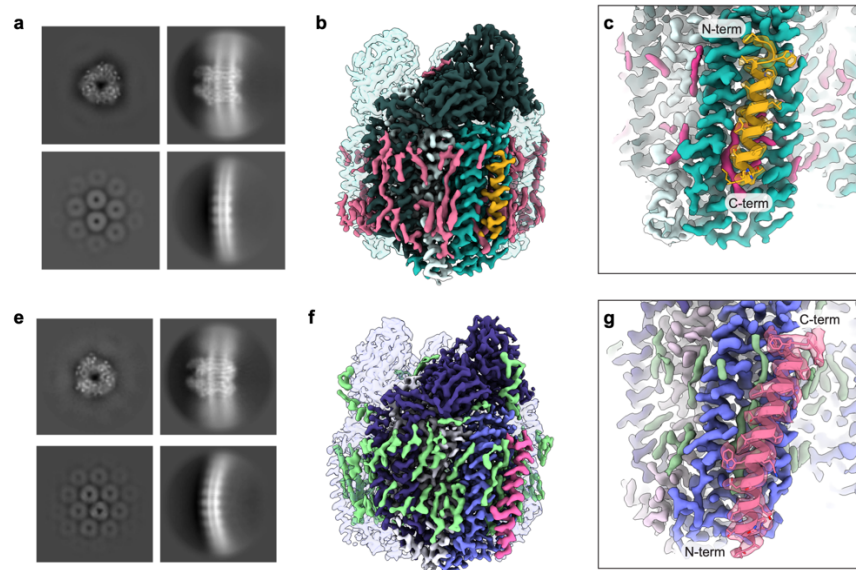


Fig. 2 | In situ structures of pMMO from *M. sp. Rockwell* and AMO from *N. europaea* identify supernumerary helices. **a)** 2D class averages and **b)** 3D reconstruction of pMMO at 2.48 Å resolution. Canonical pMMO subunits are shown (dark green, light blue, teal) along with lipid densities (pink) and **c)** a supernumerary helix identified by its high-resolution density (gold). **d)** 2D class averages and **e)** 3D reconstruction of AMO at 2.77 Å resolution. Canonical AMO subunits are shown (dark purple, light gray, purple) along with lipids (green) and **f)** a supernumerary helix identified by its high-resolution density (pink). Results are in review for publication.

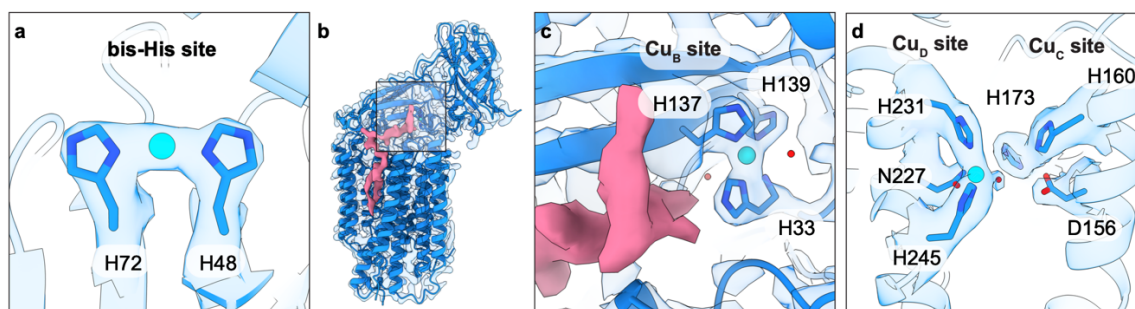


Fig. 3 | pMMO copper centers and regions of interest at high resolution as engineering targets. pMMO is shown in blue with transparent density corresponding to the 2.42 Å cryoEM map and copper ions shown as cyan spheres. **a)** The bis-His site. **b)** An unidentified membrane density shown in pink interacting with **c)** the Cu_B site. **d)** The Cu_C and Cu_D sites which comprise the active site for methane oxidation. Results are in review for publication.