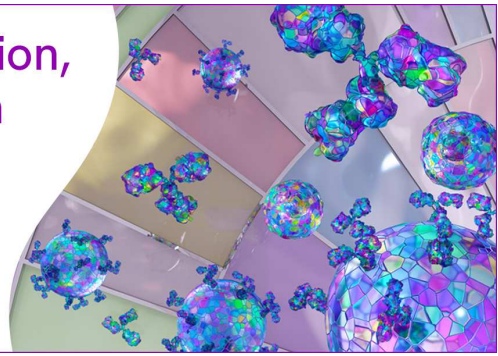


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Discovery of a toxin for skin immune defense in African lungfish

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African lungfish estivate every dry season to survive unfavorable environmental conditions. The estivation process is associated with a drastic remodeling of the skin characterized by severe inflammation, granulocyte infiltration, epithelial damage and stem cell depletion which ultimately lead to formation of a cocoon with potent antimicrobial functions. We recently identified a novel toxin molecule that can be detected in the lungfish mucus and cocoon using proteomics. There are two genes in the African lungfish genome encoding for this toxin, one with six exons and the segmented duplicated gene with five exons. The toxin is also found in the Australian lungfish genome as a single exon molecule but appears to be lost in South American lungfish. Our studies show that dermal stem cells express this toxin at the steady state. Upon estivation, toxin mRNA levels are upregulated up to 200-fold and immunofluorescence microscopy shows it co-localizes with extracellular trap markers. 3D structure modeling predicts a pore-forming delta-endotoxin with potential insecticide functions. Current experiments are trying to elucidate the biological roles of this new toxin in the lungfish skin during freshwater and estivating stages.