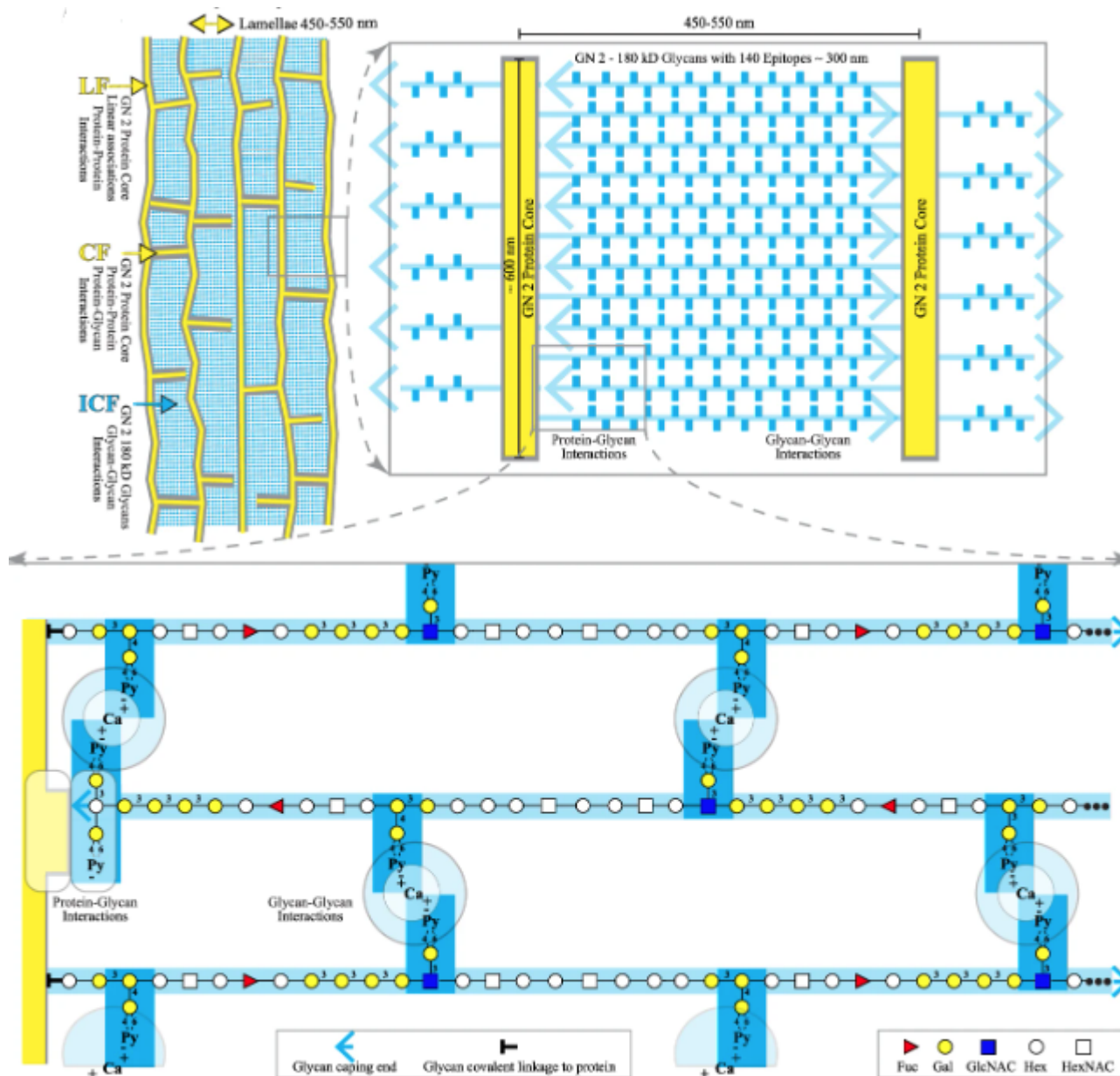


The native glyocalyx ultrastructure in humans and sponges is a self-assembled, lamellar micro- and nanoarray

## Description

Mucin, proteoglycan, glyconectin, and hyaluronan intermolecular binding in the physiological hydrated state forms the native glyocalyx ultrastructure via the polyvalent interactions of their similar bottle-brush morphologies. This ultrastructure provides a variety of essential cellular recognition adhesion and selective filtration functions. Unfortunately, the glyocalyx architecture was only examined in the non-native dehydrated/fixed state for decades. This has resulted in the visualization of an artefactual unorganized fiber mesh, hindering understanding structure-function relationships. The authors unveil a well-organized glyocalyx lamellar ultrastructure using cryo-SEM after cryo-preservation with minimal sublimation to conserve water and ion distribution and, thereby, native intermolecular interactions. The glyocalyx of human cells and the glyconectin glyocalyx of an evolutionary distant sponge displayed similar self-assembled ultra-structures comprising hierarchical micro- and nanoarrays despite compositional differences. AFM binding strength measurements and cryo-SEM results imply that evolutionarily preserved glyocalyx morphologies are formed by thermodynamically driven self-assembly of glycoconjugates with similar physicochemical properties.



Glycocalyx ultrastructure model of in vitro self-assembled glycoconnectin 2 (GN2) from the *Porifera Halichondria Panicea* , lamellar nanofiber network

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