

Investigation into the horizontal arm motion in brittle stars (Echinodermata: Ophiuroidea)

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Brittle stars are among the most active and fastest moving echinoderms. They have the ability to show complex locomotory behaviors and use their flexible arms to produce a coordinated movement. Despite the interest in their movement, little is known about the intra- and interspecies variation in arm flexibility and movement. We performed a two-dimensional (2D) image processing on horizontal movement of three ophiuroid species (*Ophiolepis superba*, *Ophiocoma scolopendrina*, *Macrophiothrix hirsuta*), using two novel parameters, 'sinuosity' and 'slip angle', in a biological context to infer the ophiuroid movement and flexibility. The result illuminated the variability of individual arm use in the studied species. In addition, an investigation on relationship between morphological structure and its function showed that arm length and the extended keel in vertebrae can play a role in angle direction and flexibility of ophiuroid arms.

Functional Morphology

Morphofunctional analysis and comparison of the stone canal in Holothuroidea

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Among the least known organ of the echinoderm stand the stone canal. This organ is constituted in two parts with a long peduncle and an embossed madreporite. The stone canal is part of the ambulacral system and is connected with the exterior in most of Echinoderm. Nevertheless, this is not the case for most of Holothuroidea which have a madreporite floating in the main cavity. The morphology and the function of the stone canal of Asteroidea and Echinoidea have been investigated in the past two centuries, but no agreement have been fixed through the function of this organ. Most of the time he is describe as a pressure manager with inflow made by cilia on the surface of the madreporite. An excretory function has been also hypothesized but more recently a bidirectional flow is suspected. All this hypothesis has never been made investigated on sea cucumber. To have a better understanding of the morphology of this organ in Holothuroidea, 6 species of holothuroids have been analyzed through biometrics measures, classical histology, SEM and EDX. The analysis of the function of the organ has been pursued with in vivo experiences by placing fluorescent microbeads near the madreporite and by injection of charcoal directly into the ambulacral system. The structure of the organ is different between order of sea cucumber and actually even between species. Many difference are observable with some species having lacunar madreporite where other species have porous madreporite. The ciliation inside the peduncle show asymmetric canal ciliation which induced a potential bidirectional flow as suspected. This potential function have been strengthen by in vivo analysis where microbeads were found following two way flows.

Functional Morphology