Modern holothurian calcareous ring anatomy and stereom structure – the need for more detailed studies and research *[poster presentation]*

Mike **Reich**[1,2] & P. Mark **O'Loughlin**[3]

[1]*Georg-August-Universität Göttingen, Museum, Sammlungen & Geopark, Goldschmidtstr. 1-5, D-37077 Göttingen, Germany; E-mail: mreich@gwdg.de*

[2]*Georg-August-Universität Göttingen, Abt. Geobiologie, Goldschmidtstr. 3, D-37077 Göttingen, Germany*

[3]*Marine Science Department, Museum Victoria, GPO Box 666, Melbourne 3001, Australia; E-mail: pmo@bigpond.net.au*

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Of the five extant classes of echinoderms, the sea cucumbers have by far the poorest fossil record, largely because their skeleton is usually reduced to microscopic elements loosely distributed inside a collagenous integument. The group,

however, is diverse, with approximately 1,450 described species that can be found living in most marine habitats. Diagnostic calcitic ossicles of holothurians extend back to at least the Middle Ordovician (465 Ma), although only a handful of Lagerstätten yielding body fossils are scattered throughout the remaining Phanerozoic. The other diagnostic characteristic of sea cucumbers is the calcareous ring (cr), a defining feature, which is possessed by nearly all modern holothurian species. The cr supports the pharynx, the anterior section of the water vascular system and provides points of attachment for the longitudinal and (if present) retractor muscles; furthermore, it is known that in some groups, a notch or a perforation in radial elements is present for the passage of radial nerves. However, almost nothing is known about the 3D-morphology and the stereom structure of the holothurian calcareous ring; similarly, the evolutionary origin of this structure is also uncertain. According to taxonomical studies on modern holothurians, the cr is considered to be highly important because of major differences in the calcareous rings of the various orders and/or families. There are a few reports on fossil calcareous ring elements, but this structure was nearly completely neglected by palaeontologists. Isolated fossil calcareous ring elements were mostly misinterpreted as aberrant ossicles or 'fused side shields' of ophiuroids. However, this structure offers more information, but this can only be deduced through a better '3-D' understanding of the calcareous ring of modern sea cucumbers, which is still largely missing.

Here we offer preliminary results from detailed studies of hard parts using X-ray computed tomography and scanning electron microscopy of members (> 15 species) of the Apodida (Chiridotidae, Myriotrochidae), Aspidochirotida (Holothuriidae, Synallactidae), Dactylochirotida (Ypsilothuriidae), Dendrochirotida (Cucumariidae, Psolidae), Elasipoda (Elpidiidae, Laetmogonidae), and Molpadiida (Caudinidae, Eupyrgidae, Molpadiidae).