to Bernoulli's principle, a pressure gradient develops as current moves over the convex-up shell. In the presence of a drill hole, the pressure gradient may drive water through the hole from the inside to the outside lessening the pressure on the shell. The position of the drill hole on a shell also affects its hydrodynamic properties: a lower entrainment velocity of upstream facing umbonally drilled shells compared to centrally drilled ones. Possibly fluid flowing into the shell through the drill hole creating turbulence within may reduce entrainment velocity. Our study reveals that these factors could contribute to a significant taphonomic separation of bivalve shells.

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Freies Thema

The evolution of pedicellariae in echinoids: an arms race against pests and parasites

Simon E. Coppard[1], Andreas Kroh[2] & A.B. Smith[3]

Sea urchins have evolved a diverse array of jawed appendages termed pedicellariae to deter pests and predators. Pedicellarial structure and function is reviewed and their distribution mapped in 75 extant genera. Using a phylogeny of echinoids at family level constructed from 353 skeletal characters scored across 162 extant and fossil taxa, the evolution of pedicellarial form and function is reconstructed. For much of the Palaeozoic echinoids possessed a very restricted pedicellarial armament, and the establishment of a diverse array of pedicellarial types by the early Mesozoic implies that the threat from predators and pests markedly increased at this time. Since the Triassic, echinoids have continued to improve their defensive capability by evolving more effective venom delivery in globiferous pedicellariae, developing spatulate-tips and curved blades for a more efficient grab in tridentate pedicellariae, and stouter, more robust valves with a stronger bite in ophicephalous pedicellariae to disable and remove ectoparasites. However, pedicellarial types are shown to be particularly prone to subsequent secondary loss, especially amongst infaunal echinoids, and thus have higher homoplasy levels than other phylogenetically useful skeletal structures.

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Virtuelle Paläontologie

Comparative Computer Tomography of *Crocuta crocuta spelaea* and Recent Hyaenids

Martin Dockner[1]

The computer tomography enables the author to present a picture of the nearly inaccessible cranial cavities of hyaenid skulls. The main interest was centered on the paranasal sinus which through its size represents a special skull trait in hyaenine hyaenids compared to other carnivores. Through digital visualisation, volume data could be acquired about the endocranial and the sinal cavities of the analysed specimens.
Computer Tomography allows non-invasive and comparative imaging of the hyaenid skulls. The author aims at comparing (a) size of the skull and (b) volume of paranasal sinuses and cranial cavities in recent hyaenids and extinct *Crocuta crocuta spelaea*. Three dimensional surface models and volume measurements of paranasal sinuses show a broad range, whereas cranial cavity volume (and thus brain size), was expanding with growing skull size in all specimens as expected.

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