BIOLOGICAL BASIS FOR TAPHONOMIC PATTERNS IN THE TRILOBITE FOSSIL RECORD

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Appreciating the biological component of taphonomic patterns is necessary for accurately interpreting the mode of formation of fossiliferous assemblages. This study documents taphonomic patterns in three Late Ordovician trilobite genera (Flexicalymene, Isotelus, Ceraurus) and identifies four biological factors that affect incorporation of trilobite exoskeletal elements into the fossil record:

1) Exoskeletal architecture. Recurring patterns of displaced tergites and points of disartiuclation indicate differential susceptibility of the exoskeleton during ecdysis, and presumably also during decay of a carcass. Disolcations are most common at articulation points, e.g., between cephalon and thorax, among thoracic segments, and between the thorax and pygidium. There is no evidence that facial sutures were lines of weakness except during ecdysis.

2) Exoskeletal thickness. Thickness is a better predictor of preservation potential than the position, shape, function, or size of a tergite. For example, Ceraurus and Flexicalymene have hypostomata of similar shape and size, but the thicker Ceraurus hypostoma is more frequently preserved (or at least identified) than the thin ventral plate of Flexicalymene.

3) Ecdysis. Molting potentially releases the greatest number of trilobite tergites to the fossil record. Molt ensembles are recognized by recurring assemblages of tergites (e.g., thoracopygidia, cephalothorax, multiple thoracic segments) although individual elements (e.g., hypostomata and librigenae) are shed as well. Distinguishing individual molt elements from tergites disarticulated via scavenging or post-mortem transport of carcass or exuvia is problematic. Ecdysis often releases intact exoskeletal elements: most breakage probably occurs later, during post-ecdysial transport or scavenging of the exuvia.

4) Predation/scavenging. These effects are characterized by broken (vs. disarticulated) exoskeletal elements. The impact of these processes on the trilobite fossil record is difficult to assess: sublethal wounds are easiest to recognize, the product of successful predation/scavenging is most often unidentifiable comminuted trilobite debris. The products of successful predation/scavenging are identified as such indirectly by their association with the remains of possible predators or by their presence in coprolites.

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