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Parasitism in Jurassic belemnites: examples from the upper Callovian of southern Poland

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Deformation in specimens of *Hibolithes hastatus* and *Rhopaloteuthis* spp. are documented from the upper Callovian Lamberti Zone of the Ogrodzieniec quarry, southern Poland. A specimen with hook-shaped bending is assigned to forma hamata, whereas other specimens with local thickening of the rostrum are assigned to another paleopathy, forma bullata. The absence of any external injury corroborated by high-resolution computed tomography suggests parasitism as the most probably cause for shell deformation. Identification of a specific parasite taxon is, however, hampered by the fact that parasites are typically small-bodied (submillimeter) and generally lack biomineralized hard parts. We argue that different parasites can leave similar traces and taxonomically distant parasites can inflict similar symptoms on their hosts due to convergence in the evolution of host-exploitation strategies. and microtomography offers a non-destructive way to analyze such structures in belemnite rostra. We show that the scan-based evidence provides a clearer picture of the internal structure of the paleopathy and suggests that the Keupp's classification of paleopathies based only on external features might lead to false inferences of their formational mechanisms.

Key words: Belemnitida, *Hibolithes, Rhopaloteuthis* , paleopathy, parasite, Callovian, Poland.

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