Lower Cambrian trace fossil evidence for predation on trilobites

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Predation upon trilobites previously has been inferred from large coprolites containing trilobite fragments, and from specimens of trilobites with healed wounds. The discovery of large burrows (*Dolopichnus gulosus*, n. ichnogen., n. ichnosp.) in micritic quartz arenite of the Lower Cambrian Poleta Formation in Esmeralda County, Nevada, suggests that sea anemones preyed upon trilobites. *Dolopichnus* n. ichnogen., vertical cylindrical burrows with a central cylindrical core, is interpreted as dwelling burrows of sea anemones. In the specimens studied, the core contains coarser-grained material, and in one series of burrows, is composed of trilobite fragments and micrite pellets, cemented with sparite. The central cylinder is interpreted to be a cast of the sea anemone's coelenteron, which in some specimens contains stomach contents.

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Lower Cambrian rocks of southern Esmeralda County, Nevada, contain large burrows that indicate sea anemones preyed upon trilobites. The locality (Locality 52 of Stewart 1970:173; UCLA Locality 6164) is in the NE 1/4 of sec. 33 and NW 1/4 of sec. 34, T. 6 S., R. 42 E. (unsurveyed), Mount Jackson, Nevada quadrangle (USGS 7.5 minute, 1968), about 4.5 miles S 9° E of the junction of State Routes 3 and 71, in the hills northeast of Mount Dunfee. The burrows are present in two quartz arenite beds of the quartzite unit of the Upper Member of the Poleta Formation (Middle Member of Stewart 1970:59), 55 feet and 110 feet below the base of the upper limestone unit. Trilobite fragments occur in the burrows of the upper bed.

Similar burrows were observed in the same unit of the Poleta Formation on the west side of Eureka Valley, Inyo County, California (Locality 3 of Stewart 1970:71), and are reported from the Upper Member of the Wood Canyon Formation (Lower Cambrian) in the Nopah Range, Death Valley area, California (Langille 1974).

The abundance of trilobites in the early Paleozoic is well established, but there is only sparse evidence suggesting the presence of their predators. Large coprolites containing trilobite fragments have been reported in the Lower Cambrian of New Brunswick by Matthew (1891:154–155; summarized by Dawson 1894: 50–51). Matthew suggested that squids were responsible for the coprolites (and for other markings, now interpreted as inorganic) and that they preyed upon trilobites, which had spines for protection against such predators. Additional coprolites, 5 and 9 cm wide, have been reported by Durham (1971) in the Lower Cambrian Poleta Formation of the White-Inyo Mountains, California.

Predators may have inflicted wounds on trilobites, and several examples of trilobites with healed wounds are known (Harrington 1959:O107). An additional case has been found in the Lower Cambrian Latham Shale at Cadiz, California, where a specimen of *Paedeumias clarki* Resser (Fig. 1) lost a part of the left side of its cephalon; the wound healed, with the anterior margin inflected inward.

The large dwelling burrows described below indicate that Early Cambrian sea anemones were sessile predators of trilobites.

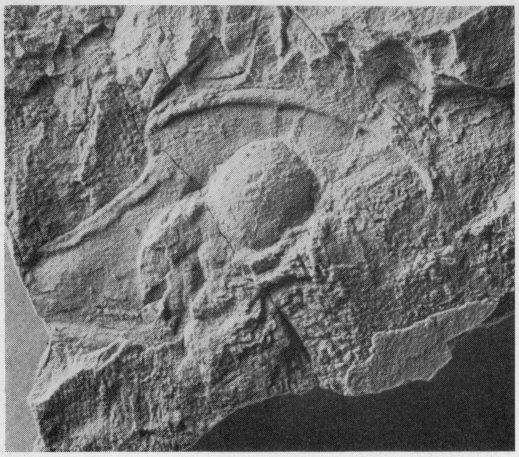

Fig. 1. Paedeumias clarki Resser, exhibiting healed wound on left side of cephalon. UCLA 49507. Collected by T. R. Fairchild from Latham Shale, Cadiz, California, UCLA Locality 3376. ×3.

Dolopichnus gulosus n. ichnogen., n. ichnosp.

Figs. 2–6.

Holotype. – UCLA 49508, Figs. 3A, B.

Paratypes. – UCLA 49509–49511, Figs. 4–6.

Name. – From the Greek *dolopos,* ambusher, plus *ichnos,* and the Latin *gulosus,* greedy, gluttonous.

Morphologic description

Large, vertical burrows are expressed as circular depressions randomly distributed on exposed bedding surfaces of quartz arenite of the Poleta Formation (Fig. 2). Two or more burrows are commonly in contact. The burrows are cylindrical to slightly conical, and 20–50 mm in diameter, most commonly 25 mm. The maximum height observed is 200 mm. Laminae in the quartz arenite bend downward around the burrows (Fig. 5A), and form concentric rings around the burrows on the upper bedding surface (Fig. 3B), making the burrows appear larger than their actual diameter.

The bottom of one large burrow (Fig. 3A) is a flattened hemisphere with concentric impressions and a shallow central depression, as in the genus *Bergaueria* Prantl (Alpert 1973).

A central, vertical, internal cylinder about 10 mm in diameter and up to 120 mm in height occurs in the burrows (Figs. 4A, B; 5 A, B; 6). The cylindrical core is distinct from the surrounding burrow, has a smooth wall, extends up to the top of the burrow, and may protrude as a small mound on weathered bedding surfaces (Figs. 2, 5B, 6). The central cylinder is bulbous or indistinct near the bottom of the burrow.

In the burrows of the upper bed, the central cylinders contain abundant trilobite fragments

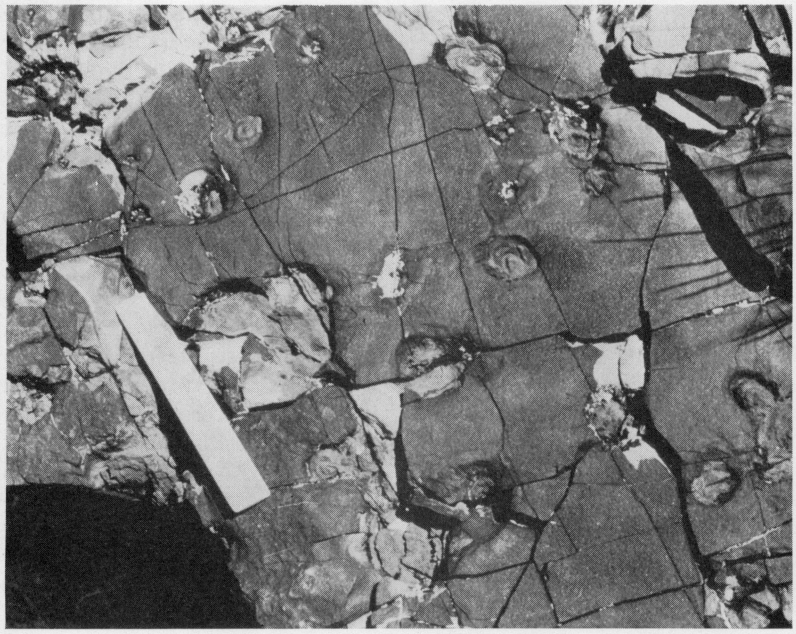

Fig. 2. Numerous burrows of *Dolopichnus gulosus* on upper bedding plane in quartzite (upper bed with burrows) of Poleta Formation. A cluster of burrows occurs to the right of the scale (scale is 15.5 cm long). Approx. ×0.2.