Ontogenetic transformations and re-interpretation of Ediacaran Trilobozoa

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One of the most noticeable groups of Precambrian Metazoa is trilobozoans (Trilobozoa Fedonkin, 1985 s.str. along with informal synonyms Tribrachiomorpha and Triradialomorpha). Their remains are common in marine sedimentary sediments of Australia and Vendian of Eastern Europe. To date, 6 monospecific genera of Trilobozoa have been described. These were small organisms, with a body diameter up to 4 cm and a height up to 5 mm. The shield-like body of trilobozoans consisted of three identical lobes (antimeres) located around the central axis which goes through the top of the shield. An extensive network of grooves separated by ridges covered the shield from the upper side. The classic Ediacaran organism, *Tribrachidium heraldicum*, is one of Trilobozoa. It had strongly curved antimeres and the appearance of a regular three-lobed swastika (migi mitsudomoe, figure). A separate cluster of grooves of the outer surface and an elongated inner cavity belonged to each antimere of *Tribrachidium*. The grooves of one cluster diverged from a small area at the top of the shield and were divided multiple times on the way to its edge. One of the ends of the internal cavity approached the same area and supposedly opened here, and this way became connected with the grooves. The branched grooves, which evenly covered the outer surface of the shield, could be lined with ciliary epithelium and form an organ responsible for collecting and transporting food. The elongated internal cavities associated with this net of grooves are considered digestive. Microparticles suspended in water could be a trilobozoan food item.
We can observe an interval of individual development of *Tribrachidium* in the preserved fossil remains. Thus, in the size interval up to 2 mm, the outer surface of the shield was smooth, and the inner space was not differentiated. While the disc diameter was from 2 to 4 mm, the internal cavities, the ridges of the sculpture, and, accordingly, the grooves of the outer surface appeared. In the interval from 4 to 5 mm, distal parts of the internal cavities were formed. Then, with growth in diameter up to 15 mm, the number of furrows and their branches increased. Further, up to the largest sizes, significant changes in the morphology of the disc did not occur. The sharp change in morphology that occurred at the beginning of the observed interval of ontogenesis can be associated with a change in the feeding method from the absorption of nutrients by the body surface to the capture of particles from the water column and their digestion in the internal cavities. Fossil remains of Trilobozoa are preserved *in situ* in the localities. However, some samples show signs that trilobozoans were not attached organisms. The loose attachment of *Albumares* to the substrate is indicated by specimens with one of the antimeres raised above the fossilization plane. Indirect indications of the mobility of *Tribrachidium* are provided by the specimens overlapping the structures of paleopascichnids, giant protozoans, spread along the surface of microbial mats. A single specimen of a trace of trilobozoan movement associated with the body imprint of *Tribrachidium* is known. The trace demonstrates a short, slightly curved depression laterally extending from the shield. The depression is covered with numerous ridges, representing casts from the grooves covering the shield. The trace was presumably left by an animal that crawled under a thin layer of silty sediment before its death. Thus, we believe that the trilobozoans were less mobile benthic seston-feeders that had gastric cavities closed at their ends and developed ciliary epithelium, but did not have tentacles. According to this body plan, they can be considered Coelenterata s. l. However, they belonged neither to the Ctenophores nor to the Cnidarians but represented a special ancient branch of Coelenterata, which probably became extinct by the beginning of the Paleozoic. This study is supported by RSF grant No. 19-14-00346.

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