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TROPHIC STYLES IN NEOPROTEROZOIC AND CAMBRIAN MARINE COMMUNITIES

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The Ediacara-type organisms of the Vendian Period (late Neoproterozoic) in contrast to Cambrian and later marine biotas were previously interpreted as dominated by organisms that took up dissolved organic compounds or that were photosynthetically-assisted through algal endosymbionts. In addition, herbivores were present that grazed on bacterial mats. The total biota was thus inferred to be more like a peaceful garden than Phanerozoic marine biotas where predation is rampant. However, this interpretation is flawed. Ediacaran organisms include anemones, tentaculate medusae, and a variety of other forms that were surely active and voracious predators on each other like Recent cnidarians. Predaceous cnidarians are, for the most part, incapable of leaving predation marks on their prey, since they ingest it whole. Likewise, no evidence supports photoendosymbiosis or the utilization of dissolved organic material, although those trophic methods could have been present. Modern cnidarian-dominated communities provide an analog for understanding the trophic roles of ancient gelatinous organisms. Anemones capture and eat medusae, as well as many other animals and plants. Medusae eat everything from minute to large plankton (including vertebrates) and, in some cases, probe the benthos or ingest detritus. In addition, they commonly prey on each other, some selectively. Comparison of analogous organisms in the Ediacara biota indicate that they too were trophically structured like similar modern biotas that are dominated by anemones and medusae. Predation, although leaving no direct indication, was likely very common since the very dawn of animal life because proteins are far easier to digest than algal cellulose. Thus, Ediacara was neither peaceful nor a garden!

In contrast, Cambrian trophic structures are more closely analogous to other Phanerozoic and modern skeletonized biotas. While soft-bodied organisms did exist, as they do today, they were not very obvious in the fossil record. The Cambrian record is one of mixed strategies of grazing, filtering, herbivory, predation, suspension feeding and selective and non-selective feeding on organic detritus, photoendosymbiosis (that became more common after the metazoan colonization of carbonate basins of the low paleolatitudes) and uptake of dissolved organic

material. These are apparent and commonplace. Evidence for them is abundant in Cambrian assemblages: infaunal and surface trace fossils, bored and crushed shells, morphologic adaptations for feeding and photosymbionts, among others. Complex predation strategies were clearly an important trophic function in Cambrian and later faunas.