

j29 The first wave of Paleozoic fauna

< hard parts, not soft parts, for fossil classification >

Sternitur infelix alieno vulnere, coelumque / Adspicit et moriens dulces reminiscitur Argos.
(He falls, unhappy, by a wound intended for another; looks up to the skies, and dying remembers sweet Argos)
—Virgil.¹

By tradition, the classification of fossils is based on neontology (which is the study of living organisms). In neontology, most distinctions for purposes of classification are made with reference to soft parts (a notable exception has been the classification of stony corals). Soft parts are usually not available for study in fossils. To classify extinct organisms with hard parts that are not comparable to hard parts of organism with living representatives, taxonomic groups are created for them, usually at a level higher than genus. An artifact of this is that as one goes back in time the number of classes, and even phyla, increases. Within each, for the time of their existence, diversity can only increase after first appearances or after times of extinctions within a group.



The guide fossils for the early Paleozoic shelly facies are genera of benthic organisms: tabulate corals, rugose corals (tetracorals), brachiopods, nautiloid mollusks, stalked echinoderms, and trilobites. As exhaustively counted by **J. John (Jack) Sepkoski Jr.** (1948-1999),² the first wave of distinctive Paleozoic fauna, which reached its peak of diversity near the beginning of the Ordovician, were fauna that became dominant in the Cambrian (**Figure j29.1**).

The modern view is that *all* phyla (between 20 and 35 are recognized variously in modern classifications) had come to be by the Early Ordovician including the phylum Bryozoa with the debut then of its first members. The total number of classes was then also at a maximum. Does this observation conflict with the theory of evolution that predicts increasing diversity in time? The answer is no. Implicit in this is that large numbers of organisms with different body plans have become extinct. The diminution of the number of classes is an artifact of the way geologists (as paleontologists) classify fossils. A huge number of genera have come into existence and gone extinct since the Cambrian. The relatively few genera that did exist during the Cambrian are sorted into very many more classes than are populated today.

The beginning of the Cambrian is marked by the first appearance fossilizable hard parts of many unrelated organisms. Some ecological shift was such that competition between organisms favored hard parts. In the shake down, the majority of different forms did not survive. Interestingly, for those who care, “Many of the major phyla that characterize modern animal life are rare elements in Cambrian assemblages whereas the phyla that contained the most numerically dominant forms were those that went extinct or have lines of descent that have not been recognized as continuing today.”³

Figure j29.1 After J. J. Sepkoski, Jr., *Paleobiology*, 1981.⁴

Plot of numbers of faunas that declined after having been dominant during the Cambrian period.

