

Mollusk Species Diversity in the Southeastern Pacific: Why Are There More Species Towards the Pole?

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Abstract

The most ubiquitous and well recognized diversity pattern at large spatial scales is the latitudinal increase in species richness near the equator and decline towards the poles. Although several exceptions to this pattern have been documented, shallow water mollusks, the most speciose group of marine invertebrates, are the epitome of the monotonic decline in species diversity toward higher latitudes along the Pacific and Atlantic coasts of North America. Here we analyze the geographic diversity of 629 mollusk species along the Pacific South American shelf. Our analyses are based on the most complete database of invertebrates assembled for this region of the world, consisting of latitudinal ranges of over 95% of all described mollusks between 10°S and 55°S. Along this coast, mollusk diversity did not follow the typical latitudinal trend. The number of species remained constant and relatively low at intermediate latitudes and sharply increased toward higher latitudes, south of 42°S. This trend was explained by changes in shelf area, but not by sea surface temperature, unlike the pattern documented for Northern Hemisphere mollusks. Direct sampling of soft bottom communities along the gradient suggests that regional trends in species richness are produced by increased alpha diversity, and not only by artifacts produced by the increase in sampling area. We hypothesize that increased shelf area south of 42°S, geographic isolation produced by divergence of major oceanic currents, and the existence of refugia during glaciations, enabled species diversification. Radiation could have been limited by narrow continental shelves between 10°-42°S. Asymmetries in latitudinal diversity trends between hemispheres show that there is not a single general factor determining large-scale diversity patterns.