BENTHIC ASSEMBLAGES IN THE NORTHWESTERN OF GONDWANA: A TEST OF THE ORDOVICIAN EVOLUTIONARY RADIATION MODEL

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INTRODUCTION

Over the past decade several evolutionary studies have concentrated on global diversification patterns including comprehensive analyses of taxonomic patterns along with the interpretation of results about the nature of changes of biotic diversity through time.

By a factor analytic description of the Phanerozoic marine fossil record Sepkoski (1979) proposed the successive appearance of three major evolutionary faunas: a trilobite-dominated Cambrian fauna, an articulate brachiopod-dominated Paleozoic fauna and a mollusk-dominated Modern fauna (see also Sepkoski and Sheehan, 1983 and Sepkoski and Miller, 1985).

According to Sepkoski and Sheehan (1983) a large increase in taxonomic diversity was produced by the great expansion of the Paleozoic fauna. This evolutionary fauna resulted from radiation among the articulate brachiopods, anthozoans, cephalopods, crinoids and stenolaemate bryozoans differentiated in suspension-feeders communities across proximal shelf environments. The Cambrian fauna, involving trilobite-inarticulate brachiopod communities of low diversity, slowly declined following the onset of the Ordovician and became restricted to deeper water facies.

In a recent paper Waisfeld and Sánchez (in press) analyzed Lower Ordovician communities developed in different basins along the western part of Argentina on the basis of an ecological approach. The example that was used as a case history involved the fossil assemblages present in the siliciclastic Acoite (Lower-Middle Arenig) and Sepulturas (Middle-Upper? Arenig) Formations in the Northwestern basin (Cordillera Oriental) and the broadly contemporaneous limestones of the San Juan Formation (Upper Tremadoc-Lower Llanvirn) in the Precordillera basin. Geologic evidence and faunal affinities in these two regions account for different paleogeographic positions during the earliest Paleozoic (Fig 1).

Thus, several workers proposed that the Precordillera terrane was next to the Appalachian Belt during the Cambrian and later migrated through the Iapetus Ocean since the Early Ordovician (Benedetto, and others,1995 and references therein).

Detailed paleoecologic studies in both basins were the ground for analyzing the correspondence between the expansion of global evolutionary faunas during the lower Ordovician and local marine communities developed in distinct paleogeographic areas. As a result suspension feeders-rich associations in San Juan limestone could be included in the Paleozoic fauna. By contrast, fossil associations that developed along the rest of the western part of Argentina in coeval siliciclastic units fit in the Cambrian fauna with the complete absence of suspension feeders communities.

Our purpose is to discuss this discrepancy concerning the Ordovician radiation model. We suggest that this discrepancy might arise from different ecological properties underlain by the paleogeographic position of both areas during the Arenig times. For this reason, we analyze main features of fossil associations in other gondwanic localities in order to test if similar patterns of distribution among fossil associations could be stated.

Financial support for this work was provided by CONICET, CONICOR and SECyT.

ECOLOGICAL PATTERNS IN THE WESTERN OF ARGENTINA

The Acoite Formation is an upward thickening shelf sequence accounting for a strong coastal progradation (Astini and Waisfeld, 1993). It is unconformably

Figure 1. Reconstruction of northwestern margin of Gondwanaland and several areas of Laurentia, Baltica and the Celtic Province in the Early Ordovician (Arenig-Early Llanvirn). Modified from Benedetto and Sánchez, 1994.)