

Late Miocene ostracods from the Solimões Formation (Western Amazonia): geochemical and palaeontological analyses

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The Pebas system represents a huge inland water system that characterized Western Amazonia from the Oligocene-Miocene boundary (about 23 Ma) until the Late Miocene. The Andean uplift caused its disappearance and it was replaced by the onset of the modern Amazonia setting during the early Pliocene. The Late Miocene of the Pebas system presents interesting palaeobiological peculiarities, with spectacular endemism and diversity. Among aquatic biota, gastropods and bivalves show noteworthy and well-studied speciation phenomena (e.g. Anderson *et al.*, 2010). Ostracods are known by extensive radiations (in particular the genus *Cypriideis*) and a high degree of endemism, but their level of documentation and knowledge it is not as satisfying as for other organisms.

The environmental characteristics of the south-eastern edge (Eirunepé area) of the Pebas system were studied by a taxonomical and geo-

chemical analysis of the ostracod fauna. The aim was to provide a better comprehension of the palaeoenvironmental conditions with a particular focus on salinity conditions and the possible occurrence of marine incursions in this area of the Pebas system.

Five outcrops belonging to the upper Solimões Formation (Upper Miocene) were studied (Gross *et al.*, 2012). Ostracod associations resulted to be highly endemic and characterized by a moderate diversity. A total of 19 species was recognized and about 60% of the ostracods are indicative of a freshwater environment (primarily *Penthesilenula* and *Cytheridella*). The taxa usually considered to be associated with a marginal marine setting (mainly *Cyprideis*) represent about 40%.

A total of 50 carbon and oxygen stable isotope measurements were carried out on five ostracod species (adult and juvenile specimens): *Cyprideis pebasae*, *Cyprideis graciosa*, *Rhadinocytherura amazonensis*, *Cytheridella danielopoli*, *Penthesilenula olivencae*. All the valves were well-preserved and not affected by diagenesis. All the isotopic analyses furnished very negative values with $\delta^{13}\text{C}$ ranging from -8.4‰ to -14.3‰ and $\delta^{18}\text{O}$ ranging from -6.5‰ to -9.8‰. Such negative values are compatible with the isotopic signatures of freshwater carbonates or lacustrine environments (Leng & Marshall, 2004) and are consistent with other carbon and oxygen stable isotopes results obtained in the Miocene of Pebas area (Wesselingh *et al.*, 2006).

Considering both the taxonomical and geochemical analyses, there are no hints on the presence of brackish water or marine influxes in the study area (as already proposed in Gross *et al.*, 2011): the taxa usually associated to marginal marine settings are probably successfully adapted to pure freshwater settings, which is also well documented for modern *Cyprideis* in other areas (Lake Tanganyika; Wouters & Martens, 2007).

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