Evolution of the cheek teeth occlusal structures in caviomorph rodents, with special reference to octodontoids and erethizontids

A. M. CANDELA[1,2] and L. L. RASIA[1]

Caviomorphs are representative of the oldest rodent radiation in South America, with a rich fossil record, known since the late Eocene? - early Oligocene. They reached an important taxonomic diversity expressed by the existence of 12 extant families and several extinct taxa. Both in extant and fossil forms, this diversity is reflected by a significant morphological variation found in crown structures of the cheek teeth. Different hypotheses of primary homology have been proposed for these structures, which, in turn, supported diverse dental evolutionary hypotheses in caviomorphs. The identification of homologies in crown structures of the oldest fossil caviomorphs became protagonists in this context. In spite of the research generated, for most of the main clades of caviomorphs, there is not a unified nomenclature of the crown structures. In the case of octodontoids and Erethizontidae, certain fossil taxa reveal the presence of cusps, which are not so well differentiated in living species, pointing out the essential role of fossils in the identification of homologous structures. In this contribution, we examine the occlusal morphology of these rodents and evaluate alternative primary homology hypotheses for occlusal structures in the cheek teeth of caviomorphs. On this base, we explore the testing of alternative primary hypotheses of lophs/lophids correspondences in a phylogenetic context. Following a dynamic approach, we select the best primary homologies and evaluate the evolutionary transformations of the analyzed dental characters. Our results indicate that pentalophodonty is the derived condition for the lower molars in caviomorphs; the trilophodonty evolved independently at least two times during the evolutionary history of octodontoids, and pentalophodonty represents the primitive condition in erethizontids and octodontoids. Pentalophodonty emerges as the derived condition in the upper molars, from a "prepentalophodont" pattern. This study shows that the dental evolution in caviomorphs can be better understood when their occlusal structures are expressed as characters reliably comparable, and when fossils are taken into account.

1 División Paleontología Vertebrados, Museo de La Plata, Pasaje Teruggi s/nº, Paseo del Bosque, (B1900FWA) La Plata, Buenos Aires, Argentina. lucianorasia@hotmail.com, acandela@fcnym.unlp.edu.ar
2 Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET).