

The relationships among diapsid reptiles and the influence of taxon selection

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Abstract

In recent years, there was significant progress in our understanding of diapsid phylogeny, but also some new and intensively discussed problems arose, of which the most prominent example is the suggested diapsid affinity of turtles. The reliability of several results, however, suffered from the problem that only a few taxa were included in the respective analyses. For that reason, a new analysis of the interrelationships of diapsid reptiles was performed, with the main focus on taxa that were either rarely entered in the latest analyses (e.g. drepanosaurs or thalattosaurs) or where strongly differing opinions towards a phylogenetic placement exist (e.g. turtles, ichthyosaurs, sauropterygians). In total, 33 taxa and 184 informative characters were taken into consideration. The most important results are a positioning of thalattosaurs and ichthyosaurs outside the lepidosauromorph/archosauromorph dichotomy but with a certain signal towards archosauromorphs, a placement of turtles close to lepidosaurs, a grouping of kuehneosaurs with drepanosaurs outside saurians, the paraphyly of prolacertiforms, and a loss of stable relationships at the base of neodiapsids. It is noted that the tree topology depends much more on the choice of taxa than on the number and definition of characters, which means that the removal of some taxa has an effect on the position of other diapsids. Testing the influence of several “problematic” forms shows, however, that this is not strongly correlated with the number of characters for which a taxon can be coded. With regard to these phenomena, it is postulated that in the case of large-scale phylogenetic analyses the stability of the results should not only be tested by using methods like bootstrap or jackknifing, but also by evaluating the effect of a respective taxon on the overall tree topology.

Introduction

Diapsid reptiles represent one of the major amniote clades and today constitute a significant part of the vertebrate fauna. Originally established by OSBORN (1903), diapsids gained prominent attention throughout the last century. Despite this immense research tradition, the basal relationships within the clade are still insufficiently understood, and furthermore, there is still a considerable debate about which taxa belong to the Diapsida. Additionally, many modern investigations on diapsid phylogeny focused only on a relatively restricted number of taxa, which hampered a satisfactory understanding of early diapsid evolution. Moreover, there are some taxa that have been almost completely neglected, although they could contribute significantly towards a better resolution. The present study, which was originally performed in connection with an anatomical revision of thalattosaurs (MÜLLER 2002a), will particularly address to these problems.

Recent progress in the understanding of diapsid phylogeny: a brief survey

The last 20 years can possibly be regarded as the most fruitful time with respect to the understanding of diapsid interrelationships, beginning with the studies of BENTON (1984, 1985), EVANS (1984), and GAUTHIER (1984), in which for the first time a stringent cladistic concept was employed. The most important progresses of these investigations were the establishment of diapsid monophyly, the definite placement of araucoscelidians at the root of the diapsid clade, the corroboration of the traditional distinction

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