A new african fossil caprin and a combined molecular and morphological bayesian phylogenetic analysis of caprini (Mammalia: Bovidae)

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Abstract

Given that most species that have ever existed on Earth are extinct, no evolutionary history can ever be complete without the inclusion of fossil taxa. Bovids (antelopes and relatives) are one of the most diverse clades of large mammals alive today, with over a hundred living species and hundreds of documented fossil species. With the advent of molecular phylogenetics, major advances have been made in the phylogeny of this clade; however, there has been little attempt to integrate the fossil record into the developing phylogenetic picture. We here describe a new large fossil caprin species from ca. 1.9-Ma deposits from the Middle Awash, Ethiopia. To place the new species phylogenetically, we perform a Bayesian analysis of a combined molecular (cytochrome b) and morphological (osteological) character supermatrix. We include all living species of Caprini, the new fossil species, a fossil takin from the Pliocene of Ethiopia (Budorcas churcheri), and the insular subfossil Myetragus balearicus. The combined analysis demonstrates successful incorporation of both living and fossil species within a single phylogeny based on both molecular and morphological evidence. Analysis of the combined supermatrix produces superior resolution than with either the molecular or morphological data sets considered alone. Parsimony and Bayesian analyses of the data set are also compared and shown to produce similar results. The combined phylogenetic analysis indicates that the new fossil species is nested within Capra, making it one of the earliest representatives of this clade, with implications for molecular clock calibration. Geographical optimization indicates no less than four independent dispersals into Africa by caprins since the Pliocene.