

Phylogenetic analysis of all living leporid genera based on the morphology of skull, jaw, and dentition

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Extant family Leporidae is a relatively small group, consisting of 11 genera, which are rather homogenous in general morphology. Supra-generic and phylogenetic classification of the family has been based mainly on dental (particularly p3) morphology. Molecular cladistic studies that became common during 1990's have been applied on leporids also, and a phylogenetic study based on multiple molecular data of nuclear and mitochondria was published by Matthee et al. in 2004. But, their result was nearly totally different from the previous one based mainly on the dental morphology.

We started in 2004 and have continued a cladistic phylogenetic analysis of all living genera of the family Leporidae, based on the morphology of the skull, jaw, and dentition, which are applicable on fossils, assuming that extinct genera should be included as much as possible in the future. Extant 11 genera of the family (*Pronolagus* includes 2 different species) and *Ochotona* as an outgroup (13 taxa in total) were analyzed with 47 (25 cranial, 7 mandibular, and 15 dental) characters. Cladistic analysis of those data by PAUP 4 provides 10 most parsimonious trees (MPT) by branch and bound search, and the strict and 50 % majority consensus trees were obtained from them. These trees are quite different from Matthee et al. (2004) and also differ in some part from the one based mainly on the dental morphology.

On 50 % majority consensus tree, the basal tree pattern is relatively conformable with place of origin and distributional diffusion. *Caprolagus* and *Poelagus* consist of a monophyletic group, and *Pentalagus* locates next to them as their sister group. *Poelagus* was originally described as a subgenus of *Caprolagus*, and our result shows their close relationships. Excluding these 3 genera and *Nesolagus* whose distribution is restricted in Asia, the other 7 genera consist of a monophyletic group. Among them, *Romerolagus* and *Brachylagus* are restricted in North America in distribution and have been thought to be primitive, which is conformable with our result. *Lepus*, *Sylvilagus*, and *Oryctolagus* have been considered to have close a relationship to each other, and this relationship is also supported by our result. *Bunolagus* and *Pronolagu* consist of a monophyletic group, and this point is conformable with their close relationship traditionally thought. But, the point where both genera thought to be closely related to *Pentalagus* because of having 5 reentrant angles on p3 does not agree with our result. It is suggested that this character may be obtained independently from *Pentalagus*.

Kriegs et al. (2010) recently analyzed phylogenetic relationships of some leporid genera based on retroposon insertions. Although number of genera included is limited, they demonstrated that *Lepu* branched off at last. This clearly differs from the results by Matthee et al. (2004) and might support our results. Their paper can be highly evaluated in that they showed the molecular phylogeny by Matthee et al. may not be a "winning hit", and it can be expected that phylogenetic estimations by molecules and by morphology will be conformable in the future.

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