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Phylogeny and Conservation of Iberian Lynxes

By Rosa Garcia-Perea*

Data offered by Beltrán *et al.* in a letter published in *Nature* (1996) are of interest because they provide information based on a new set of characters that support previously published hypotheses about the phylogenetic relationships among Recent representatives of the genus *Lynx* (see Werdelin, 1987) and other felids (Wayne *et al.*, 1989). Their molecular data also support the idea that population fragmentation may be decreasing the genetic variability of this species, such as Rodriguez and Delibes (1992) and Beltrán and Delibes (1993) have suggested earlier. Unfortunately, this is bad news for the conservation of the Iberian lynx.

In the letter, Beltrán *et al.* claim the demonstration of the monophyly of genus *Lynx* to be a relevant finding, and the taxonomic status of the Iberian lynx *Lynx*

pardinus to be controversial. I feel surprise regarding these statements.

The question of the monophyly of genus *Lynx* is something that, to my knowledge, has never been questioned. In fact, the only reference mentioned by Beltrán *et al.* contrary to the *Lynx* monophyly is Salles (1992), but the consensus tree offered by that author (Fig. 52), the one he considers the best estimate of felid phylogeny, shows a monophyletic lynx group. Beltrán *et al.*'s findings are thus consistent with previous hypotheses based on morphological, karyological, behavioral, and molecular data (Werdelin, 1981; Hemmer, 1978; Herrington, 1985; Wayne *et al.*, 1989; Leyhausen, 1979).

In my opinion, the most interesting phylogenetic question about genus *Lynx* is its relationships to the pantherines, specially to the large cats of genus *Panthera*. Several non-congruent hypotheses have

been proposed about that topic, placing lynxes sometimes close to the species of *Felis* (Hemmer, 1978; Kratochvil, 1976), sometimes close to the pantherines (Herrington, 1985; Wayne *et al.*, 1989; Janczewski *et al.*, 1995). The latter hypotheses place *Lynx* either as the only sister group of *Panthera*, or sharing a clade with a variable number of species, all forming the sister group of *Panthera*. Unfortunately, Beltrán *et al.* included in their analysis neither the species of *Panthera*, nor *Felis*, nor other species interesting to test these phylogenetic hypotheses.

Another question to comment on is the claimed controversy about the taxonomic status of the Iberian lynx. *Lynx pardinus* was described by Temminck in 1827 (*Felis pardina*) as a species different to the lynx inhabiting the rest of Eurasia, *Lynx lynx*. Ellerman and Morrison-Scott (1951) included the Iberian lynx as a subspecies

of *Lynx lynx*, and most subsequent authors accepted that opinion. Werdelin's morphometric work (1981) raised again the question of the specific identity of *Lynx pardinus*, which is supported by paleontological and morphological evidences (Ficcarelli and Torre, 1975; Matjuschkin, 1978; Werdelin, 1990; Garcia-Perea, 1991, 1992, 1996). These evidences include the presence of unique developmental, morphometric and morphological patterns in the skeleton of *Lynx pardinus* compared with the three other living species, as well as the occurrence in sympatry of *Lynx lynx* and *Lynx pardinus* in southwestern Europe over the Pleistocene (both species are presently allopatric). Since 1993, a general agreement exists in considering *Lynx pardinus* as a separate species, and so is considered by the most recent reference books (Corbet and Hill, 1992; Wilson and Reeder, 1993). This has also been accepted by conservation authorities (IUCN 1990; Nowell and Jackson 1996).

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The Problem of Sub-species: Further Comment

by Vadim Birstein*

I have read the paper proposing revision of subspecies of the leopard *Panthera pardus* (Miththapala et al. 1996). Dr. O'Brien and his group are high professionals and this article presents a lot of material. Personally, I do not like that the authors use genetic distances in this particular case. For me, these characteristics are rather fuzzy, I prefer to work with molecular markers, e.g. with differences in the nucleotide sequences. I would say that the authors should continue their research and their next step should be sequencing of a mitochondrial gene (or genes) or a so-called D-loop (or control) region. The choice of a particular gene or

the D-loop region depends on a goal of the research. But, as a first step, in answering the question about the number of subspecies in leopards the authors' data are OK.

In principle, O'Brien's molecular approach to the problem is the same as mine. I do not believe that there are 27 leopard subspecies. To take into consideration morphology only, as in the letter of P. Leyhausen (1997); how many subspecies does one need to describe, for instance, within the domestic dog or cat? This situation I know well from the example of sturgeons. During the 19th century, many researchers described scores

of species and subspecies within European and American sturgeons until they understood that there is a great orphological variation within a species in such characters as the shape of rostrum or color of different body parts. Our genetic and molecular data showed that the number of sturgeon species is rather restricted. We also found a cryptic species, which some ichthyologists have described as a subspecies, but we showed that the genetic and molecular uniqueness of this form is much greater than that of a subspecies. Incidentally, cryptic species are found now in many animal groups, for instance, whales, when molecular methods are ap-