

Cranial distinctiveness in the Apennine brown bear: genetic drift effect or eco-phenotypic adaptation?

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Molecular studies highlighted a strong genetic affinity between the remnant and isolated population of the Apennine brown bear and other southern European populations (Taberlet & Bouvet, 1994; Randi et al., 1994). Despite this genetic closeness a recent morphometric study (Loy et al., 2008) revealed a marked phenotypic distinctiveness of the Apennine population, supporting the reinstatement of a distinct taxon (*U. arctos marsicanus*).

By building upon previous morphological analyses, we adopted geometric morphometrics to better investigate skull morphology of the Apennine brown bear with reference to the other, closely related south European populations.

Both skull shape and size differences confirmed the strong divergence of *U. arctos marsicanus*. Particularly the Apennine bears are characterized by an enlargement of supraorbital apophysis and a larger distance across the zygomatic arches. Furthermore, our analyses highlighted a significant shape differences of the first upper molar in the Apennine bears.

Our results suggest that the Apennine bears underwent a rapid morphological change possibly driven by genetic drift and local selective pressures. Because the greatest morphological differentiation is likely related to the muscles involved in mastication, we hypothesize that local selective pressures might be related to a shift in food habits, with highly reduced depredation and feeding on large carcasses in favour of vegetation and hard mast (beech nuts and acorns).

These results suggest an adaptive distinctiveness of the Apennine bears, which should be carefully considered in any management and conservation action addressed to this highly endangered population. While more in-depth molecular studies are required to better assess the taxonomic and genetic status of the Apennine brown bear population, our study emphasises the importance of morphological analyses as a complementary tool for a more thorough characterization of variation and divergence of endangered taxa.

Loy A, Genov P, Galfo M, Jacobone MG, Vigna Taglianti A. 2008. Cranial morphometrics of the Apennine brown bear (*Ursus arctos marsicanus*) and preliminary notes on the relationships with other southern European populations. *Italian Journal of Zoology* 75: 67–75.

Randi E, Gentile L, Boscagli G, Huber D, Roth HU. 1994. Mitochondrial DNA sequence divergence among some west European brown bear, (*Ursus arctos* L.) populations. *Heredity* 73: 480-489.

Taberlet P, Bouvet J. 1994. Mitochondrial DNA Polymorphism, phylogeography, and conservation genetics of the brown bear *Ursus arctos* in Europe. *Proceedings of the Royal Society B* 255: 195-200.