



## The most threatened Italian mammal: marsican brown bear

### An interdisciplinary approach for its conservation

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*“Conservation problems are social and economic, not scientific,  
yet biologists have traditionally been expected to solve them”*

George B. Schaller, 1992

*After a review of the taxonomic knowledge regarding the Marsican bear, the authors summarize the reasons for which a different and more incisive approach is necessary for its conservation, with the necessity to integrate new skills in the work group that coordinates the conservation strategies of this endemic Italian bear.*

### Taxonomic history of the Marsican bear

Carlo Luciano Bonaparte had already perceived the need to study the Apennine bears, so much so that in his *Iconografia* he pointed out the necessity to deepen the knowledge about Italian bears (Bonaparte 1832-33). Bruno (2013) quotes the text of Bonaparte's unpublished correspondence in which he request to gather a specimen and listed some distinct characteristics of this taxon. Before Giuseppe Altobello's formal description in 1921, the zoologist Theodore Knottnerus-Meyer, director of the Zoological Garden of Rome, was able to directly observe a young male and note he belong to a distinct taxon not yet described. After 1921 Erminio Sipari, founder of the National Park of Abruzzo, began a heavy consultation with Italian and foreign zoologists (Enrico Festa, Decio Vinciguerra, Giuseppe Lepri, Paul Matschie and the abovementioned Altobello and Knottnerus-Meyer), from which he ascertained the autochthonous and distinctiveness of the *Ursus arctos marsicanus* Altobello, 1921. Curiously, the official Guide of the Zoological Garden of Rome from 1932 (attributable to Lepri) quoted the taxon in question with the trinomial *Ursus arctos molisanus*, never formally published. The remarkable phenotypic variability (intra-population, too) of the complex *Ursus arctos* and its relative abandonment of the museum taxonomy in favor of the modern systematic biology, caused the identification of a taxonomic unit among brown bears to be seen even more suspiciously. Pocock (1932) made a “classic” taxonomic revision, considering Altobello's evidence insufficient to acknowledge *marsicanus* as a valid subspecies, inasmuch as based on the study of a single cranium.



Young female of marsican brown bear (ph. Paolo Forconi)

On the contrary, Sergio Conti (1954) added a diametrically opposite conclusion while studying an adult male cranium from the Museum of Natural History of Genova that elevated the taxon to a specific level (*U. marsicanus*) and pointed out the similarity with his *Ursus spelaeus* var. *ligustica*. It is not surprising then that Conti's conclusions went unnoticed to most, both because the article was written in Italian and because of the scant attention given to the taxonomy of mammals for the larger part of the 20th century. The merit would go to Prof. Augusto Vigna Taglianti to have brought the question back to life with Iacobone's (1983) graduate thesis and with a series of contributions that confirmed the considerable morphological differentiation of *marsicanus* from other European bears (Loy et al, 2008; Colangelo et al. 2012). The genetic data available shows a close kinship of the Marsican bear with the brown bears of the Balkan Peninsula, reunited in the so-called 1b clade (Davison et al 2011; Hirata et al 2014) but Gippoliti (2016) pointed out how the mitochondrial DNA of the polar bear *Ursus maritimus* also fits well in the phylogenetic tree of the *Ursus arctos* (clade 2b) without anyone having ever proposed the conspecificity of the two taxa.

### **The Manifesto of the S. It. S. Fa.**

The Italian Society for the History of Fauna "G. Altobello" (S. It. S. Fa.) is named after the Molise zoologist who in 1921 describes *Ursus arctos marsicanus* as an endemic subspecies of our central-southern Apennine. It is not, therefore, by chance that in January 2013, after having recorded the disappearance of at least ten specimens (of which six female) in the previous five years, it decided to launch an appeal soliciting those responsible for their safeguard and management to consider establishing a bank of biological material of the Marsican bear and to carry out a program of reproduction in captivity. (Guacci et al., 2013) – a method already utilized successfully in the past that consented some animal species to be pulled off the endangered list and then become symbols, like the European bison, the Hawaiian goose, the Californian condor and still many others. Today the small population (around 50 specimens and not more than 13 reproductive females according to Ciucci et al., 2015) exposes the Marsican bear to poaching, to impactful anthropic activity and to the risk of lethal epizooties, without taking the reduced genetic variability into account. Even if this data does not deviate much from that

available historically, revealed with other methodologies (Boscagli, 1991), we believe that inserting an exit strategy among the protection policies that lay the foundation and assure the feasibility of a future intervention of reproductivity in captivity is absolutely indispensable. In such a way it would be possible to set up a small number of young females with which, through resettlement, we could attempt to build wild, reproductive nuclei outside of the National Park of the Abruzzi, Lazio and Molise. In fact, we know that the males in dispersion move extensively across the Apennines. The bear “Ulysses” is an example: departing from the Abruzzi National Park and crossing unthinkable anthropic barriers, he arrived in the Sibillini NP where he was filmed in June 2009 by a photo trap in the Torricchio reserve and, after having roamed through Marche, Umbria and Lazio, turned back to die on the Meadows of the Sirente in January 2012. As we know, the females, notoriously philopatric, don’t usually move from the areas of reproduction and wintering, rendering “natural” attempts of colonization very improbable. Reproduction in captivity can also allow, in the dramatic hypothesis of a vertical drop in the population, for an attempt to reconstruct a vital nucleus using the sustained ex-situ population. Returning to the appeal, this was not accepted favorably everywhere, on the contrary, in some cases it was strongly opposed, just as, on the other hand, it was encouraged by other sectors in the research world and from abroad. The adduced reasons for such hostility were varied, such as “it was never attempted” or “it’s risky”, “it’s difficult”, or yet, “it would steal resources from the actual protection measures”, but, in our opinion, all represent the renunciation of the primary function of research; research that does not dare abdicate its role. In Spain today, thanks to European funding of over thirty million euro, breeding in captivity is utilized successfully to foster the protection of genetic variability and the resettlement of the Iberian lynx *Lynx pardinus* (Vargas et al., 2008). Furthermore, more than ten years ago the University of Leon implemented a sperm bank for the Mount Cantabrici bear, one of the very few brown bear populations in Europe not yet manipulated by man. And in Italy? On one side we boast of having one of the most unique subspecies of the world in our mountains-this is what the Ministry of the Environment and the National Park of Abruzzo, the two main parties responsible for the protection and management have affirmed-on the other hand it is considered unnecessary to utilize the means of ex-situ conservation for this purpose, a procedure advised in article 9 of the Convention for Biodiversity, as useful integration of in-situ conservation policies. It has been four years since our appeal, and we know of eleven other bears that have already died; in this case, too, six were female. Among these the bear “Stefano”, found on the Molisan Mainardes as the victim of a firearm, defined as a specimen of very rare allele, lost forever (ex verbis Rita Lorenzini). It is important to us to mention that every lost Marsican bear is a fragment of a precious, unique genetic patrimony irredeemably lost. Included in this scenario is a stance that appears somewhat questionable: The ISPRA, The Superior Institute for Environmental Protection and Research, consulted by the Ministry of the Environment after our Society’s appeal produced a negative opinion towards the “activation of preparatory actions for a possible intervention of breeding the brown Marsican bear in captivity for conservation purposes” suggesting-on the basis of a IUCN/SS Bear Specialist Group opinion-that, in case it were necessary to preserve the population, it must be to “provide translocation interventions to wild specimens coming from the nearest possible populations of a geographical standpoint, in other words, import Slovenian or Croatian bears as has been done to reconstitute the Trentino population. But, while in this case a process of colonization was simply facilitated, that, although slowly, was already in progress (Giorgio Boscagli, com. pers.), in Abruzzo the Slovenian bears can only arrive if brought in by man. But, with due respect, such an opinion seems extremely dangerous: its application could conform the bear population from the Alps to the Apennines, wiping out a unique evolutionary experiment that has probably lasted more than 4-6 centuries, and that, according to an official hypothesis, would separate the Alpine population from the Apennine one. Likewise, it is not easy to understand the reticence to organize the systematic gathering of biologic materials of the bears that during the year are captured to apply or substitute radio collars for monitoring purposes. It would be a question of inserting a sample of biological materials into protocol





Male specimen in fully mature age (ph. Antonio Macioce)

whose conservation could be entrusted, through a convention contract, to a university institute already equipped for this purpose. The ignorance of the relative techniques can't and mustn't construct an alibi. Considering, then, the substantial financial resources engaged up to now for research on bears (around fifteen million euro), a small amount could certainly be invested in this direction. The tragic epic of the Alpine brown bear population that arrived with a few individuals into the 1970s and was left to languish until its ultimate disappearance caused by man's indecision and by the inadequacy of the policies put forward should constitute a strong warning for the conservation policy of the Apennine bear population.

### **Some reflections on conservation biology**

As in each study case, multiple considerations of general interest for conservation biology can be drawn from the current debate on the conservation of the Marsican bear. We have identified the following as particularly significant. The Ministry of the Environment, in the ambit of the Conservation of Biodiversity, prepared a series of National Plans of Action for some of the most endangered species in the country. It has not come to our knowledge that the criteria of the selection of the species (or subspecies) chosen up until now was made public. The Marsican bear, in any case, (and for a good reason) is among those taxa covered by a specific National Plan of Action for the Protection of the Brown Marsican Bear PATOM (AA. VV., 2011). However, it is clear from the ISPRA document cited above, that on an international level the Marsican bear is not considered anything more than an isolated and residual population of *Ursus arctos*, on which to intervene as soon as possible with a replenishment project to ament the low genetic variability. We, instead, believe that it is the national scientific community's strict competence to establish the true taxonomic value of the Marsican bear: it is, at least, a value that did not escape Erminio Sipari (Sipari, 1926), all energy should be directed to its

conservation, promoting, at the same time, research to discover its origin and real phyletic relationships of its taxon, overcoming the apparent difficulty to “communicate” which exists in the world of geneticists and that of classic systematic paleontologists/zoologists, at the risk of trivializing its autochthony and opening the doors to hypothesis—in our opinion, absolutely to avoid—of homologation to the *U. arctos* populations. The Manifesto of the S. It. S. Fa. (Guacci et al, 2013), fruit of the experience of many bear enthusiasts but also of zoologists and conservationists not actually involved in the conservation of the Marsican bear, could be considered an intervention of citizen science, in which citizens don’t only assist scientists, but also help in determining the objective of research. This approach of democratic participation to a biological question of conservation doesn’t encounter much feedback in our country. In its method it used typical instruments of scientific communication with different published contributions or contributions presented at scientific meetings (Guacci et al., 2013 Gippoliti et al., 2014) Obviously the scientific community could “suffer” the meddling of outsiders, but it is not by chance that the aforesaid Manifesto put forward some perplexities on the composition of the work table that the PATOM had compiled. The fact that behavioral ecology isn’t usually integrated in conservational biology is well known (Caro, Sherman, 2011). And it is precisely the conservation of the Marsican bear that offers numerous ideas on the involvement of behavioral discipline (confident bears, dispersion, intraspecific aggression and infanticide etc); nevertheless, it was not worth including an ethologist (or better, a socio-ecologist) in the working group. Thus, it appears inevitable that today’s conservation strategy so firmly hoped for and put into act is based on the dispersion of the females into new territories, while literature points out that the female brown bears are phylopatric (that is they tend to remain near the area where they were born) and it is the males, instead, that move around in larger areas (McLellan, Hovey, 2001). The appearance with other mammals that present the same social structure (Clutton-Brock, Lukas, 2012) allows us to presume that the females know each other and that there is a hierarchy where those with a higher rank—strictly unrelated between themselves—occupy the best territory and those of inferior rank are forced into peripheral territories or close to villages to find spaces that aren’t frequented by adult males. Infanticide carried out by males on the young constitutes an important strain factor on the behavior of the females, possibly to such an extent to push them to frequent inhabited areas without conspecifics (Steyaert et al., 2013). However, in the PATOM no consideration is given to the fact that the increment hoped for in the density inside the National Park could cause a rise in incidences of infanticide. And, yet, since the bear populations are spatially structured in matrilineal assemblages (Stoen et al., 2005), the risk is concrete that the moving away of non-related females from the best areas could cause a drop in their reproductive potential and a significant mortality of the young and therefore an ever greater loss in the genetic diversity in the population. This is one of the reasons that convinces us of the necessity of instituting a breeding in captivity program and one of preservation of genetic material. We believe that this is up to government institutions, primarily the Ministry of the Environment, to maintain a role of coordination of conservation activities and to assume an incisive role in the choice of competencies necessary for the implementation of conservation strategies. The PATOM also seems lacking in the social dimension, an aspect that in the case of the bear cannot be underestimated (Clark, Wallace, 2002). On the contrary, in the “communication” chapter, it is limited to hoping for a greater flux of information from scientists to local populations using an antiquated model and possibly false, especially for a reality where bear and man have cohabited for centuries, with questionable choices such as the way to deal with confident bear problems. Here one chooses to adopt a model of total segregation of man and wild animals, as if an invisible fence should exist between two worlds and the confident bears represent individuals of aberrant behavior. We believe, on the contrary, that control of hunting activity consents the bears greater freedom of movement and of manifestation of “typical” behaviors of large omnivorous opportunists, conversely to what happened in the past when visits to the chicken coops and to the sheepfolds were fleeting, highly risky, and less “concentrated” thanks to a widely distributed rural economy. In the PATOM the risk is to engender a psychosis towards confident bears that,

meanwhile, are informally “managed” and accepted in many communities of Abruzzo to the point that often people defend the bears when the Park team appointed to turn them away arrives. To our knowledge, for example, an analysis of SWOT (Strengths and Weaknesses, Opportunities and Threats) was never carried out for the National Park nor for other protected areas interested in Marsican bear conservation (Battisti et al., 2013). We believe that for long term conservation of the Marsican bear it is necessary for the responsible authorities to adopt an approach that actually includes a conservation project in today’s difficult socio-economic context of the Apennine Mountains (Piermattei, 2013).

## Conclusions

If the conservation strategies for the Marsican bear are to be successful, not only the socio-economic environment of reference, but the dynamics of institutions and conservation groups as well must be analyzed with scientific objectivity. A greater democracy in conservation processes and a wider spectrum of professionalism could have a positive spin-off. Furthermore, we believe it of utmost importance that communication concerning bear conservation sharply distinguishes data objectives from considerations related to the “value” of the Marsican bear for this or that group of interest bearers. In fact, the pretense to modify some values of the community through the transmission of adequate information finalized at the sensitization of the principal “stakeholders” appears naive, and it seems much more promising to condition their attitudes with values already shared by the community, especially in the Park and neighboring areas (Manfredo et al., 2016).

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