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Evidences for a late pleistocene isolation and a separate taxonomic status of the Mediterranean brown bear and the conservation value of the Balkan bear population

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Morphological and genetic evidences

It is traditionally considered that the bear in Europe belongs to the subspecies of *Ursus arctos arctos* L. (ГЕПТНЕР и др.., 1967; CORBET, 1978). The Balkan bear is also quoted as a representative of this subspecies. However, the current investigations indicate that the affinities and the taxonomic relations of the European populations are quite complicated. Recent surveys on the Balkan bear morphology show that it differs from the Russian-Carpathian population and is closer to the other Mediterranean populations (SPASSOV, 1990). Differing from the more northern populations, the Balkan bears show notable polymorphism regarding their coloration - there is a high percentage rather light (golden) specimens (SPASSOV, 1990). According some observations, which are not yet proved by enough statistical data, the Balkan bear shows slight trends for having more thickset body and is less aggressive, compared to the Russian-Carpathian bears. The above mentioned about the Balkan bear probably refers also to the Mediterranean bear at all. The conclusions about the close relation between the different Mediterranean local populations and their differences with the other northern populations were proven by genetic surveys on the European bear (TABERLET, BOUVET, 1994). These surveys indicate that the localised Mediterranean (Southeuropean) populations, including the Balkan lineage are very close and differ significantly from the population covering the Central, Northern and Eastern European localities.

Paleozoogeographical hypothesis for the isolation of the Mediterranean population

Represented by two isolated branches - Iberian and Balkan refugiums (TABERLET, BOUVET, 1994), the Mediterranean brown bear is probably a remnant of the autochtonous late Pleistocene European population. If TABERLET and BOUVET (1992) are right that the genetic differences between the Alaskan brown bear and the Polar bear are less

pronounced than those between the Alaskan bear and the Pyrenean bear, then we can make the following conclusions:

1. In spite of some suggestions the Polar bear probably appeared not earlier than the beginning of the Late Pleistocene. This coincides with some recent conceptions about the origin of the species (MAZZA, RUSTIONI, 1994).

2. Probably at the beginning of the Wurm a common circummediterranean race of the Brown bear existed. Remnants of this lineage are the Southeuropean, Syrian and recently exterminated Northafrican form. The Pyrenean (Southeuropean) Brown bear is isolated from the ancestor of *U. a. arctos* and the Northern Brown bear forms since Riss-Wurm.

3. It is not possible to assess the degree of morphological evolution by the mitochondrial DNA sequence differences.

4. The great morphological difference between *U. arctos* and *U. maritimus* (probably on a subgeneric level) on one side and the small difference between Pyrenean and other Brown bear forms (probably on a subspecific level) on the other are an example supporting the idea that the speed of evolution in different forms is not the same and depends on natural conditions.

U. arctos s. str. exists in Europe since the beginning of Riss-Wurm (CLOT, 1989). During these times of a more temperate climate the species is found further north - in Germany (Taubach and Ehringsdorf). Later in the Late Pleistocene cooling *U. arctos* probably survived mainly in the Southeuropean mountain regions. Remains of *U. arctos* are found from the upper Pleistocene of the Balkans. They are found in Slovenia (RAKOVEC, 1973), 25 000 years ago and in the Late Pleistocene of Westhern Greece as well as in the late Wurm of Bulgaria (a humerus from the Triugulnata cave, Westhern Rhodopes; a mandible from Stara Planina range - personal observations in the Karst museum, Chepelare and the National Museum of Natural History - Sofia). We could suppose that surviving in southern mountaineous refuges during the glaciations, the Mediterranean population has undergone some cross-breeding with the population of the nominat subspecies (*U. a. arctos*), invading from east on the Pleistocene-Holocene boundary, parallel to the reforestation.

Of the native population, the sub-population localized in the Iberian refuge and the isolated one of the southern parts of the Scandinavian Peninsula seem to be less affected by the crossbreeding (if we interprete the genetic researche results of TABERLET, BOUVET, 1994). Probably the contacts between these two sub-populations were maintained till later periods may be even during the period of the Upper Pleistocene interstadials, while the Balkan-Apennines native sub-population lost the contact with them much earlier. It looks possible that the ancestors of the population now located in the southern parts of the Scandinavian peninsula once used to inhabit more southern habitats and invaded their present area during the time of landscape changes on the Pleistocene/Holocene boundary. It is interesting also that the most southern parts of Scandinavia were not reached by Late Pleistocene glaciers (СЕРЕБРЯННЫЙ, 1980). Probably the crossbreeding of the native and the latter Holocene "invadrs" form was more active on the Balkans. According to different sources (ТИХОНОВ, 1987) similar crossbreeding processes between *Ursus arctos arctos* and *Ursus arctos syriacus* are on-going now in Caucasus. The Caucasian population also shows significant polymorphism, that

is similar to that of the Balkan population. It seems possible that the Syrian subspecies, characterised by lighter coloration is a form rather closer to the recent European-Mediterranean population and is a remnant of the ancient Mediterranean population. The polymorphism of the Caucasian population during the most recent times is explained by some autors by the occurrence of three ecomorhs, with no definite taxonomic status (KUDAKTIN, CHESTIN, 1993). However, the differences of the coloration patterns of the Balkan specimens do not indicate different biotope distribution. The fact that the larger and darker ecomorph occurs more often in the Northern Caucasus, while only the lighter colored one reaches far southwards in the Trans-Caucasian region, gives reasons supporting the hypotesis that the Caucasian ecomorphs are actually a result of post-Pleistocene cross-breeding of northern and southern sub-species. The Mendelian segregation of the physical features in three ecomorphs (KUDAKTIN, CHESTIN, 1993) could also be explained by this cross-breeding.

Conservational importance of Balkan and Bulgarian populations

The high conservation importance of the Bulgarian and the Balkan brown bear population is presupposed by two reasons:

1. The genetic specificity and isolation of the Mediterranean (including the Balkan) population.

2. The high population number of the Balkan bears, and especially the Bulgarian bears, compared to the other Mediterranean sub-populations.

The Balkan sub-population is the most numerous in the Mediterranean line and one of the largest in Europe following the Russian-Finlandian, the Caucasian and the Carpathian populations. Numbering 2700-3000 specimens (SORENSEN, 1990) it is much larger than the Spanish, the French and the Italian population counted together. At present the Bulgarian population is estimated to be some 750 specimens (СПИРИДОНОВ, СПАСОВ, 1993) and this makes it the fist largest among the Balkan populations, and at the same time it is among the largest European country's populations. Of the Bulgarian bears at least 180 inhabit optimal biotopes located in the protected areas with strict protection status - the National Parks and the Nature Reserves.

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Аргументи за късноплейстоценска изолация и за самостоятелен таксономичен статус на средиземноморската кафява мечка и консервационна стойност на балканската популация

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(Резюме)

Европейската мечка се поставя традиционно в подвида *Ursus arctos arctos* L. Последните морфологични и генетични изследвания показват, че таксономичната картина е вероятно по-сложна и че европейската мечка показва значителен полиморфизъм.

Българската и въобще балканската мечка е доста различна от по-северната популация и е в тясно родство с изолираните медитерански субпопулации. Това може да бъде обяснено с палеозоогеографски причини. Най-вероятно средиземноморските изолати (включително балканската мечка) са остатък от автохтонна популация, която сигурно е твърде близка на малоазиатската форма и през късния плейстоцен е представлявала единно цяло с нея.

В началото на холоцена по-мобилния номинантен подвид е нахлул от изток и е завладял обширни части от Европа, докато автохтонната форма е продължавала да обитава най-вече средиземноморски рефугиуми. Известно кръстосване вероятно е било осъществено между двете форми, по-силно в балканската област и по-слабо в пиренейската.