



Bear Conservation

Working for bears worldwide



Factsheet Number 1 – Bear Evolution



Display of *Ursus spelaeus* (cave bear) skeleton at Museum Geologicznego, Warsaw
(photograph by Jan Marucha)

The Bear Family

In evolutionary terms Ursidae, the bear family, is young having evolved from early canids about twenty to twenty five million years ago during the late Oligocene and early Miocene epochs.

There has been considerable debate and significant disagreement regarding bear taxonomy. However, at least for the purposes of this overview, the family can be divided into five subfamilies:

- 1 Hemicyoninae
- 2 Agriotheriinae
- 3 Tremarctinae
- 4 Ursinae
- 5 Ailuropodidae

Introduction

In the following sections we will briefly examine each of the above subfamilies and part of the lineage of the various genera and species found within them as they relate to modern bears. Today only eight bear species remain (see "The Bears") and a more detailed evolutionary history for each of these can be found in the relevant sections of our website at www.bearconservation.org.uk.

For a much more detailed summary of the body of knowledge regarding bear evolution an excellent place to begin is McLellan and Reiner's paper in "URSUS" 9(1) (1994) "A Review of Bear Evolution" from which much of the information in this article has been drawn.

1. Subfamily Hemicyoninae

The genera of *Hemicyoninae* from which all present day bears are believed to be descended is *Cephalogale*, members of which were initially about the size of a present day raccoon (excluding the tail, between 40 and 70 centimetres long). Over time they increased in size and some attained the size of today's brown bears. *Cephalogale* was an omnivorous predator, eating both meat and vegetation, and inhabited the forests of Eurasia from around twenty five million years ago and of North America from around twenty million years ago.

2. Subfamily Agriotheriinae

This subfamily included the genus *Ursavus* (and also *Indarctos* and *Agriotherium*). *Ursavus* is thought to have evolved in Europe from *Cephalogale*. *Ursavus* proliferated into many species in Asia and is ancestral to all living bears. These include *Ursavus*'s own subfamily *Agriotheriinae* plus the three remaining subfamilies from our list; *Tremarctidae*, *Ursinae* and *Ailuropidae*. A number of species evolved within these subfamilies and the general trend was for them to increase in size with time. The carnivorous so called "dawn-bear" *Ursavus elmensis*, about the size of a fox (excluding the tail, between 45 and 85 centimetres long), was the most primitive species of the genus and lived about 20 million years ago during the early Miocene epoch.

It is believed that two larger species evolved from *U. elmensis*; *U. primaevus* and *U. brevirohinus* with a further two larger still species *U. ehrenbergi* and *U. depereti* evolving from *U. primaevus*. *Protursus simpsoni* is believed to have evolved from *Ursavus elmensis* about 10 million years ago and given rise to the *Ursus* line through *Ursus minimus*, the Auvergne bear, between 6 and 5 million years ago. Although *Ursavus elmensis* is the first recognizable species of "true bear" known to have existed, it is believed to have been outlived by *Ursavus depereti* which is thought to have produced the genera *Indarctos* and *Agriotherium*.

3. Subfamily Tremarctinae

This is the first of the five subfamilies to have a surviving species, *Tremarctos ornatus*, the Andean or spectacled bear of South America. The subfamily is thought to be descended from the genus *Ursavus*, although fossil evidence is poor. In addition to the genus *Tremarctos* the subfamily includes the genera *Plionarctos* and *Arctodus* with the former believed to be the ancestral genus to *Tremarctos*.

As well as the Andean bear the genus *Tremarctos* consisted of a second species, *T. floridanus*. This appears to have been a heavily built bear of medium size and would have been slow moving. Extinction of this species occurred within the last eight thousand years for reasons as yet unknown.

4. Subfamily Ursinae

Mentioned in section two above, the Auvergne bear, *Ursus minimus*, was found in continental Europe as far east as the Black Sea in present-day Russia and southwards into what is now Italy. From *Ursus minimus* came *Ursus etruscus*, the Etruscan bear, which appeared in Europe around five million years ago. Like the dawn-bear the Etruscan bear was carnivorous although we know from its comparatively larger and flatter teeth that a significant part of its diet must have consisted of vegetation. It went extinct around 11,000 years ago at the end of the most recent glacial period. However, the bear's skeleton is very similar to that of today's Asiatic black bear and some scientists believe that this species is in fact a survival of the early, small variety of *U. etruscus*. Perhaps more likely is the theory that *U. minimus* gave rise to today's Asiatic black bears and American black bears (*U. thibetanus* and *U. americanus*).

The Etruscan bear increased in size and eventually evolved to be roughly the size of the present-day European brown bear and in this larger form gave rise to brown bears (*U. arctos*) in Asia and to the cave bear in Europe. Three species of cave bear have been

identified; *Ursus deningeri*, *U. spelaeus* and *U. savini*, all now extinct, probably due to a combination of circumstances including climate change and increasing competition from humans and brown bears.

Brown bears are thought to have first entered Alaska from Asia about 100,000 years ago but only began to move southwards through the North American continent around 13,000 years ago. It is now thought that the polar bear (*Ursus maritimus*) evolved from the brown bear to form a separate species as long ago as five million years. Recent research suggest that the two species may have interbred until much more recently.

Two further living bear species are part of the Ursinae subfamily; these are the sun bear (*Ursus malayanus*) and the sloth bear (*Ursus ursinus*), both found in southern Asia. Their origins are necessarily somewhat speculative due to the poor fossil record but are believed to have separated from the other members of the subfamily around six to five million years ago.

5. Subfamily Ailuropodidae

This is the subfamily of the giant panda (*Ailuropoda melanoleuca*). There has been considerable debate and dispute over the identification of Ailuropoda within the Ursidae. However, in the 1960s, 70s and 80s a number of papers were published based on fossil, genetic, molecular, protein, reproductive and anatomical research which clearly indicate that the giant panda belongs in the subfamily Ailuropoda which in turn is of the family Ursidae.

Again, a poor fossil record makes the phylogeny the giant panda speculative at best but the path seems to begin with *Ursavus primaevus* (see section two above) which produced *Ursavus depereti*, which produced *Agriarctos*, which in turn produced *Ailuropoda microta* and *A. melanoleuca*. *A. microta* was the smaller species and became extinct around one million years ago. *A. melanoleuca* is believed to have been larger than today's bears and to have a range which extended further southwards than today into Myanmar (Burma).

Conclusions

The evolution of bears is a complex and, at times, controversial subject. Here we have given a very brief overview of the five recognised subfamilies of the Ursidae (and some regard the inclusion of the first and last of those as questionable) and the place within them of the six extant species of bear. More information on the evolution of these six species can be found in the relevant pages of our web site and in the paper mentioned above and listed in the bibliography for this article.

Research into bear evolution continues and given the wide ranges of the Asiatic and American black bears and of the brown bear it seems highly likely that, in time, further species may arise. Sadly, it also seems increasingly likely that at least one of the present species, the polar bear, may well be extinct in the wild before the end of the twenty-first century. There are a number of simple steps that can be taken to help prevent such a turn of events and you will find suggestions and links to assist with this in our forthcoming factsheets on polar bears and climate change.

Citation

McLellan and Reiner's paper in "URSUS" 9(1) (1994) ["A Review of Bear Evolution"](#)