

Brown Bears: The Guile and Wile of Reproduction

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Female brown bears are driven to having many partners - not because of lust but as part of a sophisticated strategy for protecting future offspring. This surprising discovery is the result of a large-scale project by the Austrian Science Fund FWF in which the bear population in Scandinavia was closely observed in the wild. The data, that goes back for over 20 years, is published today and is contributing to a better understanding of this species which is once again becoming native to Europe.

The urge to reproduce has little to do with lust and a lot to do with population biology. Each creature would like to pass on its genetic information to the next generation, and is often prepared to go a long

way to gain an advantage. For example, male bears do not stop at killing the offspring of other fathers. A team from the Department for Integrative Biology at the University of Natural Resources and Applied Life Sciences in Vienna has now discovered an elaborate strategy used by female brown bears to counter this danger – numerous copulations with as many partners as possible.

Mean Genes

During the mating season from May to July, male brown bears have one overriding aim — to impregnate as many females as possible. A hindrance to this is females that are not yet in estrus because of existing cubs. Male brown bears have developed a simple and brutal way of getting round this problem. The offspring of other male bears are unceremoniously killed, meaning that the mother enters estrus again.

This instinctive course of action has two advantages. Firstly, the cubs that would have passed on the genes of other fathers are eliminated, and secondly the female is ready to mate and can be impregnated with the male's genes.

The killing of her litter has a big disadvantage for the female - the loss of a generation with her genetic material. The Austrian researchers have now discovered that females in bear populations where these killings of offspring are rife have developed a counterstrategy.

Protection Through Promiscuity

As project leader Andreas Zedrosser explained: "Normally a brown bear female only mates with one male. This however means that many other males will not see the cubs as their own and could possibly kill them. Things are different when the brown bear female copulates with a large

number of males. They will then believe themselves to be the fathers and leave the litter alone. In fact, 54% of the bear mothers observed during the project actually adopted this strategy."

When the female mates with several males the first partner is by no means always the biological father. On the contrary, the study strongly suggests that female bears are capable of controlling their ovulation and only decide on the sperm of a particular partner after fertilisation. Although it is not yet clear how this is possible, the data shows that two criteria in particular play an important role in the selection of the father - body size and the degree of heterozygosity (diversity of genetic information). The latter permits greater genetic diversity in the litter, and therefore improves the odds of survival for the entire population.

These surprising insights into finely balanced reproduction strategies were made possible by extensive observation of European brown bears in Scandinavia. Adult brown bears and females with their young were captured between 1984 and 2003, and fitted with radio transmitters in order to study their behaviour. The data analysed by the FWF project makes an important contribution to the previously under-researched study of the mating behaviour of European brown bears, a species which is also increasingly resettling Austria.

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