

Threatened badgers' breeding secrets

Further studies of complex breeding and social strategies in the British badger are under unprecedented threat. **Nigel Williams** reports.

Mammals, like other animals, use a range of tactics to maximise breeding success but there is often a sexual conflict which mismatches the best strategies for males and females. How these conflicts pan out represent a rich field of research for workers looking at evolutionary issues. In a new study, biologists from the University of Oxford explore the evidence that a rare tactic is used by female badgers to maximise their reproductive success. The authors argue that conception during pregnancy, known as superfetation, benefits female reproductive fitness by reducing the risk of infanticide, extending the female's window of opportunity for conception, and increasing the genetic diversity of the litter.

The European badger (*Meles meles*) is found in Western Europe eastwards across northern Asia. It shows a variety of social structures from pairs, small groups to large male and female assemblages and it is in Southern England that the most complex arrangements occur.

It is amongst these populations that researchers feel there is greatest potential to unravel the evolution of current reproductive strategies. "Natural selection and sexual selection act on both sexes. However, emphasis on sexual selection as a direct evolutionary force acting on males has diverted attention away from the selective process acting on females, whose discrete mating tactics may have masked the extent of reproductive conflict between the sexes," write Nobuyuki Yamaguchi, Hannah Dugdale and David Macdonald

at the Wildlife Conservation Unit at the University of Oxford, in the latest edition of the Quarterly Review of Biology (Vol. 81, No 1, March 2006).

One other related species is known to use this strategy — the American mink (*Mustela vison*). It is known to exhibit both superfetation and embryonic diapause — during which the newly fertilised egg temporarily ceases development and remains free in the uterus cavity instead of implanting directly into the uterus.

The female European badger first ovulates and is fertilised in late winter or early spring. However, implantation does not occur until December or January of the following year, a delay of nearly eleven months.

The combination of embryonic diapause and superfetation may benefit females by enabling them to mate with more than one male, the authors write.

The European badger is unique in exhibiting this range of social arrangements as all other species of badgers are primarily solitary.

But any future work on the complex breeding strategies of English badgers faces a major potential problem. The British government is considering a drastic cull of badgers in an effort to reduce the incidence of bovine TB. The proposal is controversial. While farmers are keen for it to

go ahead, badgers are for the most part well thought about amongst the public, being one of the country's largest native mammals. And many scientists feel the issue of a cull is less than straightforward. Tim Roper, of the University of Sussex and chair of the Mammal Society's scientific committee, who has written to the government both as a private individual and in his Mammal Society role, has done considerable research on badgers and TB. "Most of them don't carry the disease," he says. "There have been culls in 10 areas of the UK, covering 100 square kilometres each. There followed a 19 per cent reduction in tuberculosis among cattle in those areas. So the scientific evidence is irrefutable that badgers are involved. However, if you are only bring rates down by 19 per cent, then there is something else going on."

With the pressure on rural badgers likely to increase, one group of badgers is likely to come increasingly under the spotlight: urban badgers. Like many other mammals, they are adapting to human encroachment and are now found in several English towns. These animals may be vital for key future studies on the evolution of complex sexual strategies that these animals appear to have.



Sett to: European badgers show a range of social groupings, but populations showing the most complex forms are in England and now under threat. (Photo: Robin Redfern/Oxford Scientific OSF)