

# Life & times

JAPANESE SCIENTISTS HAVE SUCCESSFULLY CREATED CLONES FROM THE BODIES OF MICE FROZEN FOR 16 YEARS. AMY-JANE BEER CONSIDERS THE POSSIBILITY THAT SIMILAR TECHNOLOGY MIGHT BE USED TO RESURRECT EXTINCT SPECIES.

**S**ome time in the early or mid 1980s I watched a fur-clad figure, his body bowed against Arctic winds, stride purposefully across the TV screen. I think it was the BBC's children's news programme, *Newsround*. I forget the details, but the gist was that this man was going to scour Siberia in search of a perfect frozen mammoth. When he found it, he was going to use it to cheat extinction by creating a living, breathing, snorting, stomping great mammoth clone. It sounded far-fetched, but the image of this man setting out into a blizzard with what appeared to be nothing more sophisticated than a long pole for probing the snow stayed with me, and it comes to mind every time someone mentions the possibility of recovering extinct animals.



*Dolly the sheep was the first mammal to be artificially cloned. She was born in 1996 and died relatively young in 2003.*

## Fact and fiction

A few years went by and along with thousands of other people I found myself at my local cinema, lost in awe as a herd of *Brachiosaurus* fed placidly before me in widescreen splendour. *Jurassic Park*, still one of my favourite movies, is based on the idea that DNA extracted from the guts of blood-sucking insects preserved in amber could be used to recreate living dinosaurs. In the film, inevitably, things begin to go wrong and, in the ensuing 90 minutes of computer-generated carnage, the minor characters meet sticky ends while a team of heroic, good-looking scientists and two savvy kids do a lot of screaming but eventually save the day. It was all great entertainment, but the film also generated a lot of 'Could it happen?' type headlines. Was there truth in the pseudoscience

*The bodies of animals that died in the frozen northern landscape of the last ice age may be a source of genetic material that could be used to create living clones. (The scene in the picture is a fake, created for a television programme).*



portrayed in Michael Crichton's the novel or the film?

Fast forward to 1997 and the world was oohing and aahing over pictures of a decidedly normal looking sheep called Dolly, born the year before. Dolly was a clone, created by transferring the nucleus from an udder cell of a mature sheep cell into a denucleated egg, which was then implanted into the womb of a surrogate mother. A procession of other clones followed Dolly: mice in 1998, pigs in 2000, rabbits in 2002 and horses in 2003.

The possibilities of cloning have certainly not been lost on conservationists. January 2001 saw the first nuclear-transfer cloning of an endangered species. A cloned baby gaur (an ox-like Asian bovid listed as Vulnerable by the IUCN) was born to a surrogate domestic cow mother. The baby, known as Noah, died within 48 hours, from a mundane infection apparently unrelated to him being a clone. The fact that he was born at all was regarded as an important step forward. A cloned European mouflon lamb (IUCN Vulnerable) born later the same year, and a banteng calf (IUCN Endangered) born in 2003, both fared better and developed normally.

Recognition of the urgent need to maintain and increase population numbers and gene pools of declining mammal species is central to the mission of the Institute for Breeding Rare and Endangered African Mammals (IBREAM), founded in 2008. Surrogacy, artificial insemination and cryobanking all feature in their efforts to prevent future extinctions through groundbreaking research in reproductive biology.

## Deep freeze

In 2007 a Siberian reindeer herder literally stumbled over what turned out to be an almost perfectly preserved baby mammoth. Suddenly the raw materials for a cloning experiment involving a long extinct species didn't seem so hard to come by. But the specimen has been deep frozen for about 10 000 years – can genetic material survive that kind of treatment? The long-term viability of biological material has always been a major stumbling block for the mammoth or dinosaur cloning idea. Achieving perfect preservation is difficult enough under controlled laboratory conditions. Seeking it in specimens that have been subject to the vagaries of Earth's climate for thousands, even millions, of years still seems like folly. Even if they could be resurrected, where would they live, for starters?

But the same prohibitions may not apply to more recently extinct species, or to those currently teetering on the brink. Could we find

adequate preservation in the remains of the last thylacine (Tasmanian wolf), the last orang-utan, the last pure-bred Scottish wildcat? That surely is not out of the question. Indeed banking such material may be the logical next step.

Captive breeding programmes and reintroductions are fraught with risk and wholly unnatural, but in the last quarter century they've become almost routine in the dismal business of last-ditch conservation. So could cryo-cloning be a conservation tool for the 21st century? The possibility came a little closer last November when Japanese scientists published a piece of research explaining how genetic material from the brain cells of mice frozen at -20°C for 16 years has been used to create healthy embryos.

## What next?

The question of whether we could recreate certain extinct animals looks set to be answered in the affirmative. But what then? What use is a single animal, or even a herd of identical clones, all of the same sex? They would be little more than ghosts, conjured from oblivion by science as living, breathing museum specimens, unable to reproduce themselves or, in all probability, to live wild. If we could create both sexes, the gene pool would still be worryingly small. Does that matter? Genetic fingerprinting has shown that the entire

world population of cheetahs is descended from a tiny handful of individuals and it is well known that all the world's pet golden hamsters are descended from one litter collected in the 1930s. Obviously, species *can* survive genetic bottlenecks, but it's far from ideal. Inbred populations suffer abnormally high rates of birth defects and are vulnerable to extinction by chance events such as infections or climate conditions to which all individuals are equally susceptible.

Call it what you will – the holy grail, the elixir of life, the philosopher's stone – we've always dreamed of cheating death. Immortality and resurrection are appealing precisely because they've always been impossible. Conventional wisdom usually concludes that we're better off focusing our energies on making the most of our natural lifespan. In conservation terms, this equates to responsible stewardship and preservation of those species that we still have. As a supporter of PTEs, you'd no doubt agree that this is the right thing to do. But when it comes to the preventable tragedy of future extinctions of our making, could cloning technology be the ultimate let-off? It's questionable whether we deserve such a thing, but most of the species currently facing extinction deserve that fate even less.



*Japanese scientists extracted genetic material from the brain of laboratory mice killed and then frozen at -20°C for 16 years (top left). The genetic material was thawed and inserted into viable egg cells from which the native nucleus had been removed (bottom left). The resulting embryos were implanted into surrogate mothers and developed into apparently healthy babies (right).*

SAWAKA WAKAYAMA ET AL.

## Find out more...

### Scientific articles

Mouse clones from frozen tissue: *Production of healthy cloned mice from bodies frozen at -20°C for 16 years* Sayaka Wakayama et al; *Proceedings of the National Academy of Sciences of the United States of America*, November 11 2008, vol. 105 no. 45, pp17318-17322

Dolly the Sheep: *Viable offspring derived from fetal and adult mammalian cells* Wilmut, I., Schnieke, A.E., McWhir, J., Kind, A.J. & Campbell K.H.S *Nature*, Feb 11 1997, 385, pp 810-813

### Further reading online

*No more cloning around* Scientific American article by Sally Lerhman <http://www.sciam.com/article.cfm?id=no-more-cloning-around>

*Baby mammoth discovery unveiled* <http://news.bbc.co.uk/1/hi/sci/tech/6284214.stm>

### The IBREAM project

For information regarding the Institute for Breeding Rare and Endangered African Mammals, visit [www.ibream.org](http://www.ibream.org)

# Diary

## March...

### 13 WALKING WITH WOLVES, READING £25/30

The UK Wolf Conservation Trust provides a unique experience of walking with their socialised wolves through beautiful woodland. The wolves are handled by an experienced team and will interact with you, often walking in amongst you. Due to the length, pace and occasional rough terrain of the walk this event is not suitable for those with walking difficulties.

## April...

### 4 GORILLA PHOTOGRAPHY DAY, RHYTHE, KENT £80/90

Port Lymgne houses the largest and most successful breeding colony of western lowland gorillas in the world. On this event you will be photographing the bachelor gorillas as they feed in an open enclosure. Separated by a low wall and a moat, you may be just 20 feet away from the magnificent silverbacks. The event leader, Vic Sharratt, is a respected freelance photographer.

### 12 FANTASTIC FOXES, KENT £14/18

A wonderful opportunity to see fox clubs and learn many interesting facts about the animal. Your leader, Trevor Williams, will give a comprehensive illustrated talk and then you will meet the fox cubs in the intensive care unit.

All events are led by expert guides. Prices shown are for supporters and guests respectively. For more details, or to order a copy of our exciting 2009 events brochure call Nicola on 020 7498 4533 or visit [www.ptes.org](http://www.ptes.org).

### LAURIE CAMPBELL EXHIBITION:

**WILD NATURE**  
Wildlife photographer Laurie Campbell is a regular and generous contributor to Mammals UK. A selection of Laurie's work is being exhibited at the Scottish Birdwatching Resource Centre, Waterston House, Aberlady until 4 February 2009. For more information call 01875 871330 or visit [www.lauriecampbell.com](http://www.lauriecampbell.com)

