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Extinction need not be forever

Biotechnology can help to save endangered species and revive vanished ones. Conservationists should not hesitate to use it, says **Subrat Kumar**.

Charismatic mammals such as cheetahs and tigers are important for wildlife tourism. Yet in India, these and other species are in trouble — or worse. Cheetahs are already extinct here and the country's tiger population was put at just 1,706 in a census last year, down from an estimated 40,000 at the start of the twentieth century. The plight of the tiger is so dire that in July, India took the serious step of banning tourism in core areas of tiger reserves. The ban, which affected 41 tiger parks across the country and drew protests from tour operators and conservationists alike, was not lifted until October, when the government announced tighter regulations for visitors.

Pressures such as habitat loss have led to progressive decline in tiger numbers. Poachers are a bigger threat, and India lacks the funds, manpower and infrastructure necessary to curb the killing of these magnificent mammals. Efforts to protect surviving populations need to be stepped up. But it is high time that we, as a modern society, took on the problem of conservation with greater use of the advanced tools given to us by the tremendous scientific developments of the past few years.

People work hard at zoological parks around the world to breed endangered animals in captivity, but reliable repopulation strategies still evade us. Captive breeding has been successful in some cases, but it remains difficult to breed migratory birds and fish and large species, especially whales and dolphins. Even when such efforts are successful, there are often problems such as extensive inbreeding owing to small population sizes, a lack of immunity against disease in the inbred populations, induced behavioural changes (which can impair the hunting abilities of the released animals) and loss of habitat during the time animals are held in captivity.

Given the urgent need, it seems wise to pursue other approaches. We now have the technology to generate genetically modified organisms for research purposes or for use as biological-product factories. These advances in molecular biology can, and should, be used to revive lost species from their stored genetic material or to add genetic diversity to remnant populations. We must collect as many DNA samples from endangered, threatened and extinct species as we can, so that if the human population ever reduces its footprint on Earth, these species can be reintroduced.

Cloning and interspecies nuclear transfer are two possibilities, and there are others. Scientists in California, for example, have already produced stem cells similar to those found in early embryos using cryopreserved cells collected from critically endangered rhinos and monkeys. Researchers in Australia have done the same for the snow leopard. The ultimate goal is to convert stem cells from these threatened species into germ cells that could diversify the gene pools of dwindling populations. To be sure, technological gaps prevent this approach from being widely applied, but they can be filled.

All these efforts require genetic material from the endangered or extinct species. The 'frozen zoo' at San Diego Zoo in California has been maintained since 1976 and holds some 8,400 samples from more than 800 species and subspecies, including DNA, sperm, eggs and embryos, stored in liquid nitrogen. An Indian government laboratory in Hyderabad has started to bank blood samples from the country's endangered animals, but there are fewer than a dozen such facilities around the world. We need to establish more frozen zoos worldwide.

Could the technology also be used to attempt to revive extinct species from which we have already collected biological samples? Why not? I hope that at least one responsible government will be able to see the advantage that it can get from such a revival in terms of both tourism and science. If the species has unusual characteristics, scientists would be able to study its behaviour and capabilities. We could collect information on the animal's origins and evolutionary patterns, as well as bioactive compounds that could be useful for treating human diseases. Species revival is justified on scientific grounds, but we need strong political backing and long-term commitment for it to happen.

Some conservationists fear that a lost species revived in this way would cause ecological disturbances and compete with other species. The once-extinct species might even spread so successfully that it would wipe out other species. However, any species that we bring back could be engineered to be eliminated easily should it pose a problem. And the risk of disturbance from a single, previously native revived species is no greater than those we already face from the large numbers of invasive species introduced by human trade and travel. These risks, I argue, are negligible compared with the scientific and social benefits of reviving the lost species.

There was a time when travellers on a safari in the Indian countryside could expect to see Asiatic lions, Bengal tigers, Asiatic cheetahs and South China tigers, to name but a few species that are now extinct or on the verge of extinction. Biotechnology cannot address the poaching and habitat loss that are driving these animals out, but it can act as insurance to protect their future. ■

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