

MISCELLANY

Survival of the loudest

Research by the Whitley Wildlife Conservation Trust and the University of Exeter has shown that howler monkeys who call most often breed more. And the discovery could help zoos improve the way they care for the species.

Holly Farmer is Assistant Research Officer at the Trust, which runs Paignton Zoo, Living Coasts in Torquay and Newquay Zoo in Cornwall. Holly outlines her findings in a paper to be published in *Applied Animal Behaviour Science*: 'We have found that females who hear males calling breed more and that males who howl more breed more. In zoos, the more often adult males howl, the more likely they are to breed.'

The black howler monkey (*Alouatta caraya*) is the loudest animal in the Americas — apart from human beings, perhaps. The long call of the male has been recorded at 90 decibels and heard over two kilometres away. Holly, who has just been awarded her Psychology Ph.D. by the University of Exeter, has spent time in Argentina studying the species. Until now, breeding in zoos has been poor, but her research could help to change that.

'In the wild, females are attracted to dominant males who lead the howling,' says Holly. 'Males who howl more have an increased chance of reproductive success — we think that a similar thing is happening in zoos. Howling may display the fitness of males and maintain social relations.'

This information could help improve husbandry in zoos. 'We know that there is a positive relationship between howling and reproductive success, so encouraging individuals to call more could be a way of increasing breeding. We could consider introducing other groups into a zoo or play back the sound of animals calling to mimic the presence of others nearby. Howling is the behaviour which characterises this genus, and may be a good indicator of welfare, with animals living under optimal conditions both howling and breeding more.'

Abridged from a Paignton Zoo press release

A biological control for amphibian chytrid fungus?

Zoologists at Oregon State University have discovered that a freshwater species of zooplankton will eat the fungal pathogen which is devastating amphibian populations around the world. The zooplankton, a tiny crustacean called *Daphnia magna*, could provide a desperately-needed tool for biological control of the deadly fungus, the scientists said, if field studies confirm its efficacy in a natural setting.

When the fungus, *Batrachochytrium dendrobatidis*, reaches high levels it can disrupt electrolyte balance and lead to death from cardiac arrest in its amphibian hosts. One researcher has called its impact on amphibians 'the most spectacular loss of vertebrate biodiversity due to disease in recorded

history'.

The research (Buck et al., 2011) was supported by the National Science Foundation. 'There was evidence that zooplankton would eat some other types of fungi, so we wanted to find out if *Daphnia* would consume the chytrid fungus,' said Julia Buck, the lead author of the study. 'Our laboratory experiments and DNA analysis confirmed that it would eat the zoospore, the free-swimming stage of the fungus. We feel that biological control offers the best chance to control this fungal disease, and now we have a good candidate for that. Efforts to eradicate this disease have been unsuccessful, but so far no one has attempted bio-control of the chytrid fungus. That may be the way to go.'

The chytrid fungus, which was only identified in 1998, is not always deadly at low levels of infestation, Buck said. It may not be necessary to completely eliminate it, but rather just to reduce its density in order to prevent mortality. Biological controls can work well in that type of situation.

Amphibians have been one of the great survival stories in Earth's history, evolving about 400 million years ago and surviving to the present while many other life forms came and went, including the dinosaurs. But in recent decades the global decline of amphibians has reached crisis proportions, almost certainly from multiple causes that include habitat destruction, pollution, increases in ultraviolet light due to ozone depletion, invasive species and other issues. High on the list, however, is the chytrid fungus that has been documented to be destroying amphibians around the world, through a disease called chytridiomycosis. Its impact has been severe and defied various attempts to control it, even

including use of fungicides on individual amphibians. Chytridiomycosis has been responsible for 'unprecedented population declines and extinctions globally', the researchers said in their report.

'About one third of the amphibians in the world are now threatened and many have gone extinct,' said zoology professor Andrew Blaustein, co-author of this study and an international leader in the study of amphibian decline. 'It's clear there are multiple threats to amphibians, but disease seems to be a dominant cause.'

HerpDigest (www.herpdigest.org)
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Reference

Buck, J.C., Truong, L., and Blaustein, A.R. (2011): *Predation by zooplankton on Batrachochytrium dendrobatidis: biological control of the deadly amphibian chytrid fungus?* Biodiversity and Conservation (DOI: 10.1007/s10531-011-0147-4).

Stem Cells Made from Endangered Rhinos and Monkeys

Scientists have created the first artificial embryonic stem cells from two endangered species, a breakthrough that could help save animals from extinction. Using frozen cells stored at the San Diego Zoo, Jeanne Loring, professor of developmental neurobiology at the Scripps Research Institute, and her collaborators have created stem cells from frozen skin cells of two such endangered species — the drill monkey and the northern white rhinoceros. The northern white rhino (*Ceratotherium simum cottoni*) is one of the most endangered animals on

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Earth, while the drill (*Mandrillus leucophaeus*) - a West African monkey - is threatened by habitat loss and hunting. With countless endangered animals teetering on the brink of extinction throughout the world, the work of preservation has never been more important. The scientists report in Nature Methods that their stem cells could be made to turn into different types of body cell.

"The best way to manage extinction is to preserve species and habitats, but that is not always working," Oliver Ryder, director of genetics at the San Diego Zoo and co-leader of the study. About five years ago, Loring was contacted by Ryder, who was keen to collect stem cells from endangered animals. Obtaining stem cells by sacrificing the fertilized embryo of an endangered species was out of the question, so Loring tried to think of other sources, but came up empty. A couple of years later, in 2007, teams at the University of Kyoto in Japan and the University of Wisconsin in Madison revealed that cells called fibroblasts from human connective tissue could be coaxed into a state resembling that of an embryonic stem cell by activating a suite of reprogramming genes in the adult cells. This kind of science entails a fair amount of trial and error, and the researchers expected it would work with the drill because of previous studies on primates. But the rhino was a different matter.

Both animals, the researchers said, were chosen because they could benefit from stem cells now. For instance, the drill primate suffers from diabetes when in captivity, and stem cell-based treatments for diabetes being researched in humans suggest the same may work in these primates. The drill is closely related to the baboon

(genus *Papio*) and even more closely to the mandrill (*Mandrillus sphinx*). The rhinoceros was chosen because it is one of the most highly endangered species on the planet, with only seven animals, all in captivity, in existence. They haven't reproduced in several years, and because the population is so small there is a lack of genetic diversity, which could affect their survival. If the researchers can use the stem cells to make sperm and eggs from skin cells of deceased animals in the frozen zoo, they could reintroduce some genetic diversity into the population, while also increasing its size.

Source: *International Business Times*, 6 September 2011
 From *Animal Keepers' Forum*, Vol. 38, No. 10

Vietnamese exit

A critically endangered species of rhino is now extinct in Vietnam, according to a report by conservation groups.

The WWF and the International Rhino Foundation said the country's last Javan rhino was probably killed by poachers, as its horn had been cut off.

Experts said the news was not a surprise, as only one sighting had been recorded in Vietnam since 2008.

Fewer than 50 individuals are now estimated to remain in the wild.

<http://www.bbc.co.uk/news/science-environment-15453390>

Aquazoo/Löbbecke-Museum, Düsseldorf, Germany

In 2008 the Aquazoo/Löbbecke-Museum started a project called 'Protection and Breeding Station for Amphibians', which is supported by the environmental department of the city of Düsseldorf. Early in 2009 a special room for keeping and breeding frogs, toads and newts was established with 25 terrariums and two special racks of boxes for raising tadpoles. A conditioner and sprayers produce a special humidity- and temperature-controlled climate. There are two main colleagues working on the project and many others are supporting it in different ways. Apart from fire salamander (*Salamandra salamandra*) and Amazon milk frog (*Phrynohyas resinifictrix*), the species in our project are listed as either Endangered, Critically Endangered or Data Deficient. Our ambition is to do what we can to establish solid populations in captivity to avoid poaching in nature.

The first animals in the so-called 'frog room' were two species of mossy frogs, *Theloderma corticale* and *T. bicolor*, Marañon poison frogs (*Excidobates mysteriosus*), mandarin newts (*Tylototriton shanjing*), and two subspecies of harlequin toad, *Atelopus s. spumarius* and *A. s. barbatonii*. Since then we have also received Taylor's bug-eyed frog (*Theloderma stellatum*), Himalayan newt (*Tylototriton verrucosus*), red-eyed tree frog (*Agalychnis callydrias*), Amazon milk frog, and the local species common tree frog (*Hyla arborea*) and fire salamander.

Over the next two years we successfully bred all of the three *Theloderma* species. As is the case in other institutions, we have the problem that all *T. corticale* offspring are male. We have started to investigate the reasons and how to produce female individuals. After some problems in the beginning, we were also able to breed *E. mysteriosus*. *A. callydrias* is one of the most common frog species held in zoos, and like many other institutions the Aquazoo breeds it very successfully. With the offspring from these species we have been able to supply other zoos, zoological institutions and even private breeders. We have also achieved several egg depositions from *A. s. spumarius* and are now trying to establish the right conditions for rearing tadpoles and even juvenile harlequin toads. We are a little bit disappointed that we have not bred *T. shanjing* so far, although we know that other zoos have been successful with this species. We have observed several matings but have never produced eggs or tadpoles. The other species mentioned above have not been in the project long enough for successful breeding.

We are also restoring the habitats of our local amphibians. In 2008 we worked with many volunteers to clean up the ponds around the Aquazoo/Museum. Just a few months later our success was clear, because we observed the common toad (*Bufo bufo*) and several species of *Rana* and *Pelophylax* in our ponds, mating and breeding. We also support a local biological station in the research and re-establishment