

SPERM "ON THE ROCKS" - USING SEMEN CRYOPRESERVATION TO PROTECT AMPHIBIAN SPECIES

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A current research project funded by the Austrian Science Fund FWF is working to optimise the cryopreservation of amphibian sperm. The project aims to protect endangered amphibian species, which can be successfully reproduced using frozen sperm. The African Clawed Frog and the Mexican Axolotl are being used as amphibian models.

Throughout the world, almost 2,000 amphibian species are classed as endangered. Efforts to save these species in their natural environment have had only limited success and alternative approaches are urgently required. One possible alternative is the long-term storage of genetic material, which can be used for breeding purposes at a later date. A project run by the Austrian Science Fund FWF is currently attempting to optimise the cold storage – or cryopreservation – of sperm, which is a useful medium for the practical storage of genetic material.

EGGS & SPERM

The project manager, Prof. Robert Patzner from Paris Lodron University of Salzburg (Department of Organismic Biology) explains the advantages of sperm cryopreservation: "Although it is, in principle, technically possible to store eggs instead of sperm, the size, shape and contents of eggs are problematic for cold storage. The temperature exchange is not ideal and causes damage to the eggs. Sperm on the other hand can be collected from living animals and, due to its compactness, can be frozen under ideal conditions."

However, despite the clear advantages that sperm offers for cryopreservation, there is still a great deal of potential for optimising methods, and this is precisely the area that Prof. Patzner and his colleague Dr. Nabil Mansour are investigating. Parameters under investigation include: the optimum dilution medium, the concentration of the cryoprotectants used to lower the freezing point of the water in the sperm, the precise freezing rate and details of the subsequent thawing process.

The overall aim is to end up with sperm that is ideal for use in androgenesis, which is the development of a living being from exclusively paternal chromosomes. This process involves the use of frozen semen to fertilise eggs that have previously had their genetic material destroyed using UV radiation. Then, the fertilised eggs are subjected to a heat shock that causes the paternal genetic material to duplicate. This produces two sets of chromosomes in each egg, which is essential for the development of a viable amphibian.

This method is ideal for protecting endangered species as eggs can be taken from reared species rather than from endangered species. If these eggs are then fertilised with frozen sperm from endangered species, only offspring of the endangered species are produced.

SURVIVAL-OF-THE-FITTEST METHOD

Prof. Patzner explains how the success of this method is measured: "Naturally, the survival rate of the amphibians that are produced is the ultimate indicator of how successful the method is, and of course we will only be able to assess that once our work is completed. That's why we also monitor how genetic material develops in the fertilised eggs during the early stages of work. This enables us to assess how successful the process will be further down the line. However, the quality of the frozen sperm is also incredibly important. Once it has been thawed, we determine the percentage of spermatozoa that have died and check the motility and viability of the live sperm. If the sperm is of high quality, then there is a higher probability of success at the breeding stage."

Prof. Patzner and Dr. Mansour are keenly aware that semen cryopreservation cannot compensate for the worldwide destruction of the natural habitat of amphibians. However, there are many species of amphibian that face other threats, such as the recently identified fungal disease which kills up to 100 percent of an infected population. This is where the

cryopreservation and androgenesis techniques developed in this FWF project can provide an effective solution to help protect the survival of endangered species.

Image and text will be available online from Monday, 21st April 2008, 09.00 a.m. CET onwards:

www.fwf.ac.at/en/public_relations/press/pv200804-en.html

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