Stem cells from endangered species

Induced pluripotent stem cells (iPSCs) are very exciting for human disease modeling but may prove useful for entirely different applications as well. One such application is the study and possibly the preservation of endangered species. In this issue of *Nature Methods*, Loring and colleagues describe the generation of iPSCs from a primate, the silver-maned drill, and from the northern white rhinoceros. Both species are endangered, and the latter is close to extinction, with only seven known living animals. iPSCs provide an expandable source of cellular material for the study of these rare species. Generation of the cells is also the first step toward future application to assisted reproduction efforts. However, as argued in an accompanying News and Views, the application of iPSC technology to species preservation faces many formidable challenges.

**Article p861**

Microscope miniaturization

Despite great strides in miniaturization of many instruments, the fluorescence microscope has been quite resistant to this trend. Now Schnitzer and colleagues describe a completely self-contained miniature digital fluorescence microscope that includes everything but the computer. They built the 1.9-gram microscope using mass-producible parts including an LED for illumination and a charge-coupled device (CCD) for image capture. The large field of view it provides allowed monitoring of changes in microvessel blood flow and the detection of large-scale, synchronized Ca²⁺ spiking in the brain of a freely behaving mouse. Proof-of-principle experiments highlight the potential for other applications such as parallel imaging of multiple zebrafish and imaging of single cells for research or diagnostic purposes.

**Article p871, The Author File p781**

Optical sectioning alternatives

Confocal and two-photon point-scanning fluorescence microscopes are deservedly the laboratory workhorses for a wide variety of applications requiring optical sectioning in countless biology laboratories. But some researchers are increasingly turning to alternative optical sectioning microscopes based on planar or structured illumination. A primary advantage these microscopes provide is an increase in speed and/or lower irradiation. In a Review, Mertz provides an introduction to these alternatives based on first principles, and describes the advantages and disadvantages of each technique and the factors that need to be considered when deciding what to adopt for a particular application.

**Review p811**

Stable gene transfer

Transgene expression in mammalian cells is an important tool for basic research and also for gene therapy. But both variability in expression of the transgene itself and perturbation of endogenous genes at the insertion site can confound the interpretation of studies of gene function. Naldini and colleagues present an experimental analysis of the stability of transgene expression, the perturbation of endogenous expression and the perturbation of epigenetic organization upon zinc-finger nuclease–mediated site-directed delivery of transgenes to the CCR5 and AAVS1 loci in several human cell types. They observed that the AAVS1 site supports more robust transgene expression and is less prone to perturbation, and they provide guidelines for optimal cassette design for stable and nonperturbative gene transfer.

**Article p853**

Viral transgenesis in the cat

Genetically modified cats have previously been generated by somatic cell nuclear transfer (cloning). But this process is inefficient, and even animals that look normal can have aberrations at the cellular and molecular level. Poeschla and colleagues now describe methods for cat transgenesis using viral vectors to modify oocytes obtained from routine spaying procedures. They report efficient transgenesis, robust transgene expression, healthy kittens and germline transmission of the modification. To apply this methodology to the study of AIDS virus pathogenesis, they generated transgenic cats expressing antiviral factors from the rhesus macaque. Efficient transgenesis will increase the range of experiments that are possible in the cat and should contribute to an increased understanding of human and feline disease.

**Article p853**