

Bidding Bye-Bye to the Black Sheep?

Sheep already look so much alike that counting them helps people fall asleep. Now, they may become even more uniform. For the first time, researchers have demonstrated a technique that may lead to the mass production of livestock clones created from genetically altered cells.

Although scientists can create clones of genetically engineered mice, they are far less successful with livestock.

Researchers in Roslin, Scotland, report this week that they have succeeded in cloning sheep using a technique that they improved to produce potentially hundreds of animals. Moreover, the group expects to combine the method with genetic engineering to create animals with specific traits. Called nuclear transfer, the technique replaces the nucleus of an immature egg with a nucleus from another cell.

In the past, scientists obtained the replacement nuclei directly from cells in embryos. Now, Keith H.S. Campbell and his colleagues at the Roslin Institute are using nuclei from cells grown in a laboratory culture, they report in the March 7 NATURE. An embryo has no more than 30 or 40 usable cells, whereas a culture features an almost endless supply.

The new approach makes genetic engineering of these donor cells more feasible because a lab culture can supply so many of them to manipulate, says coauthor Ian Wilmut. A company could first select cells for cloning from prize animals, then improve them further with a gene that, for example, makes the animals produce milk rich in a therapeutic protein.

Many labs have tried for years to clone livestock using cell lines, "and now Campbell's group has done it," asserts George E. Seidel Jr. of the Animal Reproduction and Biotechnology Laboratory at Colorado State University in Fort Collins.

The success "is cause for celebration," exclaims Davor Solter of the Max Planck Institute for Immunobiology in Freiburg, Germany, who wrote a commentary accompanying the report. The finding opens the door to cloning mammals from adult cells, he adds.

In their study, the Scottish investigators grew embryo cells of Welsh mountain sheep in the laboratory. During a relatively stable stage of the cell cycle, they transferred 244 of the nuclei to the stripped-down eggs of Scottish blackface ewes.

They didn't have to fertilize the eggs, because the new nuclei had a full set of chromosomes. By giving the eggs an electric shock, they also took over the sperm's job of initiating development.

Thirty-four of the eggs developed sufficiently for the scientists to insert them into Scottish blackface ewes. After a week, they removed them from the ewes, discarded the failures, and returned the 19 healthy ones to their surrogate mothers.

Their efforts resulted in five genetically identical Welsh mountain lambs. Two of the lambs died within 10 days of birth, probably from kidney trouble. What caused the illness remains unclear. "The more you interfere with reproduction, the more danger there is of things going wrong," Wilmut acknowledges.

However, asking what failed with the procedure "is like asking what went wrong when [the Wright brothers] flew their plane and it went only 300 feet. . .

Things went remarkably well," Seidel observes. He expects the approach to be applicable to cattle and other livestock.

Might this approach work for cloning humans (SN: 2/5/94, p. 92)? Both Wilmut and Seidel agree it's theoretically possible but far from feasible. Besides, "we don't think it's something you'd want to do," says Wilmut. — T. Adler



Norman Russell/NATURE; Bill Ritchie/NATURE (inset)

Sheep clones with their foster mothers. Inset: sheep embryos.

One-man band: X-ray source plays two tunes

It pulses, it flickers, and some 20 times a day it emits a torrent of X rays more intense than the combined radiation of a million suns. Since bursting on the scene in early December, this bizarre astronomical object, a Milky Way resident that lies toward our galaxy's center, has ranked as the brightest known X-ray source in the heavens.

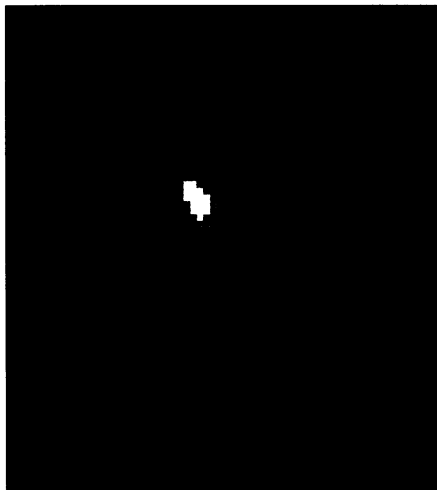
Though it's still the champ at X-ray wavelengths, the source's intensity has halved, and in a month or two the fireworks will probably fizzle altogether. That's why researchers are scrambling

to study this enigmatic system, which exhibits two types of X-ray activity—regular pulsing and sporadic bursting—never before seen in the same object.

Astronomers believe the object is a neutron star—a remnant of a collapsed star that packs the mass of the sun into a sphere no more than 16 kilometers in diameter. Some, perhaps even all, of the dazzling X-ray emissions stem from the violent interactions that ensue when the star steals mass from an orbiting companion.

Discovered Dec. 2, 1995, by NASA's Compton Gamma Ray Observatory (GRO), a spacecraft carrying X-ray and gamma-ray telescopes, this celestial source emits pulses of X rays every 2 seconds. At erratic intervals averaging about once an hour, it also emits an outburst of high-energy X rays.

Rapidly rotating neutron stars that act as X-ray pulsars, beaming radiation at regular intervals, are familiar to astronomers. And the GRO has recorded thousands of so-called gamma-ray bursters—objects that explode like flashbulbs, emitting high-energy radiation and then vanishing without a trace. But the new object, for-



Compton Gamma Ray Observatory/NASA

Image of the sky taken by GRO after Dec. 2, 1995 shows a new object (top), the bursting pulsar. Dashed line indicates the galactic plane of the Milky Way.