from her uterus and implanted in Holsteins, only one resulted in a live birth. If and when perfected, however, the embryo transfer technique could produce up to six or eight gaurs per year from a single mother, researchers assert, as opposed to the gaur's natural rate of one each year.

"Manhar," the infant ox whose name translates to "one who wins everyone's heart," boosted the hopes of zoo researchers around the world who worry about maintaining both numbers and genetic variety in animal species near extinction. As a burgeoning human community encroaches upon the specialized habitats of more and more animal species, zoos and animal preserves must assume a greater responsibility for maintaining healthy, representative populations of animals, says Richard Schultz, director of the St. Louis Zoological Park.

"I may sound pessimistic [about the preservation of endangered species in the wild], but I am very optimistic about the roles a zoo can play today," Schultz told SCIENCE NEWS. While the Bronx zoo focused on improving the reproductive success of a rare species with the embryo transfer technique, scientists at the St. Louis zoo concentrated on developing a reliable method of artificial insemination in a rare variety of antelope. A current recourse to inbred zoo populations is exchanging adult animals, Schultz says, a procedure that is costly, time consuming, and sometimes dangerous to both transported animals and their human handlers.

The accumulation of sperm banks, *in vitro* fertilization of ova, and intraspecific transfer of frozen embryos are other reproductive methods currently under research at various U.S. zoos. Although Bronx zoo researchers say they hope next to transplant embryos from the endangered Arabian oryx to the gemsbok, a more common antelope, further knowledge of the endocrinology and reproductive cycles of exotic species must be gained before cross-species transplants can come into common use.

"We're still learning a lot about just the basic reproductive physiology in these animals," says Janet Ott, a researcher specializing in reproduction in exotic animals at the Brookfield Zoo in Chicago. Before embryo transplants or artificial insemination can be useful reproductive tools, scientists need to understand each female's fluctuating hormonal cycles to be able to predict when fertilization and implantation are most likely to be successful. Conventional mapping of the cycles involves assaying the hormone levels in daily blood samples — a technique that is detrimentally stressful for most wild animals, Ott says. By developing a technique to measure the hormonal levels in urine samples instead, Ott can now unobtrusively map reproductive cycles of rare okapis, short-necked African relatives of the giraffe. She hopes to expand the technique's use to other species soon. □

Bell's theorem: Still not ringing true

It's difficult for many scientists to know just how to feel toward quantum mechanics. On the one hand, it has this reputation for predicting with unrivaled accuracy the outcome of experiments involving a comprehensive range of submolecular phenomena including elementary particles, atoms and electromagnetic radiation. On the other hand, it suggests, heretically to some, that our universe may be nondeterministic, that is to say, statistical in its basic structure. This seemingly is the concept being borne out by experiments done since 1972 and recently upheld by yet another similar experiment, noteworthy for its statistical significance.

Reported in the Aug. 17 PHYSICAL REVIEW LETTERS, this latest experiment, in some respects like others before it, employed visible photon pairs emitted by the energized calcium-40 isotope. In each such pair, the two photons emerge from the isotope with mutually opposite polarizations and in opposite directions. The ostensible object of this experiment was to record the number of coincidences, the number of occasions one detector was hit by a photon at the same time the opposite detector was hit by another photon, presumably the other member of the pair.

Experiments of this sort aim to test theoretical and philosophical developments that stem from a 1935 suggestion by Albert Einstein, Boris Podolsky and Nathan Rosen. They advocated the preservation of the determinism characteristic of classical physics and proposed a way to save it by introducing the notion of "hidden parameters." In short, they argued that the reason a particle's trajectory is ill-defined in quantum mechanics is not that it is ill-defined in reality, but because quantum mechanics does not take into account the existence of certain unobserved parameters that influence the particle's trajectory. Were we only to take account of these parameters, they argued, the uncertainty attached to the particle's movement would disappear.

In 1963, John S. Bell of the CERN laboratory in Geneva discovered that an empirically testable distinction exists between quantum mechanics and deterministic hypotheses, generally referred to as local realistic theories (these include, but are not limited to, the hidden-parameter theories). Specifically, this distinction relies on the discovery of a mathematical inequality, now named after Bell, that expresses a limitation on the number of coincidences that can be expected between correlated objects separated by a large distance, such as the calcium-40 photons, if any of these local realistic theories holds.

The recent experiment, carried out by A. Aspect, P. Grangier and G. Roger at the Optics Institute of the University of Paris, found that Bell's inequality was violated, and resoundingly so (the discrepancy exceeded 13 standard deviations), thus upholding quantum mechanics. The majority of previous experiments have come to the same conclusion, but this latest experiment further dispells lingering uncertainties by improving the statistics. □

Monoclonal antibodies tackle human cancer

A new immunotherapy against cancer is flexing its muscles: monoclonal antibodies — large batches of antibodies primed against a single enemy molecule (antigen). Last year monoclonal antibodies were used against tumors in animals and selectively targeted drugs against cancer cells. Now, for the first time, they have made cancer regress in humans, Richard Miller, Ronald Levy, James McKillop and David Maloney of Stanford University Medical Center in Stanford, Calif., report in the Aug. 1 LANCET and in the July BLOOD.

In 1975 George Köhler and Cesar Milstein of the Medical Research Council Laboratory of Molecular Biology in Cambridge, England, devised a means of mass-producing antibodies reactive against the same antigen (SN: 12/30/78, p. 444). They fused mouse cells making antibodies against a specific antigen to mouse tumor cells, creating new cells called hybridomas. The hybridomas inherited the quality of immortality from their cancer-cell progenitors and also the ability to produce antibodies from their antibody-producing cell ancestors. The hybridoma cells were then screened, and only those making antibody against the desired antigen were put into a test-tube to continue to multiply. The result: vast amounts of hybridomas making vast amounts of antibodies all directed against a desired antigen.

Miller and his co-workers then applied Köhler and Milstein's technique in order to make lots of mouse antibodies that react against a particular antigen that is much more plentiful on the surface of cancerous white blood cells than it is on the surface of healthy white blood cells. They injected the antibodies into six patients with leukemia or lymphoma (both white blood cell cancers) who had not responded to conventional cancer therapies. All six patients tolerated the antibodies without difficulty. The researchers had not been sure whether they would, since mouse antibodies are foreign proteins in the eyes of the human immune system, and the patients' immune systems could have triggered serious allergic reactions against the antibodies. The antibodies