tions remain to be answered about the use of this product, vaccination will now become an annual spring ritual for the bird collection.

Animals in zoos occasionally (but infrequently) develop aberrant behaviors that involve some degree of self-mutilation. Steroids are traditionally used in an effort to control these behaviors, but there can be negative side effects from their long-term use. We have successfully substituted a narcotic, naltrexone, to control this problem in an Amur leopard, a clouded leopard and a Prévost's squirrel. There have been no behavioral side effects and two of the animals have sired offspring. Several other institutions have expressed interest in using this treatment protocol. The mechanism by which the drug works in this condition is not known.

ZOOLOGICAL SOCIETY OF SAN DIEGO, U.S.A.

Extracts from the Annual Report 1990

In 1992 the administration continued to enlarge its innovative 'team approach' to exhibit management: bioclimatic areas were assigned for complete care to selected employees, who see to the plants, animals and maintenance, working as teams to manage and solve problems. This innovation brought about greater efficiency, stimulated 'pride in work', and produced many favorable comments from leaders in the zoological and business worlds.

The Society supported basic research and field conservation in the amount of $3.9 million. Further, 1992 saw the initiation of plans for a new veterinary hospital and CRES facility to be located at the Wild Animal Park. This complex, when completed, will be without a world peer and will ensure that the Society remains in the forefront of animal-related conservation and research. To our already prestigious CRES organization will be added a division of microbiology, which will be invaluable in the study of the many obscure diseases afflicting exotic animals.

The year saw the opening of the temperature-controlled greenhouse at the Park: this facility, constructed to house hummingbirds and butterflies, was an enormous success and attracted many visitors. In the coming year, the size of the exhibit will double, as well as the variety of species housed in it.

Caring for elephants has been a part of Zoo activities since the days of founder Dr Harry Wegeforth. Nevertheless, providing adequate husbandry for these huge animals has been shown to be one of the world's most dangerous occupations, and the Society is actively seeking ways to minimize risk to our personnel and to improve the well-being of the pachyderms. During 1992 at the Park, the elephant staff embarked on an innovative program of 'protected contact': with this method, elephants are trained to respond to a food reward. Implementing this program has required that elephant barns and demonstration areas be completely rebuilt. This program has attracted great interest from the zoo world, and we plan to introduce the new technique to the general public in 1993.

The Society's botanical collection was also a major focus. During 1992, a complete inventory of our plant collections at both campuses was concluded. This was a monumental job, to say the least, with the objective of having the animal, plant, library, photo lab, Frozen Zoo, and herbarium collections (the latter maintained at the San Diego Natural History Museum) accredited by the American Association of Museums. The Society has now, indeed, been notified of such accreditation, which places us among a few select zoos that have received status as museums.

Among notable animal events in 1992, two pygmy chimps were born at the Wild Animal Park, as was a male Indian rhino. A male black rhinoceros, Werikhe, was born at the Zoo, the first Zoo rhino birth ever. (The Wild Animal Park has had 100 rhino births: five black, 17 Indian, and 78 southern white.) A female sun bear, Elvira, was born in February at Sun Bear Forest. Three cheetahs were born at the Park, bringing to 104 those that have been born at the Park's CRES facility over the years. Two rare milky storks (*Mycteria cinerea*) hatched at the Zoo, and three painted storks (*M. leucocephala*) at the Park, a Society first. Other births and hatchings included, at the Zoo, a female Sumatran orang-utan and a northern koala, and at the Park, a Persian onager, a Somali wild ass, an okapi, and four San Clemente Island loggerhead shrikes (*Lanius ludovicianus mearnsi*), destined to be introduced into their native habitat [see *I.Z.N.* No. 242, pp. 62–63].

Three red-fronted gazelles (*Gazella rufifrons*) were received, the first to be exhibited in the United States. A male Komodo dragon came to the Zoo on loan from Cincinnati, and a male Sumatran rhino arrived to pair with the Zoo's female.

The Center for Reproduction of Endangered Species (CRES) enjoyed a banner year in 1992 with regard to external funding and scientific achievement. More than $1.5 million was obtained from various federal or state agencies, as well as private foundations and gifts, and more than 88 scientific articles and several dozen technical reports were written by the CRES staff. These numbers alone, however, do not tell the complete story. Important and often unique successes were achieved by each division.

Many of these accomplishments resulted from the ever-increasing involvement of CRES personnel in overseas projects. Many staff members are also involved at various levels with national and international conservation agencies. We are now members of no less than a dozen SSPs, special task forces, and advisory groups. Expert scientific input has benefited species as diverse as cheetahs, gorillas, condors, macaques, iguanid and varanid lizards, turtles, wild horses and dik-diks.

Dr Michael Worley and the virology/immunology division continued their examination of free-ranging koalas from parks in Australia to determine the prevalence of retrovirus infection. Because the majority of deaths in adult koalas are the results of cancer or opportunistic infections, there is a likely link between these causes and the presence of retrovirus.

The genetics division, under the direction of Dr Oliver Ryder, furthered their study of the genetic viability of the Przewalski's horse and its eventual restoration to its former habitats. During 1992, discussions with officials of the Mongolian government led to an agreement for future studies of endangered species of the Gobi Desert region. Arlene Kumamoto and her associates accessioned almost 300 samples into the Frozen Zoo, and the entire cell line collection now has samples from more than

300 species and subspecies.

The endocrinology division, headed by Dr Valentine Lance and Nancy Czekala, extended their collaborative work on species ranging from giant pandas to leatherback sea turtles. Reproduction of captive giant pandas has been poor, and assessment of reproductive cycles was needed for evaluation purposes. A new urinary estrogen assay will now allow the determination of the exact day of ovulation. This is important, as plans for 1993 include receiving giant pandas on long-term breeding loan from China; others will arrive at other U.S. zoos to form a 'breeding cluster' which will increase the gene pool for captive reproduction. Unlike the giant pandas, reproduction in endangered turtles is relatively common. However, to bolster wild populations, artificial incubation of eggs (especially to skew the clutches to female-biased sex ratios) has been highly effective. Dr Lance's work has now focused on determining the sex of hatchlings by obtaining a small blood sample immediately after hatching. Such a technique will allow others to establish proper incubation temperatures for individual species.

Dr John Phillips of the comparative physiology division, along with Drs Allison Alberts and William Gasaway, established new programs in Cuba and Namibia during 1992. In Cuba, the study involves examining the biology of the Cuban rock iguana. [See pp. 36–37 of this issue of *I.Z.N.*] The program in Namibia is more ecologically oriented, and is designed to examine predator-prey interactions in Etosha National Park.

Closer to home, the behavior division, headed by Dr Donald Lindburg, concentrated their efforts on four species – cheetahs, elephants, lion-tailed macaques and California condors. Two specific findings in this year were of primary importance. First, reproductive performance of captive-born condors was found to be non-existent in individuals paired exclusively during the first six months of life. Second, data from the cheetah facility at the Wild Animal Park suggest that female infertility may be of greater concern than problems with male fertility. To date, most investigations have assumed that poor reproduction in captivity was a male-oriented problem. Much of this work was a collaborative effort with the reproductive physiology division, headed by Dr Barbara Durrant. Together with her associates, Dr Durrant furthered their investigations in cryopreservation, with a notable study of Przewalski's horse semen. When sperm motility was examined, using various freeze-thaw methods, it was apparent that what had proved to be a superior technique for domestic horses was not necessarily an adequate one for Przewalski's horses. This suggests that techniques developed for domestic species may not be sufficient for exotics.

Dr Roya Lahijani and Robert Klieforth of the infectious diseases division extended their studies on the molecular biology of malignant catarrhal fever, a virus-induced disease that continues to affect ruminant species, particularly at the Wild Animal Park. The Society's pathologists, headed by Dr Marilyn Anderson and including Drs Robert Murnane and Bruce Rideout, continued their unenviable task in the necropsy room. The importance of their work and that of the diagnostic laboratory can be measured by the number of intramural and extramural institutions that make use of their findings – in 1992, that number exceeded 50 nationwide.

INTERNATIONAL ZOO NEWS

Birds International, Inc., Research and Breeding Centre, Philippines

The completion of a new facility for Loriinae in late 1992 increased the breeding accommodation available for these birds at the Centre by 100 cages, and 19 types were bred during the first half of 1993, many for the first time. Some of the more important successes include the rajah lory (*Chalcopsitta atra insignis*), cardinal lory (*C. cardinalis*), red-and-blue lory (*Eos histrio*), black-winged lory (*E. cyanogenia*), Obi lory (*E. squamata obiensis*), black-capped lory (*Lorius lory*), purple-naped lory (*L. domicellus*), yellow-bibbed lory (*L. chlorocercus*), musk lorikeet (*Glossopsitta concinna*), and Mount Apo lorikeet (*Trichoglossus johnstoniae*). The scaly-breasted lorikeet (*T. chlorolepidotus*) was one species which bred for the first time in 1993; the first chick hatched proved to be a double surprise, for not only was it the Centre's first successfully reared chick of this species, but it also proved to be a Cinnamon mutation.

The fig parrots are following their 1992 successes with even greater consistency in 1993. At the beginning of the current year great emphasis was placed upon producing parent-reared fig parrots; previously it had been easier and more productive to hand-rear the chicks. Following extensive research and the provision of new accommodation and dietary guidelines, large-scale parent-rearing is now being successfully achieved with all three *Psittaculirostris* species (Edwards', Salvadori's and Desmarest's), and also with the double-eyed fig parrot (*Opopsitta diophthalma*). The remaining species, the orange-breasted fig parrot (*O. gulielmiterti*) is currently the subject of much concentrated effort at the Centre and successful breeding is anticipated in the near future.

One particularly pleasing first breeding success (believed to be a world first) was the Centre's first breeding of the Guaiabero parrot (*Bolbopsittacus lunulatus*). To date, this species has proved almost impossible to establish in captivity on the few occasions that it has been seen in aviculture outside the Philippines, and even given the Centre's perfect climatic conditions and abundant supplies of natural food items, it has been one of the most difficult of all psittacines to establish in captivity. Now that a number of pairs are settled at the Centre and the first chick has been reared, it is hoped that further successes will follow before the end of the year.

Another pleasing first breeding was that of the great-billed parrot (*Tanygnathus megalorhynchos*). Birds had been successfully paired at the Centre for six years before the first eggs were laid. The two resulting chicks were both reared in the Nursery Department after spending