



CRES

CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

REPORT

FALL 2000

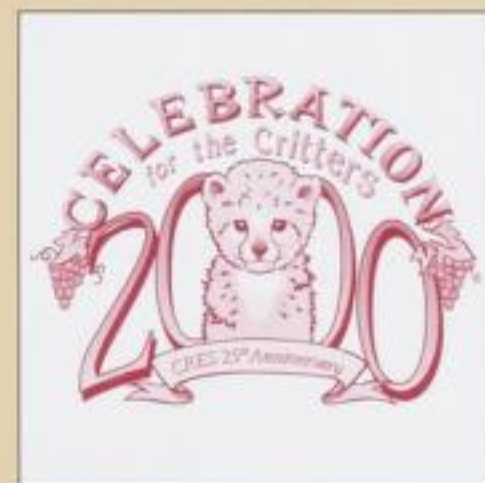
CRES® is operated by the Zoological Society of San Diego.



Bud Heller Fellow for 2000
Rhino studies under way in the virology/immunology division at CRES. See page 4.



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Come for Celebration for the Critters!
The "wildest" party in town is on September 23 at the San Diego Zoo. See back cover.

Focus on the Field: Ecology and Applied Conservation Join Forces

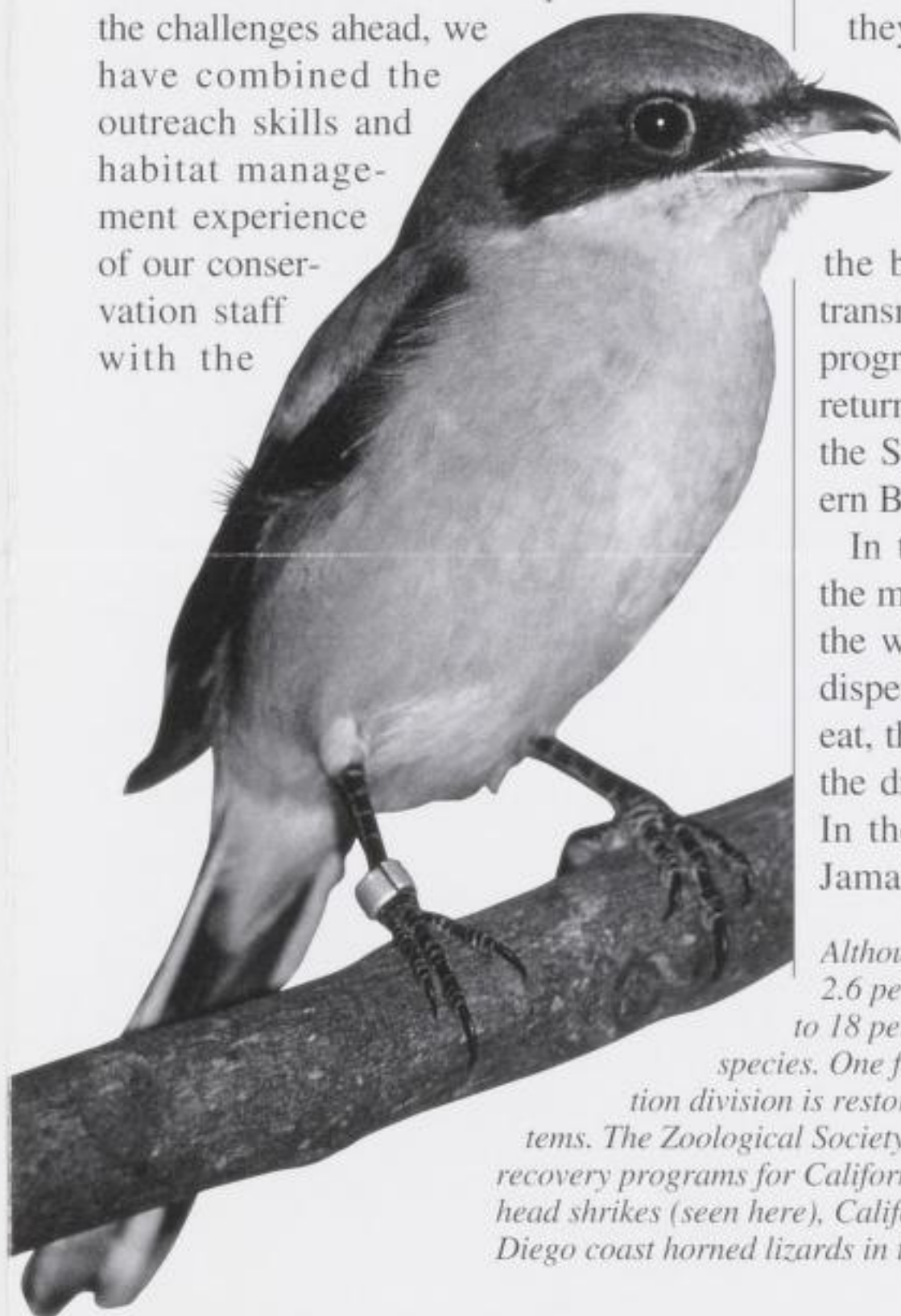
The recovery and preservation of the world's declining and sensitive flora and fauna is an immense effort, requiring the integration of research, education, and policy on a broad scale. This year, the CRES ecology division merged with the applied conservation department to form a new unit within CRES, devoted specifically to the conservation of endangered species in their native habitats. To help CRES meet the challenges ahead, we have combined the outreach skills and habitat management experience of our conservation staff with the

scientific background and expertise of our ecology research team.

The work of the CRES ecology and applied conservation division is focused on three broad wildlife conservation themes. The first of these is reintroduction of key-stone species to their natural environments. As scavengers unparalleled in their size and flight capabilities, California condors are exquisitely evolved for the ecosystems they inhabit. In collaboration with the Zoological Society's bird department, our group is leading the effort to restore this magnificent species to its native habitat. Once the birds are released, we use satellite-transmitter radiotelemetry to monitor their progress in the wild. This year, we hope to return condors to their ancestral habitat in the San Pedro Martír Mountains of northern Baja California.

In the Caribbean, we are reintroducing the most endangered lizards in the world to the wild. Because Caribbean rock iguanas disperse the seeds of the native plants they eat, their loss has serious consequences for the dry tropical forests in which they live. In the British Virgin Islands, Cuba, and Jamaica, we are collaborating with local

Although San Diego County comprises only 2.6 percent of California's land base, it is home to 18 percent of the state's rare and endangered species. One focus of the ecology and applied conservation division is restoration of our native species to their ecosystems. The Zoological Society of San Diego is an integral partner in recovery programs for California condors, San Clemente Island loggerhead shrikes (seen here), California least terns, snowy plovers, and San Diego coast horned lizards in the wild.



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Bud Heller Conservation Fellowship: A Focus on Black Rhinos

As recently as a year ago, Betty Jensen was conducting genetic crosses of the malaria vector, *Anopheles gambiae*, looking for a genetic basis of insecticide resistance. These days, as the Bud Heller Fellow for the year 2000, she is involved in molecularly cloning and sequencing the DNA of specific genes of the immune system that allows an individual to fight off infectious microorganisms. She is also busy codiscovering novel herpesviruses that may play some causative role in a variety of diseases seen in the species on which she works. But rather than working on six-legged invertebrates as she has for the last 20 years, Betty is now focusing her energy on helping sustain the captive population of the critically endangered *Diceros bicornis*, the black rhinoceros.

Established by the Heller Foundation of San Diego in memory of the late Bud Heller, the Heller Conservation Fellowship is awarded annually to an individual who will be working in one of the divisions at CRES, specifically on a species kept at the San Diego Wild Animal Park. The virology/immunology division of CRES pursues, as one of its priorities, an understanding of the immune system of rhinoceroses and the infectious agents that potentially threaten their long-term existence in captivity. Working with Dr. Michael Worley, head of the division, and Holly Trotter, research laboratory coordinator, Betty is applying a variety of molecular biological techniques to both identify rhinoceros-specific genes for subsequent analysis and for the discovery of novel pathogens.

Rhinoceroses diverged from their fellow odd-toed ungulates (horses, zebras, asses, and tapirs) approximately 55 million years ago. Once represented by more than 70 genera and filling every niche available to large mammalian herbivores, rhinoceroses are now limited to 5 extant species. As part of a global conservation strategy, some of these species are being intensively managed in national parks, sanctuaries, or zoological parks. One of the highest priorities for research on the black rhinoceros is to understand the genetic basis and causative factors of the many diseases seen in this species in captivity. These diseases include, among others, acute hemolytic anemia, chronic nonhemolytic anemia, hemorrhagic vasculopathy, fungal pneumonia, necrolytic dermatitis, mycobacterial infections, and chronic nonspecific weight loss.

Whether there are specific individuals or subpopulations of the species that are more or less likely to develop one or all of these diseases is unknown. Betty has been involved with determining the DNA sequence and level of genetic variation, among individuals, of two immune system genes



Betty Jensen, the Bud Heller Fellow for the year 2000, is seen applying polymerase chain reaction (PCR) products to an electrophoresis gel for DNA analysis. Individual DNA bands, separated with this basic technique, will be molecularly cloned and sequenced. Betty is applying these techniques to studies of rhinoceros herpesviruses and immune system genes.

that bind foreign proteins and present them to responsive cells. By utilizing genomic DNA samples isolated from the blood of more than 100 individual black rhinos, she and her co-workers have been looking for genetic patterns among these animals and will attempt to correlate these patterns with the presence or absence of specific diseases.

In addition to this extremely challenging project, Betty has been intensively involved with the discovery and partial sequencing of three novel herpesviruses that have been detected in blood or tissue-specific cell lines of the black rhinoceros. Herpesviruses are widespread in nature and cause a broad spectrum of diseases, some of which are similar to those seen in this species. Betty has been instrumental in developing assays for the specific detection of these viruses in the blood of living animals, and the molecular epidemiological data that emerges from this study may establish connections between viral infections and specific diseases.

Although the Heller Conservation Fellowship is awarded for only a 12-month period, Betty has already made significant contributions to better understanding disease issues in a highly endangered species. There is no doubt that the remainder of her fellowship will be as productive.

Michael Worley, D.V.M., Division Head,
Virology/Immunology at CRES