taking over the elephant's grazing areas which results in a permanent loss of the elephant's habitat.

Riddle's Elephant Breeding Farm and Wildlife Sanctuary, Inc. has many goals. The foremost being the establishment of breeding herds of both African and Asian elephants; building more facilities at our sanctuary for these animals; giving refuge to any needy elephants; and educating the general public about the importance of safeguarding these majestic creatures for future generations.

You can be very important in helping to protect these rare and unusual animals. We need your donations. For further information or to answer any of your questions, please contact: Scott or Heidi Riddle, Riddle's Elephant Breeding and Wildlife Sanctuary, Inc., Post Office Box 715, Greenbrier, Arkansas 72058. Tel: *(501)* 589 3291.

Press release

Reserve for Rare Rhino

In 1989 George Schaller, Wildlife Conservation International director for science, and three Vietnamese researchers found solid proof that the Javan rhino still existed in Vietnam. They estimated that perhaps 10-15 of the animals survived near the Dong Nai river, in the Budang district of Song Be Province. Last year Le Dien Duc, of the University of Hanoi, and other biologists surveyed Budang and two other districts with WCI support to identify the rhino's range and recommend areas for protection. On the basis of reports from local people that five or six rhinos live along the Dong Nai in Budang, the Song Be government has set aside about 66 square miles for a rhino reserve. In the Cat Tien district there are six or seven animals, and Duc and his colleagues are proposing that a reserve be created there too.

The only other place where this most endangered of species is known to exist is Udjong Kulon National Park, in Java, where there are about 50.

Wildlife Conservation International

For White Rhinos, Guarded Condition is Good News

Under the watchful eyes of 180 well-motivated guards, the world population of northern white rhinos jumped nearly 20% last year (1989) with the births of four babies to the rhinos in Zaire's Garamba National Park. Now numbering 26 up from a mere 15 in 1983 this subspecies of the white rhinoceros survives only in the 3,000-square-mile park. It once ranged through five countries in Central Africa.

The heavy poaching that nearly wiped out the sub-species and which together with habitat destruction, disease, and drought, has reduced all rhino populations by 85 percent in the past 25 years, came to a halt in Garamba six years ago when a vigourous rhino protection programme was launched. The Zairean government, with the help of conservation groups, increased the number of guards, raised their monthly salaries from US$ 4 to US$ 16, and provided uniforms, better equipment, and other benefits and pay incentives.

Muhindo Mesi, the park warden, plans to pursue yet another approach to save the rhinos in Garamba: actively courting the support of the 100,000 or so people living around the perimeter of the park, through a conservation education programme and, possibly, by improving goat and sheep herds to reduce the temptations for villagers to come to the park for meat.

The New York Times

Vitamin E Levels Measured in Rhino Browse Plants

Previous work in our laboratory and others has shown differences in plasma alpha-tocopherol levels between zoo (0.2 micrograms/ml) and free-ranging (0.8 micrograms/ml) black rhinos. Because this is a measure of vitamin E activity, the result suggested that many captive animals may be suffering from vitamin E deficiency. The original comparison was made with 31 blood samples taken during a 1988 translocation exercise in Zimbabwe. Later we measured plasma alphatocopherol in samples from 44 free-ranging black rhinos in South Africa, 7 in Kenya, 4 in Namibia, and an additional 24 animals in Zimbabwe. These results averaged 0.6,0.2,0.8 and 0.5 micrograms/ml respectively.

Because plasma and dietary levels of alpha-tocopherol are closely correlated, the differences seen among these various rhino populations suggested widely varying diets and/or habitat quality. To investigate this possibility, a collaborative field study with Fred K. Wawereu, Wildlife Conservation International, Kenya, R. DuToit, Zambezi Rhino Project, and R. Brett, World Wildlife Fund, Kenya, was organized to quantify alpha-tocopherol levels in major browse species consumed by black rhinos. Two national parks and two private reserves in Kenya, and the Zambezi Valley, Zimbabwe, were chosen as study sites.

Tocopherols must be extracted from fresh plant tissues, and, to our knowledge, have not before been measured in a field study. In order to do so, a portable laboratory containing necessary chemicals and a hand-held homogenizer, as well as a full-sized tank of nitrogen gas, was loaded into vehicles and taken to makeshift labs. Converted storerooms or kitchens generally met our relative minor requirements of bench space, electricity and water, although we were treated to a proper laboratory at the Rukomechi Tsetse Fly Research Station in the Zambezi Valley! Samples were weighed, homogenized, extracted, evaporated, reconstituted, sealed, and freezer-stored until shipment back to the United States for high-performance liquid chromatography analysis.

The experienced African field researchers identified a minimum of ten species of major food plants for each site. Results indicated wide variation in vitamin E levels in fresh rhino browse plants. Leaves contained two to fifty times more alpha-tocopherol than stem fractions of the same plant; mature tissues had higher concentrations than young, growing tissues. Environmental

variables appeared to influence vitamin E levels in browse significantly, but were not taken into account in this preliminary study. Rainfall, temperature and sunlight effects on alpha-tocopherol metabolism in plants are currently being examined in controlled greenhouse studies.

Whole plants ranged from 4.1 *(Acacia drepanolobium)* to 420.9 *(Scutia myrtinus)* mg alpha-tocopherol per kg dry matter which is equivalent to 6-630 International Units of Vitamin E activity/ kg (1 mg = 1.49 IU). Dietary levels of alpha-tocopherol from various locations (unweighted means) did not correlate well with the plasma levels previously measured in animals from the various sites. For example, the twenty-seven Zambezi Valley plants averaged 45.5 mg/kg alpha-tocopherol (range 6.4 to 191.8) whereas the Kenyan location, which had the animals with lowest plasma alpha-tocopherol, averaged 154.2 (range 21.2 to 420.9). Reasons for this apparent discrepancy are being investigated.

Nonetheless, about 60% of the plants sampled contained vitamin E levels greater than 50 lU/kg, the current National Research Council recommendation for dietary vitamin E in horses. These data, though limited, should provide excellent guidelines for use in formulating appropriate levels of vitamin E supplementation for zoo rhinoceros. Based on field observations, diets fed to black rhino should contain a minimum of 150 IU, and more likely 250 IU vitamin E per kg of dry matter. Future projects will be designed to investigate seasonal and other environmental as well as physical (i.e. fire, grazing pressure) influences on vitamin E in plants, in an effort to refine not only herbivore feeding recommendations, but also plant conservation in relevant locations.

Ellen S. Dierenfeld, *The Rhino Conservation Newsletter*, I, No 3 (Autumn 1990).

Black Rhinos Sold to Private Owner in Southern Africa

History was made on June 18, 1990, when the Natal Parks Board auctioned a founder population of five black rhino to a privately owned nature reserve. Lapalala Wilderness successfully bid 2.2 million rand for the two bulls and three cows.

Because the black rhino is so highly endangered, South Africa, like Kenya and Zimbabwe, is turning to controlled breeding in small discrete reserves to ensure the species' survival. Assessments by the Natal Parks Board and Peter Hitchens, a black rhino specialist, found the 24,400 hectare Lapalala Wilderness to be one of eight private reserves in southern Africa considered suitable for black rhino introduction. It is located in the Waterberg Mountains in the northwestern part of the Transvaal province, a region from which black rhinos have been absent for over 100 years.

The rhinos 900 kilometre trip to Lapalala Wilderness was supervised by Dr Martin Brooks of the Natal Parks Board. On August 8, 1990, the animals were immobilized by Parks Board veterinarian Peter Rogers, at which time body measurements were taken and ears were notched for future field identification. Also at this time, the tip of each rhino's horn was cut off as a precaution against injury to one another. The horn tips will be used in a DNA fingerprinting study being undertaken by Dr Anthony Hall-Martin of the National Parks Board of South Africa.

Upon their arrival on August 9, they were released into specially constructed enclosures within a 10,000 hectare game-fenced section of Lapalala Wilderness to undergo a settling in period before their release. As of October 12, 1990, the rhinos were still being held in the enclosures and doing very well. The release process was to begin in late October, 1990, after the rainy season had commenced and the quality of the habitat had improved.

Clive Walker of Lapalala Wilderness admits that there is some controversy about turning black rhinos over to private owners, but he believes most would agree that it is wise and that it will continue to occur. The significance of the event to the private sector can be gauged by the price that was paid for the privilege of acquiring the five rhinos. As stated by Clive Walker: "This is a great responsibility for us at Lapalala Wilderness. This opportunity arises from the confidence the Natal Parks Board has placed on the private sector in allowing these animals to go onto private land. We are only too aware of what has happened to the black rhino across Africa; southern Africa is their last stronghold and we are happy to be part of their conservation. A great deal will be expected of us and we will have to measure up to those expectations."

The Lapalala transaction was of great economic benefit to the Natal Parks Board because sale proceeds were used to provide funding for its various conservation programmes. Of even greater significance, however, was the fact that for the first time ever in South Africa, black rhinos were assigned an economic value. This could potentially prove helpful in the courtroom, as judges can now take into consideration a replacement cost in assessing penalties against rhino poachers. Increased fines and stiffer sentences are being called for in South Africa where the current penalty for rhino poaching is only 1,500 rand or one year in jail.

The Rhino Conservation Newsletter, I, No 3 (Autumn 1990).

Time to go!