THE ELEPHANT PROJECT OVERVIEW

The global export of elephant ivory was banned in 1989 by the Convention on International Trade in Endangered Species (CITES) in a frantic effort to save the African elephant from catastrophic decline and possible extinction. From 1979 to 1987 the elephant population plummeted from 1.3 million to 600,000 (a 60% reduction), with up to 70,000 elephants being poached every year to satisfy the 80-ton global demand for ivory.

Many African countries stepped up conservation plans to improve habitats for the elephants and to aggressively pursue poachers and illegal marketers. By the mid '90's, some of these protected elephant populations had increased in such numbers that park rangers were given permission to kill entire families of elephants (culling). At the CITES conference in April 2000, Botswana, Namibia, Zimbabwe and South Africa requested to relax the ban to allow sales of their stockpiled ivory. Many other countries wanted the ban to stay in effect, fearing that opening up the market to this "culled" ivory would offer poachers a market for their "harvest" of ivory. It was agreed that more effective ways of determining the impact of ivory sales upon poaching must be developed before opening the ivory market.

Two Seattle scientists began using molecular biology techniques to determine the characteristics of specific populations of African elephants. Dr. Sam Wasser of the University of Washington and Dr. Kenine Comstock of Fred Hutchinson Cancer Research Center collaborate with researchers in various African countries to collect and analyze genetic data from elephants. The goal is to develop a genetic method for assessing the geographic origin of disputed elephant ivory to inhibit illicit ivory from entering the market. This involves matching the genotype from a piece of ivory to the continent-wide distribution and frequency of elephant-specific markers.

Using a non-invasive technique of collecting DNA used by Dr. Wasser in the study of grizzly and black bears, DNA can be isolated from the intestinal epithelial cells that are sloughed off and deposited in the abundant supply of the animal's dung. Because of the biohazard issues involved, Dr. Nick Georgiadis in Africa extracts the DNA, then sends the "raw" DNA to Dr. Comstock. At her lab at FHCRC in Seattle, she and her colleagues use a variety of techniques to isolate and amplify mitochondrial genes and microsatellite DNA markers. Wasser's work demonstrates that DNA can be extracted from any part of a tusk/ivory since it is essentially the dentin of a highly modified incisor tooth.

To date, Dr. Comstock has identified seventeen elephant-specific markers. In the spirit of this ongoing work, this simulation is designed to give students the experience of performing a DNA restriction digest, analyzing results of a gel electrophoresis, and contributing "new" data to the collection of DNA markers. The simulation includes matching DNA from a piece of confiscated ivory to a known population of elephants, and allows students to explore their own values about species conservation using an ethics module.

Consistent with the nature of all scientific research, new discoveries lead to new understandings, which in turn can shape the course of events in unexpected ways. When we began developing the Elephant Project there were two recognized elephant species, the African Elephant, *Loxodonta Africana,* and the Asian Elephant, *Elephas maximus*. In the past year genetic research has demonstrated that there at least 2, and perhaps even 3 distinct species of African Elephants. This and other recent events emphasize the dynamic nature of the science, and the politics, associated with an issue as complex as elephant conservation.