SCIENTIFIC ABSTRACT OF DR. COMSTOCK'S AND DR. WASSER'S WORK

A Genetic Method for Tracking the Origin of Poached African Elephant Ivory

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International trade in African elephant (*Loxodonta africana*) ivory was banned in 1989 by the Convention on International Trade in Endangered Species (CITES) after a poaching-related, continent-wide decline from 1.3 million to 600,000 elephants was documented between 1979 and 1987. Since that time, elephant populations have increased in several southern African countries. At the CITES meeting in April, 2000 Botswana, Namibia, Zimbabwe and South Africa withdrew their proposals for relaxing the ban to allow sales of their stockpiled ivory. Many other nations had requested that the ban remain in place, fearing that future opening of the market will renew incentives to poach ivory throughout the continent. There was a general agreement that more effective ways of determining the impact of ivory sales upon poaching of elephants throughout Africa must be developed before allowing more sales.

To this end, we are developing a genetic method for assessing the geographic origin of disputed elephant ivory samples and hence the portion of illicit ivory entering the market. This involves matching the genotype from a piece of ivory to the continent-wide frequency and distribution of elephant-specific microsatellite marker alleles. The characterization of polymorphic elephant microsatellite markers has recently been described by us and others (Nyakaana *et.al* 1998, Comstock *et.al* 2000). We will describe a method by which DNA can be isolated and amplified using primers for both mitochondrial genes and microsatellite markers from small amounts of ivory stored at ambient temperatures for long periods of time, without any visible tissue attached, sampled essentially anywhere along the tusk.

Critical to the success of our method is the presense of sufficient differences in microsatellite allele frequencies to distinguish elephants from different countries. To test this, samples from African elephants were analyzed to determine if there are differences in the frequencies of microsatellite marker alleles between populations located in different countries. Tissue samples were collected from Gabon, Camaroon, Central African Republic, Namibia, Congo, Botswana, Zimbabwe, Congo-Brazaville, Tanzania

and South Africa. Primers specific for two microsatellite markers were used to amplify alleles. We observed a very strong correlation between allele size and whether an elephant was classified based upon physical characteristics as a forest elephant or a savannah elephant. Distinguishing savannah elephants from forest elephants is particularly important because an estimated 30-50 % of Africa's remaining elephants are central African forest elephants and the sale of ivory from these countries will remain strictly banned. This is the first example of a nuclear marker which can distinguish forest elephants and savannah elephants, and as such provides evidence that elephants are genetically subdivided by geographic region.