WHY IS THE SALE OF IVORY FROM AFRICAN ELEPHANTS CONTROLLED OR BANNED?

Ivory has been prized globally for thousands of years, since it was widely introduced by the armies of Alexander the Great. The ivory and slave trades later fed on each other as traders captured men and women to carry the tusks to their ships. Early in the 1900s, colonial administrators, concerned at the alarming depletion of elephants and other animals, passed hunting laws and set aside wildlife reserves in Africa.

Beginning in the 1960s, the killing of African elephants escalated once again as automatic weapons became plentiful and the demand for ivory increased, especially in Hong Kong, Japan, and Europe, where it was reworked into carvings. Ivory carving moved to the assembly line and the price for ivory rose from $3 to $125 per pound. The result: between 1979 and 1988, the population of African elephants dropped from 1.3 million to 750,000. By 1992, only 600,000 African elephants remained. Over 700 tons of ivory, representing tusks from more than 70,000 African elephants, were being sold annually. Some wildlife experts feared that the species might be extinct by 2025.

In 1985, increasing levels of elephant poaching persuaded countries of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) to establish quotas for the sale of ivory. It was soon decided that the quotas were not effective. Only 16 of the 35 African countries that agreed to the quota system complied. Illegal ivory traders altered trade routes and used regulation loopholes. In 1988, over one-third of the world's raw ivory was shipped out of Burundi – a country that then had only one elephant. Penalties for ignoring the quotas were too mild to stop the illegal trade. Fines of as little as $3000 were levied on people smuggling $400,000 worth of ivory.

Kenya, Gambia, and Somalia argued in favor of a total ban on the ivory trade at a CITES meeting in 1989. They wanted the African elephant placed on CITES Appendix I list, which mandates a total ban on commercial trade, rather than the Appendix II list, which allows a limited trade. Zimbabwe, Botswana, and South Africa, all with large elephant herds, lobbied for an Appendix II listing, as did several Hong Kong business interests. CITES voted to temporally impose a total ban in 1990. Zimbabwe, Botswana, South Africa, and Malawi voted against that resolution.

In 1989 the United States passed the African Elephant Conservation Act. This law makes it illegal to export or import raw ivory from countries in violation of CITES controls. A person who provides information leading to fines or criminal conviction may receive a reward of up to $25,000.

After the 1990 ban went into effect, the demand for ivory declined dramatically. By 1993, the black market price had dropped to $5 per pound. Only 50 elephants were killed by poachers in Kenya in 1993, compared with thousands annually prior to the total ban.

Despite restrictions on the ivory trade, the African elephant is still at risk. Some African countries and countries elsewhere in the world involved in the ivory trade continue to exert political pressure to downgrade the status of certain elephant populations to the CITES Appendix II list.

References:

Moss, C. 2000. Elephant Memories. University of Chicago Press, Chicago, 364 p.

http://www.american.edu/projects/mandala/TED/ELEPHANT.HTM
http://international.fws.gov/global/cites/cites.html
(Web sites active in June 2002.)

USES FOR IVORY

WHO ARE THE MAIN BUYERS OF IVORY?

Buyers and business people and tourists from Italy, Portugal, Korea, Spain, China, France, Belgium, Japan, Cameroon, Nigeria, Arab countries, Germany and America are the primary buyers of ivory "raw" and "worked."

WHAT DO THEY DO WITH THE IVORY?

Some tusks are exported as "raw" ivory to a country, where it is purchased by someone who wants to carve it. Much of the ivory is carved into objects in Africa or nearby countries, then exported as:

Jewelry, necklaces, bracelets, rings, Earrings, watch faces Hair combs, hair clips and pins Paperknives (letter-openers) Knife and gun handles Handles on "silverware" Belt buckles Rosary beads Billiard balls Chess pieces Toothpicks Chopsticks Cigarette holders Tobacco pipes Napkin rings	Umbrella handles Walking sticks and canes Assorted figurines and sculptures Nativity scenes and religious figures Inlaid designs on furniture Inlaid designs on guitars, violins, etc Piano keys Key chains Oriental name seals Lamp stands and candleabras Designer masks Pen holders Razor handles Vases

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SAM K. WASSER, PH.D.

(Adapted from the Department of Zoology, University of Washington)

Dr. Sam Wasser received his Ph.D. from the University of Washington in 1981. His research uses endocrinology and molecular biology techniques to address questions concerning conservation and evolutionary biology in free-ranging wildlife. He has been particularly interested in the evolution of mechanisms that enable mammals to control the timing of reproduction in response to environmental pressures.

To facilitate these studies, Dr. Wasser pioneered the development of noninvasive techniques to extract steroid hormones from feces of free-ranging wildlife. Over the years, he began applying these techniques to conservation problems, using fecal stress hormone measures to demonstrate the relative impacts of various timber harvest techniques on physiological stress in Northern Spotted Owls. Dr. Wasser, along with other scientists in Africa and the U.S., used these techniques to examine long-term consequences of poaching on African elephants. Realizing the power of this noninvasive technology, he also developed techniques to measure DNA in feces.

His laboratory has since applied noninvasive fecal DNA techniques in mark/recapture models to estimate the number and distribution of a variety of wildlife species at risk. They also applied these fecal DNA techniques to wildlife forensics. The ease of sample collection has enabled scientists to develop highly accurate geographic maps of gene frequencies for use in tracking the origin of poached ivory from African elephants.

KENINE E. COMSTOCK, PH.D.

Dr. Kenine Comstock recent work at the Fred Hutchinson Cancer Research Center in Seattle involved developing a genetic method for assessing the geographic origin of ivory that is entering the market. She and other scientists use molecular techniques to isolate tiny repetitive regions of DNA (called microsattelites). These DNA fragments are electrophoresed and used as markers to identify unique populations of elephants. Dr. Comstock's work will be used to create a geo-genetic map of Africa that shows the allele frequencies of the elephants and the regions where those alleles are found.

Dr. Comstock received her Ph.D. from the Oregon Health Sciences University in Portland Oregon in 1993 in Biochemistry and Molecular Biology. She graduated from Oregon State University in Corvallis Oregon in 1984 with her B.S. degree in Biology.

Since 1984, Dr. Comstock has worked as a Research Technologist at the Shriner's Hospital for Crippled Children in Portland, and then as a Postdoctoral Fellow at the Cystic Fibrosis and Pulmonary Research and Treatment Center in North Carolina. In 1996, Kenine came to the Fred Hutchinson Cancer Research Center to continue her Postdoctoral Fellowship in conjunction with the University of Washington and The Center for Wildlife Conservation at the Woodland Park Zoo.

Dr. Comstock has published (or has been a collaborator for) eight separate articles on her various research projects, and has a patent on a invention for using PCR in determining a gene deletion status.

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.

Anatomy

Size – Savannah male elephants weigh up to 13,000 pounds (6,000 kilograms) and grow up to 11 feet (3.3 meters) tall, while females weigh up to 7,700 pounds (3500 kilograms) and grow up to 8 feet tall. Forest elephants are smaller and only weigh up to 7,040 pounds (3200 kilograms) and grow up to 9 feet (2.7 m) tall.

Skin and Hair – The skin of an elephant is usually gray in color and may be as thick as 1 inch (2.5 cm) on the head, back, and the soles of the feet, but paper-thin on the backside of the ear, or around the mouth. (It is the thick skin of the elephant that is referred to when the term "pachyderm" is used.) Elephants have very little body hair, which is concentrated around the eyes, ear openings, the chin, the trunk, and the end of the tail.

Trunk – The trunk is a fusion of the nose and the upper lip of an elephant. It contains the nostrils and is equipped with 2 fingerlike projections for handling small objects. It is a highly sensitive, and strong organ equipped with an estimated 150,000 muscle units. An elephant can pour about 9 liters of water into its mouth at a time by sucking water into its trunk.

Teeth and Tusks – Elephants have 26 teeth during their lifetime including 12 deciduous premolars, 12 permanent molars, and 2 modified upper incisors called tusks. Tusks are present in both males and females, and grow continuously at a rate of about 7 inches (18 cm) per year. The maximum size for one tusk is approximately 287 pounds (1130 kg) and 7.7 feet (2.2 m) long, with the average being about 134 pounds (61 kg). Only two-thirds of the tusk is visible because the rest is embedded in the socket in the skull. An elephant's tusk (like a human tooth) has pulp cavities which contain blood vessels and nerves.

Life span

The average life span is between 60 and 70 years.

Diet

Elephants are herbivores. They eat grass, reeds, shrubs, herbs, seeds, fruit pods, tubers, and all parts of trees. An elephant can use the projections on the end of its trunk to pluck individual leaves or fruits from a plant, or use its sharp-edged toenails to dig up roots and tubers. Feeding may occupy about 60% to 70% of an elephant's waking hours, and a typical individual can eat around 300 pounds (140 kg) in a 24 hour period. In general, Savannah elephants prefer to eat grasses and Forest elephants prefer fruit (which makes them important seed dispersers). Elephants have an enormous effect on the habitats in which they live due to their large appetites, and their ability to use almost all parts of a plant. For example, when elephants disappear from a savannah, grasslands that once supported large populations of grazers and their predators become dense thickets of brush with fewer grazers and more browsers.

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Behavior

Social – Elephant societies center on females and are called matriarchal. Males live separately, either alone or in bachelor herds, until conditions are favorable for mating (usually during rains). An elephant family typically consists of several related females and their offspring. Male offspring stay with the female herds until they are at least 12 years old. Female herds generally contain 9 to 40 individuals, while male herds range from 2 to 144 individuals. In female herds, the largest and oldest adult female is the matriarch or leader. She decides where the herd will go each day and the pace with which the herd will travel. Larger female herds with older matriarchs tend to be able to compete more successfully for scarce resources. Therefore, calves born into these herds are more likely to survive than calves born into smaller herds.

Reproductive and Parental – Females become sexually mature between 8 and 18 years old, depending on habitat quality and food availability. Males become sexually mature at about 17 years old, however many of the dominant males are at least twice as old and twice as big and do the majority of the mating. Once mating has occurred, pregnancy (gestation period) lasts about 640 days or 21.5 months. Females generally give birth to their first calf when they are about 11 years old. Females can produce a calf on average every 4-6 years, depending on food availability. Newborn calves weigh approximately 265 pounds (1120 kg) and can stand within an hour of birth. A yearling calf remains in almost constant contact with its mother, and a calf that is between 1 and 9 years old will spend half of its time within 5 meters of its mother's side. These close ties help develop the bonds of the elephant herd and allow teaching to take place between older members and calves. Young elephants must learn techniques such as feeding, drinking, dusting, and manipulating objects with their trunks from older members. The dependence of young calves on their mothers is so strong that babies who are orphaned under the age of two do not survive their mother's death, and up to 70% of young elephants between the ages of two and five die within two years of their mother's death. The special bond between mother and daughter can last up to 50 years.

Sources

Poole, J. 1997. Elephants. Voyageur Press, Stillwater, MN. 72pp.

http://nature-wildlife.com/eletxt.htm

http://swishweb.com/trivia/Natural_History/Animals/nathist08a.shtml