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General Information on Elephants with Emphasis on Tusks

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Introduction:

The following general information and salient facts about living elephants were abstracted and compiled from several sources. The editor found it necessary to put these things in writing as a result of widespread interest and in reply to different questions received from readers and friends. Readers are encouraged to send in additional valid information on elephants, ask questions or express an opinion.

Ancestry and Taxonomy:

Elephants are classified in the class - Mammalia, order - Proboscidea, and family - Elephantidae. Forefathers of the living elephants are believed to have originated in the Eocene, about 50 million years ago. Three hundred and fifty two species of Proboscidea were recognized (Osborn, 1936 and 1942); all but two became extinct. The two living species (representing two genera) are the African elephant, Loxodonta africana Blumenbach, 1797, and the Asian elephant, Elephas maximus Linnaeus, 1758. Paleontological records indicate that separation between the two genera took place during the Pliocene, some 5.5 million years ago (Maglio, 1973).

Eight living subspecies of the Asian elephant have been described (Deraniyagala, 1955), while only two are listed for the African elephant. The two subspecies of the African elephant generally recognized are L. a. africana, the bush African elephant and L. a. cyclotis, the forest, not "pygmy", African elephant (Laurson and Bekoff, 1978).

Elephants have been the subject of countless myths and legends. They are said to have superior intelligence and seem to demonstrate great loyalty to their group members. "Certainly, there is something special about the elephant - not just its size, or its long life, or its ivory; there is something else, perhaps its intelligence, that somehow sets it apart from other African animals" (Moss, 1975).

Major external differences between the African and Asian elephant:

<u>Character</u>	<u>Asian</u>	<u>African</u>
Shape of back	Convex	Concave
Size of ears	Small; do not exceed the width of the neck.	Larger; do exceed the width of the neck.

<u>Character</u>	<u>Asian</u>	<u>African</u>
Shape of head	Compressed antero-posteriorly; has dorsal bulges.	No compression, no bulges.
Tusks	When present, are small and mostly in males.	Both sexes possess tusks; larger in males.
Tip of trunk	With one "finger"	With two "fingers"

Longevity: 60-80 years. A rough estimate of the elephant age can be obtained from its ears. In very young elephants, 6-7 years, the top of the ear is not turned over as in human; but with advancing years, it laps over. In old elephants the turning over of the upper edge of the pinnae is very prominent and the ear is usually ragged and torn especially along the lower edge. Other methods of age estimation (eye lens dry-weights and cheek teeth analysis) require more knowledge, measurements and weights. The cheek teeth method is more precise than the ear method and is based on the condition and number of cross-lophes (laminae) on the teeth. This method is applied to non-living elephants. Each tooth has a fixed number of laminae and is replaced horizontally, not vertically as in most mammals. Six such replacements occur for each half-jaw, upper and lower, therefore, a total of 24 cheek teeth may appear in a lifetime (Sikes, 1971). Hypothetically, an elephant can live as long as new sets of teeth replace the worn ones, within limits.

Weight: 4-7 tons. The African elephant is the largest living terrestrial mammal.

Height: 7.5-12 feet (2-4 meters), at the shoulders. Growth continuous throughout life.

Diet: Herbivorous

Amount of food/day: 150-300 lbs. (75-150 kg.).

Amount of water/day: 30-50 gallons (83-140 liters).

Ears and Their Functions:

Generally speaking, animals that live in cold regions of the world possess small extremities (ears, tails, bills, and appendages) in order to reduce heat loss. Conversely, animals that live in warmer parts of the globe have larger and longer extremities. This natural phenomenon, is a very well established ecological maxim and is known as Allen's rule (Smith, 1974).

Allen's rule is only part of the answer. Large ears for elephants act as built-in fans. It was observed that, under natural conditions, as the temperature increases so did the flapping of the ears per unit of time (Buss and Estes, 1971). This ear flapping not only creates air currents to blow on the body, but also exposes the inner side of the ear where large blood vessels are close to the surface allowing for increases of heat loss in hot weather.

Finally, large pinnae (the external ears) provide a large surface area to trap greater number of sound waves than smaller pinnae would. This is imperative since elephants depend greatly on their sense of hearing for survival.

Dental formula: $\frac{1}{0} \frac{0}{0} \frac{3}{3} \frac{3}{3}$; a total of 26 teeth.

Tusks: These are continuously growing upper incisors composed almost entirely of dentine or ivory. According to Webster's definition, ivory is the "hard creamy white substance, a form of dentine that makes up the tusks of elephants, walruses, etc." It is a hard creamy white substance, true; it is a form of dentine, true; it makes up the tusks of elephants, true; walruses, etc. - not quite so.

Elephant ivory (dentine) is very unique in its fine structure and it alone should properly be called ivory. If an elephant tusk is cut in a cross section and examined with the naked eye, one can see a peculiar and interesting geometrically regular pattern of lines which criss-cross each other. These lines form diamond-shaped areas which are larger at the periphery and then become progressively smaller towards the center of the tusk. "This diamond pattern is a constant feature of the elephant tusk ivory and is not present in the ivory of the tusk of hippotamus, walrus, narwhal or wild boar" (Sikes, 1971).

Once ivory is out of the elephant body, it soon dries and splits along the concentric as well as the criss-cross lines, unless it is kept in cool moist sand. If conditions are too hot and moist, the ivory rots and disintegrates. The water-absorbing property is well known to craftsmen and weathermen of certain African tribes. These weathermen use the ivory as a rain detector by planting it in the ground in a selected location. The patterns described above would show more clearly as the ivory rods swell and bend due to changes in soil and/or air humidity.

Ivory is a synonym for tusks. The milk or deciduous tusks (baby tusks) are called "tushes". These tushes, which do not grow to more than two inches in length, are replaced after about one year by a pair of permanent incisor teeth (the tusks of pigs, hippopotamuses, and walruses are canine; those of narwhals are incisors). Ivory is a non-cellular matrix, secreted by the odontoblasts; it is a hard and durable but yet elastic material (Sikes, 1971). At an early stage of development, the tusks bear a conical cap of smooth enamel which wears off rapidly. In a longitudinal, or sagittal section, the upper end of the tusk (the base) is hollow while the lower end is solid. The hollow portion contains the pulp, a highly vascular tissue, innervated by fine nerve branches. Microscopically it resembles the pulp of the incisors in man. Due to this nerve tissue, the tusks are quite sensitive to external pressure. A large part of the tusk (about two-thirds or more) is visible, while the base is embedded in the socket, or alveolus within the skull.

Although elephants usually have but a single pair of tusks, elephants with multiple tusks have been authentically recorded; three, four, five, or even seven tusks were observed (Carrington, 1958 and Murray, 1976). These supernumerary tusks may be straight, curved, or even spiral like the horns of a ram. Appearance of additional tusks is usually the result of abnormal bifurcation (due to a bullet, a spear, or a splinter) of the permanent tusks during calthood. Tuskless elephants (mostly females) are more commonly seen in Asia, but can also occasionally be seen in Africa.

Six-tusked elephants have not been observed in nature. However, an interesting Jataka (a birth story, usually carved in a stone) called the Saddanta Jataka from the early Andra Period (c. 32 B.C. - 50 A.D.) tells us of such an episode. This carved story appears on an architrave in the Great Stupa, Sanchi, India. The Jataka recounts the story, in a continuous narration, of how the future Buddha, depicted as a six-tusked elephant, sacrifices his tusks during his incarnation (Rowland, 1967).

At the present, it is not possible to differentiate, even microscopically, between the ivory of the African and the Asian elephant. However, once the origin and identity of the tusks are known, the ivory of the African elephant is said to be more compact than that of the Asian, and is preferred by professional artists who claim that African ivory is more suitable for carving. Furthermore, there may be a difference between the sexes of the African elephant, i.e., a cow's ivory is generally regarded as being superior to that of bulls, as it has a closer grain. These phenomena have led to persecution of the African elephants (especially the females) more than the Asian elephants (Carrington, 1958).

Ivory, as a precious commodity and as a medium for artistic expression, has been known for ages. It was known to be used in Biblical times (I Kings, Chap. 22, Verse 39). King Solomon was known to have a craving for ivory. He decorated his palace quite extensively, using various media, some of which required mobilizing the navy: "Once every three years came the navy of Tarshish, bringing gold, and silver, ivory, and apes, and peacocks" (I Kings, Chapter 10, Verse 22).

In earlier times, mammoth ivory was used by the first true man of the Old Stone Age; fish hooks, arrow straighteners, and other implements were made. The Greeks had a passion for ivory, e.g., it was used by the great sculptor Pheidias (5th Century B.C.). Thereafter, the usage of ivory had its ups and downs until modern times where it has been used for a variety of domestic tools, ornaments, jewelry, carving, and as an art per se. Some examples of the more contemporary use of ivory include: caskets, mirror cases, combs, billiard balls, piano keys, knife handles, trinkets, bracelets, and more--items which could be easily, more economically and more usefully produced from synthetic materials.

Medicinal values of tusks are rather different from those of rhino's horns, which are used as aphrodisiacs. In ancient times, ivory dust was used as vermifuge, emetic and as a substance to remove spots from the face. For the latter property, it was said that one had to ingest the powdered ivory along with Greek honey if a smooth and spotless face was desired. Ivory powder is also known to rapidly kill geranium plants (Sikes, 1971).

Unfortunately for the elephant, the collection of ivory is a lucrative business. The price of the ivory has soared from \$2.80 per pound in 1969 to \$36.00 per pound or more in 1978. Most of the demand for ivory comes from the Orient: Japan, China, and Hong Kong. The United States is not a "pure lamb" either. The desire for ivory in the United States was high, particularly in the 1970s, nourished by trends in fashion and travel (Pace, 1977).

Elephant ivory is best in its natural place--on the live elephant. Tusks are indispensable, multipurpose instruments. Elephants may use their tusks to dig for water, salt and roots; to debark trees; as levers for maneuvering fallen trees and branches; for work (in domestic animals); for display; for marking trees; as weapons of defense and offense; as trunk-rests; as protection for the trunk (comparable to a bumper in a car); and may be akin to "status symbols". Just as humans are left or right handed, so too elephants are left or right tusked; the tusk that is used more than the other is called the master tusk. Master tusks can easily be distinguished since they are shorter and more rounded at the tip. In addition, master tusks usually have a groove near their tip where the constant action of grass wears a transverse furrow in the ivory.

Records of tusk length and weight have been made for a considerable period of time. It is claimed that tusks can reach lengths of up to 20 feet (6 meters) if they don't break. If this is true, then it must be very rare, since the longest tusk recorded is 11.5 feet (3.45 meters). The record weight of a single tusk is 259 pounds (117 kilograms) (Laurson and Bekoff, 1978, Sikes, 1971). This is due to the fact that large tuskers are slain preferentially for their ivory. Tusk size and weight is probably related to nutrition, isolation, population control, genetics, or any combination of these factors.

Trunk: The trunk of an elephant is a prehensile elongation of the upper lip and the nose. It is a very complex organ, believed to be manipulated by about 40-60,000 muscles (Lewis, 1971 and Rabb, 1974). The trunk is also a highly sensitive organ innervated primarily by the maxillary division of the trigeminal nerve. A variety of functions is attributed to the trunk, including feeding, watering, dusting, smelling, touching, sound production/communication, loading, weapon of defense and offense and whatever may be necessary in critical moments. It is indeed an indispensable tool, probably the elephant's single most important organ in everyday living.

The ability of the elephant to perform so many functions with its trunk is undoubtedly related directly to the remarkable structure of this organ which involves no rigid tissues, and yet contains a musculature constructed so as to provide the most amazing strength, mobility and control. It has been said that an elephant can lift 3.7% of its own weight (about 185 kg. or just over 400 lbs.) with its trunk. Exactly how the trunk functions and the mechanisms involved in operating this extraordinary organ remain obscure.

Elephants have been observed carrying "their newborn calves that were too young to walk. They laid them across their tusks and held them around the middle with their trunks" (Sikes, 1971). A similar manner of loading was reported when a mother was observed carrying her dead and rotting calf with which she was unwilling to part. "She (the cow elephant) lifted the (calf) body with her tusk but appeared to carry it between her lower jaw and shoulder almost as a violinist holds his instrument" (Sikes, 1971). Newborn elephants do not use their trunk in the first few months of their lives; they suckle milk and drink water with their mouths while the trunk is curled in an "S" shape above their heads. These young calves seem to be inept with their trunks. They have been seen to suck their trunks (much as human babies suck their thumbs) and even to step on their trunks while walking.

The trunk of an elephant is an exceptionally vulnerable organ. Severe injuries to the trunk may cause the elephant's death. Injuries or accidents can be inflicted by sharp twigs and bamboo shoots, by disturbing an occasional resting snake in the grass, or by man-made devices, e.g., a snare. There are also authentic reports of elephant's calves losing their trunk tip to crocodiles. These crocodiles very often pull their victims into the water and drown them for subsequent consumption.

In both the African and the Asian elephants, the trunk is annulated and is covered with sensory hairs. The trunk of the African species differs from that of the Asian in having two "fingers" (dorsal and ventral finger-like processes) at its extremity. The Asian elephant has only one "finger", the dorsal process. Water-holding capacity of the trunk is about 1 1/2 gallons (4.67 liters). A trained circus elephant can hold a trunkful of water for a long time for certain performances; at this time the elephant breathes through his mouth. It is also known that some elephants sleep with the mouth partly open and actually snore; this stertorous breathing can be heard for long distances.

Certain squeaking sounds produced by the Asian elephant are believed to be indicative of greeting and affection. The African elephant was not heard to produce this particular sound. Interestingly enough, the Asian elephant was found to have a curious valve-like canal communicating between the right and the left nasal passages of the trunk, about 5.5 inches (13 cm.) from its tip (Anthony and Coupin, 1925). This canal was not found in the trunk of the African elephant and it is believed that this apparatus may account for the affectionate squeaking sound in the Asian elephant. Trunks are not only used to produce affectionate and greeting sounds but also known to be important tools during courtship and love-making. On these occasions, "...the trunk carasses, slaps, explores and tickles, and is even inserted periodically into the mouth of the partner in a manner highly suggestive of an elephantine form of 'kissing'" (Sikes, 1971).

Reproduction: Sexual maturity is attained at the age of 8-13 years. Mating is not confined to any season and gestation period may last 18-22 months - the longest pregnancy for any known living mammal. Number of offspring per birth is usually one, rarely twins. Newborns weigh 170-250 lbs. (77-113 kg.) and are 3 feet (91 cm.) tall at the shoulder. They are extremely hairy compared to adult animals; the amount of hair reduces with age. Newborn calves may consume two-and-a-half gallons of milk a day. Weaning is a very gradual process beginning at the first year of life and may continue to the 7th or the 10th year of the animal. Termination of milk sucking may be initiated either by the ability of the calf to use its trunk to pull grass and leaves or by its growing tusks that poke its mother's breast while the young elephant is trying to nurse.

Senses: Change with age but generally speaking,
Sight - poor (good in dull light),
Hearing - excellent
Smell - acute
Touch - very good
Taste - unknown (seems to be selective).

Behavior: Elephants are highly sociable animals. The basic social structure is the family unit varying in number from 3 to 20 or more and averaging 10 animals (Douglas-Hamilton and Douglas-Hamilton, 1975). A hierarchy within the family is based on age and size. The family is headed by a matriarch (usually the oldest cow) whose accumulated experience provides an important leadership for the group; at time of drought and danger the matriarch's knowledge may be the key to survival. Two or more family units that are probably related to each other, may form a larger unit referred to as "kin group". Large herds are usually a protective device against predators, facilitate social learning, and/or are a result of displacement initiated by human expansion (Douglas-Hamilton and Douglas-Hamilton, 1975). Huge herds of over 1000 individuals have been observed in Africa (Laws, Parker, and Johnstone, 1975).

The boundaries of home range differ depending on the ecological niche available; anywhere from 500-600 square miles or more has been reported. Home ranges do overlap and if not disturbed, elephants follow the same daily pattern and seasonal movement throughout their lifetime. Elephants are very adaptable; they are good swimmers and can endure extreme climatic conditions including mountain climbing (Hannibal crossed the Alps with 37 elephants in 218 B.C.).

Most elephants are diurnal or crepuscular in nature; they spend 2/3 of their lives or more searching for food and water (McKay, 1973; Time Life Television, 1976; and Vancuylenberg, 1977). The rest of the time is devoted to other activities such

as bathing, wallowing, dusting, playing, mating, resting or sleeping. "Many elephants doze standing up, but under favorable conditions they will lie down to sleep, particularly between 11:00 p.m. and 4:00 a.m. They remain lying for a relatively short time, standing up frequently to urinate or defecate" (Benedict, 1936). It has been claimed that circus elephants make pillows for their heads from straw or any available material. Such "pillow making" behavior was not observed in the wild but elephants have been seen resting their heads on slopes of anthills. Interestingly enough, some report that the pulse of an elephant's heart beats considerably faster when it is asleep than when it is awake; the opposite of what one would normally expect (Carrington, 1958).

Thermoregulatory mechanisms in elephants involve, as with all other mammals, physical, chemical and behavioral regulation. However, because of the huge bulk and the lower ratio between its body surface and body mass (as compared to smaller animals), it is easier for an elephant to keep its body warm. The reverse is also true, i.e., it is hard for an elephant to keep its body cool.

On warm days elephants limit their activity to only the cooler periods, seek shade, wallow, bathe and spray water on themselves either from naturally occurring water sources or "retrieved water" sources.

This "retrieved water" phenomenon is one of the most fascinating about elephant behavior. Iain Douglas-Hamilton in the book, Among the Elephants, gives the following account of an observation of such behavior. While he was radio-tracking an elephant called M4/3, Douglas-Hamilton noted a serious increase in the elephant's temperature. "His overall temperature must have been very high despite my efforts at cooling him with water, for he now did something which I have never seen before. He put his trunk deep inside his throat and sucked out some water which he then splashed on the back of his ears and shoulders." (Douglas-Hamilton, I., and O. Douglas-Hamilton, 1975). Similar accounts of this behavior were given during the nineteenth century and also during this century.

In connection with this water retrieval behavior, observers use the word regurgitation to describe the process involved in bringing the water to the throat for possible retrieval. It should be mentioned that some believe elephants lack vomiting centers in the brain (Hennessy, 1977?).

Obtaining water is vital for any species and elephants are no exception. During dry seasons, elephants often dig waterholes or wells in river beds where the water ceases to flow above the ground but continues to do so under the sand. When elephants finish drinking, other animals, especially baboons, drink from these holes. Thus, elephant wells play an important role in the survival of many species. (Douglas-Hamilton, I., and Douglas-Hamilton, O., 1975; Moss, 1975; Poche, 1974; Quick, 1965; and Sikes, 1971).

Despite their colossal size, elephants can be extremely docile and tractable. On the other hand, they are subject to excitation and alarm on the very slightest provocation. At times elephants can be extremely dangerous reacting belligerently, even killing their own mahouts. This is particularly true with "rogue" elephants but even more so with an elephant in musth (a phenomenon that might be associated with sexual activity and/or communication), especially in the male Asian elephant. Charles Darwin recognized this phenomenon and wrote: "No animal in the world is so dangerous as an elephant in must(h)." Nursing mothers are not less dangerous than elephants in musth, especially when their babies are threatened.

Altruism is a behavioral pattern often associated with elephants. Whether or not a particular behavior can be interpreted as a maternal or sisterly instinct, a self interest, perpetuation of the species or altruism, no one really knows. A cow elephant has been observed endangering herself to rescue her calf from a storming river, another was observed carrying her dead calf on her tusks until it rotted (later she buried it), and yet another was observed babysitting her brother to make sure he was not left behind (she woke him up with a good kicking). Bull elephants are also known to help each other in time of distress; they would not desert their wounded or dazed companion but would stay and support him physically (by ranging themselves alongside and boosting him on his feet). These are just a few examples that make elephant behavior so unique. It should be pointed out that because of the long bond between the mother and her offsprings and the strong family ties, a great deal of elephant behavior is believed to be learned or acquired and not innate.

Mysterious elephant behaviors have been observed in recent years - behaviors for which no scientific rationale has ever been given. Some of these puzzling incidents include the fact that elephants often bury dead animals, including dead elephant or parts of them. "A group of scientists and park officials working on a cropping scheme in Uganda collected the ears and feet of the dead elephants to sell later for making handbags and umbrella stands, and put them in a shed. One night a group of elephants broke into the shed and buried the ears and feet. The people involved still feel uncomfortable about the incident" (Moss, 1975). Furthermore, elephants have been observed to fondle and examine the bones and tusks of dead elephants. They carry the bones and tusks a good distance from the carcass. Some believe, quite seriously "...that elephants know their companions are being killed for their tusks and that they carry the tusks away to hide them. What is more, tusks have been found smashed against rocks" (Moss, 1975).

Brain and intelligence: The elephant brain, when considered in relation to its body is comparatively small. When compared to man, the elephant intelligence potential is less (since man's brain/body ratio is much larger than that of an elephant, about 20-25 times). Whether an elephant has the capacity to acquire and apply knowledge, and whether it has any highly developed reasoning powers of its own is a rather debatable point. Elephants have undoubtedly exceptional aptitude for absorbing instruction and their ability to learn and perform tricks is remarkable. A well trained elephant can recognize 60-100 words and phrases (Lewis, 1971). Elephants have exhibited a long memory and extraordinary docility; the rate of learning varies with each elephant but once it has mastered a trick it will repeat it faultlessly as often as the trainer wishes, even after long lapses of time (Burger, 1965 and Blond, 1962). Some of these training achievements with elephants exhibit the highest degree of virtuosity. It has been reported that elephants use twigs to scratch parts of their body not reached by tail or trunk. A brief report at the beginning of the century tells of an Asian elephant that was ordered by his master to stay under a tree until his return. That elephant broke twigs from the tree and placed them under his feet in order to prevent his body from sinking in the wet and muddy ground. Elephants have been observed both using (Grzimek, 1970) and manufacturing (Gordon, 1966) tools.

The above stated information plus those uncanny tales described in the previous section had undoubtedly led to the belief that elephants are highly intelligent animals, having their own reasoning powers. Presently, there is insufficient data to prove or disprove such statements.

Myths, legends and folklore: One of the most common beliefs even today, is the concept of elephant's graveyards. The origin of this myth probably stems from the fact that certain African tribes hunted elephants by building a ring of fire around one or more groups of elephants. These animals are suffocated and then killed with most of the remains staying in place. In addition, old elephants require soft vegetation and therefore they stay and die near rivers and swamps, whereafter many skeletons are found.

Elephant "askaries" (soldiers) is one of those legends still prevailing. In this case, it is believed that old elephants have special young body guards ready to protect the old and the experienced. This does not seem to be true; it is probably the result of coincidences, false interpretation and exaggeration.

White (albino) elephants are regarded as sacred animals in the East where they enjoyed immense symbolic importance. In Thailand, past and present, the law specifies that all white elephants are the property of the king where they are used in special ceremonies, parades and royal exhibits. This sacredness surrounding the white elephant possibly has its origin in the Dream of Queen Maya (185-72 B.C.) where she conceived Lord Buddha in the form of a white elephant. Thereafter elephant images were incorporated in different idols, e.g. the elephant-headed Ganesa, god of wisdom, good fortune and prudence, who is one of the best-loved Hindu deities (Murray, 1976). Elephants have not only been worshipped but are believed to be worshippers themselves; the sun, the moon and the stars are just examples of what the elephants supposedly have worshipped.

"Do elephants have four knees?" No. No mammal has four knees. These so called knees are nothing but the wrists of the elephant; they are situated, relatively speaking, high above the ground and therefore mistakenly referred to as "knees".

Captive as well as wild elephants are said to have a passion for alcohol. In the wild they are known to be fond of the fruits of the umgamu-tree. "This fruit is capable of being made into a strong intoxicating drink, and the elephants after eating it become quite tipsy, staggering about, playing huge antics, screaming so as to be heard miles off, and often having tremendous fights" (Carrington, 1953).

Elephant anecdotes can not be complete without mentioning three famous elephants - Ahmed, Pickaninny and Jumbo. Ahmed, an African elephant became a walking legend while still alive. Hunters were after his huge tusks (about 148 lbs., 67 kg., each), a thought that ignited a worldwide protest and a decree by the President of Kenya, Mzee Jomo Kenyata that Ahmed be protected. Ahmed was not a victim of the "Ivory Rush" but died a natural death at the age of 55. Presently, he is preserved at the National Museum of Nairobi, Kenya where he became the symbol of conservation.

The episode of Pickaninny involves him appearing in court as a witness to give evidence that his trainer did not mistreat him (the Society for Prevention of Cruelty of Animals indicted the trainer for cruelty). This event took place in Cleveland, Ohio during the last century. The trainer won the court case and was discharged; and "Pickaninny was congratulated by all present, and received loaves of bread, fruit, and other delicacies as a reward for his loyal support" (Carrington, 1958).

The fame of Jumbo was of a different nature, it was not short but long-lasting fame whose career and ultimate fate caused a sensation on two continents. Jumbo was an African elephant raised in the London Zoo, England for almost 17 years (1865-1882). He soon became a popular favorite of all visitors, young and old. Children loved to ride on his back, pet him, present him with buns or perhaps just be in his vicinity and catch a glimpse of the majestic animal. At the age of 21 Jumbo began to show signs of an unreliable temper; a temper that was considered dangerous enough to warrant a search for "...the means of killing this animal should such a necessity arise" (Carrington, 1958). Those who had to deal directly with this dilemma were relieved due to an offer made by the American showman, P. T. Barnum, who ventured to purchase Jumbo. The news caused a reaction of horror and dismay that could only have been exceeded by the sale of Queen Victoria herself to the Americans. Jumbo was regarded as a national monument and his departure was considered as a slur upon the honor and patriotism of all true Englishmen. Letters, telegrams, songs, poems and telephone calls were some of the means used to persuade Barnum from his "evil" move. Nothing changed Barnum's mind and Jumbo finally sailed across the Atlantic Ocean for America on March 25, 1882. For three years he delighted the Americans as he had formerly done for the British. Jumbo was the greatest and largest attraction ever shown in the Barnum and Baily Circus; "the towering monarch of his race" so he was heralded by Barnum himself. Jumbo's glorious career came to a tragic and sudden end on September 15, 1885 when he was struck by a freight locomotive at St. Thomas, Ontario. At his death, Jumbo stood more than 11 feet high at the shoulder and weighed 6 and 1/2 tons; he was actually very young, only about 25 years old. His mounted skin was destroyed in a fire at Tuft's College in Boston; but his mounted skeleton is still at the American Museum of Natural History in New York. A book dedicated to Jumbo has been recently written honoring his life's history (Jolly, 1976). Jumbo will never be forgotten, his name lives on as a gift to the English language...the universal synonym for all stupendous things.

Living relatives: Of all the living mammals, the following orders bear special phylogenetic relationships to the Proboscidea: Sirenia, Hyracoidea and Tubulidentata.

Enemies: Man (Douglas-Hamilton and Douglas-Hamilton, 1975; Carrington, 1958; and Beard, 1977).

Present status: The population of wild elephants is estimated to be 1,350,000, most of which are on the African continent. Conservationists and other interest groups are constantly trying to prevent the elephant population from reaching critical numbers. Elephants are being killed faster than they can reproduce. If this rate continues, it means that we are rapidly approaching a population level beyond which we will be unable to save the elephants from extinction.

Diminution of elephants is a direct result of competition with humans for available habitats and the growing ivory market. Along with the "Ivory Rush", domestication of the Asian elephant has also taken a toll. Consequently, the wild Asian elephant populations have declined dramatically (there are between 25,000 and 36,000) and this decline was evidence enough to declare the Asian elephant as an endangered species under the terms of the Endangered Species Act of 1973. This act prohibits the importation of the Asian elephant or its ivory unless for breeding or scientific purposes. The African elephant, has just been declared as a threatened species. See further details under "Ban the ivory campaign" in this issue. Efforts to save elephants range from basic research projects, to management programs, meetings, symposia, production of synthetic ivory, and including the African elephant on the Endangered Species List. In my opinion, the African

is indeed in danger. If we are sophisticated enough to debate the right to life of humans, and humans are part of the ecosystem, why can't we debate the right to life of all species of organisms?

Regarding elephants, the most crucial question we are facing today is; can we find a practical solution to the problem of co-existence between elephant and human population? There is no easy way to solve the problem. But I feel that through education as to the value of a wild elephant population, and proper management, man and elephant can co-exist peaceably. Proper and sound management techniques have to be developed through long term field research projects. Only the future will tell if such management techniques can be implemented.

References:

- Anthony, R., and Coupin, F. 1925. Nouvelles recherches sur les cavites nasales de l'elephant d'Asie (Elephas indicus L.), Arch. Anat. Hist. Embr., 4:107-147.
- Beard, P. H. 1977. The end of the game. Doubleday & Company, New York. 280 pp.
- Benedict, F. G. 1936. The physiology of the elephant. Carnegie Institution, Washington, D.C. 302 pp.
- Blond, G. 1962. The elephants. Andre Deutch, London. 180 pp.
- Burger, C. 1965. All about elephants. Random House, New York. 132 pp.
- Buss, I. O., and J. A. Estes. 1971. The functional significance of movements and positions of the pinnae of the African elephant Loxodonta africana. J. Mammal., 52(1):21-27.
- Carrington, R. 1958. Elephants: a short account of their natural history, evolution and influence on mankind. Penguin, London. 285 pp.
- Croze, H. 1974. The seronera bull problem, II: the trees. E. Afr. Wildl. J., 12:29-48.
- Deraniyagala, P.E.P. 1955. Some extinct elephants, their relatives and the two living species. Ceylon Nat. Mus. Pub. 161 pp.
- Douglas-Hamilton, I. 1977. Recent population estimates for the African elephant. P. 3, in Information Report: Animal Welfare Institute, Vol. 27(1):1-4.
- Douglas-Hamilton, I., and Douglas-Hamilton, O. 1975. Among the Elephants. Viking Press, New York. 285 pp.
- Gordon, J. A. 1966. Elephants do think. African Wild Life, 20:75-79.
- Grzimek, B. 1970. Among animals in Africa. Stein and Day, New York. 215 pp.
- Hennessy, M.V.P. 1977? The world of performing animals. The Ark, pp. 35-41.
- IUCN/SSC. 1977. Asian elephant group news. Tigerpaper, 4(4):22-25.
- Jolly, W. P. 1976. Jumbo. Constable, London. 173 pp.
- Laursen, L. and M. Bekoff. 1978. Loxodonta africana. Mammalian Species, No. 92:1-8, plus 5 figs.
- Laws, R. M., I. S. C. Parker, and R. C. B. Johnstone. 1975. Elephants and their habitats: the ecology of elephants in North Bunyoro, Uganda. Clarendon Press, Oxford. 376 pp.
- Lewis, M. 1971. The kingdom of Abu. Pp. 19-23, in Dinny's Calgary Digest, Calgary Zoological Society, Vol. 1(7):1-24.
- McKay, G. M. 1973. The ecology and behavior of the Asiatic elephant in southeastern Ceylon. Smithsonian Contribution to Zoology, No. 125:1-113.
- Maglio, V. J. 1973. Origin and evolution of the Elephantidae (a monograph). The Amer. Phil. Soc. Phila., 63(3):1-149.
- Moss, C. 1975. Portraits in the wild: behavior studies of east African mammals. Houghton-Mifflin Co., Boston. 363 pp.
- Murray, N. 1976. The love of elephants. Octopus Books Limited, London. 96 pp.
- Osborn, H. F. 1936. Proboscidea. Vol. I. American Museum Press, New York. Pp. 1-802.
- Osborn, H. F. 1942. Proboscidea. Vol. II. American Museum Press, New York. Pp. 803-1676.

- Pace, E. 1977. Whether for love or money, demand for ivory soars. The New York Times. Sunday, August 28, p. 50.
- Poche, R. M. 1974. Ecology of the African elephant (Loxodonta africana) in Niger, West Africa. *Mammalia*, 38(4):567-580.
- Quick, H. 1965. Ecology of the African elephant. D.C. Heath and Co., Boston. 34 pp.
- Rabb, G. 1974. Elephants. Pp. 48-49, in Guide Book: Chicago Zoological Park, Brookfield, Illinois. 112 pp.
- Rowland, B. 1967. The art and architecture of India. Buddhist/Hindu/Jain. Penguin Books Ltd., Baltimore. 512 pp.
- Shoshani, J. (ed.) 1977. Elephant Newsletter No. 1 (summer). Wayne State University, Detroit. 18 pp.
- Sikes, S. K. 1971. The natural history of the African elephant. Weidenfeld and Nicholson, London. 397 pp.
- Smith, R. L. 1974. Ecology and field biology. (2nd ed.) Harper & Row, New York. 850 pp.
- Time Life Television. 1976. Elephants & Other Land Giants. Time-Life Films. 128 pp.
- Vancuylenberg, B. W. B. 1977. Feeding behavior of the Asiatic elephant in southeast Sri Lanka in relation to conservation. *Biol. Conserv.*, 12(1):33-54.

OTHER BRIEF COMMUNICATIONS

OBSERVING ELEPHANTS IN AFRICA

by Richard Van Gelder

Richard Van Gelder has been conducting field research in Africa, off and on for the past ten years. Although he has been specifically studying antelopes, he "could not avoid having an interest in elephants". The following information is based on two recent, independent visits to Africa. The first set of observations was made during September/October of 1977 in the Savuti Channel area of Chobe National Park in Botswana while he was studying tsessebe (Damaliscus lunatus). The second set of observations was made during a two and a half week visit to Kenya in March of 1978.

I. Observation in the Savuti Channel area of Chobe National Park, Botswana.

My informal census suggests that there are still good numbers of elephants in the region. I believe that there were fewer bulls there this year than a year ago, but this is more likely a response of a greater amount of water still standing in the pans this year, so that all of the animals did not come into Savuti marsh, where I did most of my work. Further, I definitely detected the presence of more cow herds this year than last, and larger-sized herds, as well. There seemed to be good reproduction in the cow herds. No significant damage to vegetation from elephants was noted. I made one trip from the Savuti Marsh to the Linyanti River in October, and again was impressed with seeing several quite large (50+) cow herds.

II. Observations in Kenya.

I didn't see a lot of elephants, at least not what I am used to from previous visits, all of which were from August to November, at the height of the dry season. It was unbelievably green--evidently the short rains were late and heavy, and the long rains were starting while we were there. Seven national parks were visited. All in all, I doubt that I saw 500 elephants in the two and a half weeks in Kenya, and I know that is far less than I have ever seen before.