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Reviews and Recent Literature on Elephants

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REVIEWS AND RECENT LITERATURE ON ELEPHANTS

With this issue we are beginning a section of reviews on recent books, chapters in books and similar published materials on elephants. Also we have annotated a brief collection of recent books (1970-1980) on elephants and related taxa which may be of particular interest. (See BIBLIOGRAPHY for explanation on annotation.) Readers are invited to send reviews as well as references on recent literature. If possible, we would appreciate receiving a copy of the publication for the Elephant Library (see section in this issue entitled ELEPHANT LIBRARY).

Please note that, starting with this issue, children's books are included in this section and in the Bibliography. These publications are designated by the term "Junior Library" and most of the annotations have a suggested age/reading level.

John Hanks. THE STRUGGLE FOR SURVIVAL: THE ELEPHANT PROBLEM. Mayflower Books, Inc., New York, 176 pp., 1979. Price $14.95.*

The title for this book is very appropriate. Throughout the book the phrase "the struggle for survival" is haunting. Gradually, we are introduced to the "elephant problem" and soon we are faced with the controversial question "to cull (read 'to kill') or not to cull?" By the end of the book, the answer is self-evident--to kill.

Professor John Hanks has done a beautiful piece of work; he translated scientific data collected over many years into a simple, clear and informative account which even a high school student can follow. Often this information is spiced with personal and familial experiences and episodes, making reading even more interesting. Let me illustrate with one example.

In Chapter Four ("Age and Growth") the author describes how the age of elephants is estimated and that out of 1,236 lower jaws which he examined at the Luangwa Valley, Zambia, only one of the whole collection had a supernumerary (extra) tooth. Credit for finding that specimen was given to Carol, his wife. One afternoon she was curious enough to look at their "loo seat" (the commode) in their outhouse, which was an upside down elephant mandible. Her curiosity was fruitful - the discovery of the only jaw containing a supernumerary molar in 1,236 specimens!

The book is illustrated with 74 color and black and white photographs, 23 figures, two maps and three tables. Among the photographs is a rare sequence (plates 33-44) of a birth of a calf photographed by Barbara and Walter Leuthold in Samburu Game Reserve, Kenya, telling the story not only of a newborn calf and the associated maternal behavior, but also of the social interactions among members of the family units. Excitement, commotion and (in the absence of a better term) almost human touch are conveyed in these photographs. Plate 8 (p. 35) is also interesting. It shows items removed from an elephant stomach and intestine including "broken glass, beer bottle tops, nuts, bolts, fish bones, a 50¢ piece, one ½ ounce weight, a sardine tin opener, the heel of a shoe, two

six inch nails, a collection of stones, the base of a light bulb, and tin foil from wine bottles!"

Culling vs. laissez-faire is the major theme of the book. In lucid and non-technical language Hanks lays the basis for the elephant problem: staggering growth of human population, inefficient land-use planning and lack of sufficient conservation education programs. The rapid growth of human population implies encroachment upon wildlife habitat and consequent limited emigration and immigration of elephants from and into protected areas. This is described as the "compression hypothesis" (that is, elephants are being 'compressed' in a given locale). Soon the vegetation is overexploited, and damage to the habitat follows. To avoid this habitat overutilization, elephants would have to be reduced, either naturally (dying of starvation) or artifically with the aid of man. This man-elephant-habitat interaction is well illustrated in Figure 21 (p. 153) which is actually the summary of the book.

Presently, there is no other solution but to interfere and reduce the elephants artifically. The author introduces us to the cold, hard facts about the "killing programs" and describes how these programs aid in retrieving scientific information as well as providing revenue which can be channelled towards conservation.

Elephants' good attributes are given in Chapter Two and elsewhere. These attributes include: seed dispersal (e.g. of Acacia trees) and providing media for rapid germination; distribution of nutrients in their dung which is carried below the ground by termites and dung beetles; providing water for other species by digging waterholes; leaving footprints and body depressions that trap rainfall, and enlarging existing waterholes as mud is plastered on their bodies when bathing and wallowing; providing food for birds when walking in high grass and disturbing insects, small reptiles or amphibians; providing protection for smaller species by the mere fact that, being tall, they can see approaching predators, and other species such as the impala are given early warning; and soil aeration. In addition, elephant paths (which usually lead to waterholes) act as fire breakers.

The basic elephant society is outlined in several parts of the book. A family unit averages about 10 elephants, two to four family units numbering up to 50 represent a kinship group. Young bulls stay with the family until they reach sexual maturity. Bulls between 25-50 years old are sexually competitive. Below that age, they are unable to compete with the older bulls, and above that age they retire.

Chapter Five ("Reproduction") is the best chapter; here we learn that the mean age of first ovulation is about 14 years and that a correlation exists between rainfall and conception. Also, Figure 17 (p. 92) provides evidence for the elephants' 'built-in' birth control. In this figure the mean calving intervals, i.e. the frequency with which elephants give birth, are depicted.

Towards the end of Chapter Five the author mentions the relationships of elephants to sea cows (manatees) and to hyraxes. There are a number of comments I would like to make in this regard; they are included for completion and clarification. The relationships between elephants, manatees and hyraxes

are indicated in a publication earlier than G. G. Simpson 1945, that is, Gill, T., 1870. The Paenungulata of Simpson contains not only the three living groups mentioned but also four extinct orders. The oldest known fossil record of Hyracoidea is from the Oligocene not the Eocene. Elephants have five phalanges (toes) on each foot, hyraxes have five on the front (on living specimens not all five are seen externally) and three on the hind limbs. John Hanks states that "...all four (toes) are present and quite close together in both the hyrax and the elephant." He also states the fact that testes of both the elephant and hyrax are permanently intraabdominal and implies that it is a feature that has phylogenetic significance. This feature, I believe, could well be a primitive character in its nature.

The last chapter ("The Future for Elephants in Africa") is of course the climax. Simply speaking, elephant populations are regulated by a combination of three factors: birth rate, death rate and migration. In long-lived mammals the survival of the young and adult females is an important regulatory mechanism. Studies conducted by the author showed that the most important factor in controlling an elephant population is the variation in death rates, especially among the newborn. Factors which contribute to mortality include: predation (excluding man), disease and parasites, accidents, drought, starvation, stress, hunting and poaching, old age and fighting. Death rates of elephants vary not only throughout the African continent, but also within a given population.

Toward the last few pages of the book (pp. 163-166) the author reminds us of how the elephant problem came into being and what the possible solutions are. The three main areas in which positive actions must be taken immediately are: land-use planning, reduction of the human population growth rate and reappraisal of the present system of conservation education. Ivory trade and poaching are two additional facets to be dealt with. In the absence of a better solution, "...elephants will have to justify their existence by the money they earn from tourism, hunting and sustained-yield meat production - there is no realistic alternative."

The crux of the problem is the very high rate of increase of human population. In my opinion, the solution to this problem is the solution to many other problems. More funds should be channeled toward education and the introduction of birth control to the uneducated and fastest growing populations. There is not much space on this planet, and until other suitable locations (oceanic or extraterrestrial) for human habitation are found, man, animals and plants must coexist. Elimination of one species or a number of species from the ecosystem will disturb the balance of nature. Elephants interact with many plant and animal species, their presence helps to maintain diversity and their ecological value is unquestionable.

Elephant behavior is well portrayed throughout the book - for example, the two escapes of Leslie (the reader is referred to pages 65-67 since Leslie is not mentioned in the Index nor in the Table of Contents), the time spent to look for her, the frustration and, of course, the lessons to be learned about her strength and perseverance. There is one extraordinary episode. It took place during the "Zambezi operation" when John Hanks tried to dart a calf from the helicopter, "...one of the cows gave us a nasty shock; she spun around and

reached up at us with her trunk, trying to knock or pull us out of the sky" (p. 63). The book also includes many studies by other scientists - all of whom are properly acknowledged. Some original field guides described by the author are also mentioned throughout the book.

One does not have to read the book in orderly fashion. For example, I started reading the captions of all the photographs, then read chapters 5 and 4, followed by chapters 6, 1, 2, 3, 7 and 8. Then I reread chapter 5. There are very few typographical errors. I consulted the dictionary only 11 times. In the Glossary I would have liked to have seen definitions of "home range" and "compressions hypothesis" in addition to, or even instead of, "ovary" and "testes"; most people are familiar with the latter but not so many with the former. The "compression hypothesis" is included in the Index; "home range" and "territory" are not. The name change for countries and wildlife sanctuaries given at the end of the Author's Note proved to be useful.

The Bibliography is extensive. The full titles of abbreviations used for most common journals are given at the beginning of the references. Nevertheless, an important reference of Viv Wilson (1957) is mentioned on pp. 77-78 but no bibliographical reference is given. It would help to have each reference in the Bibliography clearly delineated from the rest (by indenting the second line under the author(s)' line).

This book has given me a better insight into some of the problems directly related to elephants, in particular, and to wildlife conservation in general. Sometimes, I wish I would not find out about these problems. I consider myself as one for whom the word "impossible" does not exist, but we are facing a grave problem.

Overall, the book is very informative, summarizes existing knowledge, updates it and provides new scientific accounts about elephant population dynamics and elephant biology in general. It is easy and pleasurable to read and can be used as a good and quick reference. I definitely recommend it. **--Jeheskel (Hezy) Shoshani**, Department of Biological Sciences, Wayne State University, Detroit, Michigan, 48202, USA.

*Condensed version of this review appeared in J. Mamm., 61(4)782-783.

Hans Krause. THE MAMMOTH - IN ICE AND SNOW? Self-publisher, Stuttgart, 108 pp., 1978. Price not given.

In this short book, the author questions whether the woolly mammoth (Elephas primigenius) lived during the Ice Age in a severe arctic climate. He contends that study of the following four points will enable us to tell if the woolly mammoth could have lived in such a climate in northeast Siberia:

1. those physical characteristics of the woolly mammoths that are adaptive to cold climates,

2. the animal fossils found with the woolly mammoths,

3. the plant remains found in the stomach contents of the woolly mammoths,

4. the taphonomic conditions since the woolly mammoths died which allowed preservation of the carcasses.

Unfortunately, Krause has included extensive evidence related to point 1 only. If his argument that the woolly mammoth lived in a temperate climate is considered only on this basis, it has little validity. Nonetheless, he raises some significant points in the process of discussion. It is the way in which he reaches his ultimate conclusion which detracts from the scientific value of the text. For this reason, the book should be approached with the thought in mind that there are suggestions for serious consideration separate from the question of its basic premise.

Krause's detailed examination of eight physical characteristics which are considered to be adaptive to cold climates is based on his own observations of collected materials and on statistics and comments gathered from scientists throughout the world. It is this section of the text which has significance: each characteristic is considered carefully in regard to its adaptive value for survival in an arctic climate. The characters associated with cold climate and listed by Krause are: small ears; short legs; short, goatlike tail; long, dense hair and thick skin without sweat (sebaceous) glands; large body volume compared to surface area; anal flap; fat hump and thick layer of fat beneath the skin; and rubbed-down zones on large, curved tusks.

The first seven characteristics are regarded as ways in which heat is retained by the body. In a series of complex discussions using Allen's and Bergmann's rules, Krause demonstrates that the sizes of ears, legs and tails are not necessarily distinct adaptations of the species to a cold climate and that they might not have been beneficial for woolly mammoths in an arctic climate. He also raises a question of whether the types of hair and distribution on the woolly mammoth were an effective barrier to cold. On this point, his evidence comes from one study in 1892 and another in 1919. Krause relies heavily on points made by H. Neuville in his 1919 study of mammoth integument. Neuville's conclusion in regard to the condition of the hair was: "The very peculiar fur of the mammoth thus furnished only a precarious protection against cold, a protection analogous to that enjoyed at present by a few mammals of the tropical zone." (Neuville, 1919, 332). It would be more interesting and valid to find out what contemporary scientists have observed.

Krause points to the absence of sweat glands as further evidence that the woolly mammoth was not living in an arctic climate. Since sweat mixed with the hair would be a more effective barrier against rain, snow, wind and cold, it would be more advantageous to have sweat glands, he indicates. At this point, Krause shows his lack of study of climates in conjunction with his basic argument. Nowhere in the text does he refer to the specific conditions of the

arctic climate against which he argues. In arctic tundra there is very little precipitation and, therefore, sweat glands would not be advantageous in the sense he suggests.

Furthermore, in the section on body volume, Krause again stumbles on the issue of climate. He cites the cave drawings of "naked" elephants (both E. primigenius and E. antiguus) in the southern Urals and China northeast of Lake Baikal as evidence that this area was a temperate climate in the period of the woolly mammoth. Since these areas were subject to moderate temperatures during the interglacial periods of the Pleistocene and mammoths have been associated with several biotopes (arctic tundra, and taiga, boreal forest, cool temperate forest, and loess-steppe), Krause's conclusion appears invalid.

Krause does make an interesting point with regard to the anal flap as an adaptation to cold. He points out that modern elephants living in warm continental steppe and savannah and in equatorial forest have anal flaps. These species evolved contemporaneously with the woolly mammoth. The function of the anal flap in living elephants is not well understood; it clearly may be protection for the delicate tissue of the anus, as it forms a semicircular fold below the tail and anal opening. But what does it protect against - injury, cold, evaporation, or some other climatic condition? Another interesting aspect of this question is whether or not the anal flap is an adaptation to climatic conditions in the past and has remained genetically unchanged.

Thus, the presence of an anal flap would not necessarily suggest adaptation to a cold climate. With respect to the fat hump which has been cited as an adaptation to the arctic climate, Krause rightly states that no scientist has found evidence of one on a woolly mammoth carcass with any of the skin intact. The appearance of such a hump in cave paintings has been attributed to the shape of the woolly mammoth's skull and vertebral processes in comparison to contemporary elephants and other species of mammoths. Krause contends that the rubbed-down zones at the ends of mammoths tusks were not produced by pushing snow away from vegetation, as stated by many scientists. He points out that the tusks should be worn down all over from pushing snow and should be heavily scratched from rocks in the tundra. He concludes that mammoths lived in temperate grassy areas where their tusks were worn from resting them on the ground while grazing, sleeping and standing. It is at the point in the text where Krause turns to a comment on stomach contents and associated animal fossils that his contention completely loses all scientific validity. He states that his own work on this aspect is incomplete but that he believes that this evidence will show that the woolly mammoth lived in a temperate climate.

Finally Krause leaps to his conclusion, with verbal support from fellow passengers on a train from Stuttgart to Mainz. He summarizes his own view that there was no Ice Age but rather that the Biblical Flood caused the extinction of animals like the woolly mammoth. He ends with a quotation from E. W. Pfizenmayer's book "Mammutleichen Und Urwaldmenschen" (1926, p. 22):

> Hence, the old Russians of Northeast Siberia at the beginning of the 18th century were not so far off at all, when they believed 'that the elephants have stayed in these countries before the Flood, when the air must have been warmer, and that during the Flood their drowned bodies floated on the water and were washed beneath the ground. After the Flood, the region, that had been warm before, became cold, so that from this time, onward, the ground must have been frozen.'

In fact, Krause has raised several worthwhile questions about characteristics of the woolly mammoth. For this reason, the text is worth exploring. If the woolly mammoth were so poorly adapted to cold climate, it might not have been able to survive even in an area such as northeast Siberia which was apparently a poor hunting region for early man. Krause includes in his text a quotation from a personal communication from Malcolm C. McKenna, Frick Curator, Department of Vertebrate Paleontology, American Museum of Natural History: "I am persuaded by what I have observed that the argument that there is no particular reason to think of mammoths as adapted to extreme cold is probably valid. After all, if they were, they would probably still be there in the Canadian arctic!"

Yet Krause chooses to overlook this approach to the problem in favor of his hypothesis that woolly mammoths never lived in an arctic climate and that they died out in the Biblical Flood. Krause's illogical conclusion, plus serious flaws in his presentation of the material, could overshadow the importance of his observations. There are a variety of annoying aspects in the method: lack of reference to time periods for any of the mammoth materials, references from the 1974 Britannica and 1892 and 1919 studies in preference to more recent work, a quotation from an anonymous scientist "Mr. B.", and an abundance of grammatical errors in the text. But if one reads the main sections of The Mammoth - In Ice or Snow? as a series of individual discussions on physical aspects of the woolly mammoth, then the book can be valuable. It is not necessary to accept the underlying hypothesis in order to find relevant ideas, and therefore the book is worth reading. **--Sandra S. Lash**, 3120 Spring, West Bloomfield, Michigan 48033, U.S.A.

(These two references are cited in the Book Review, they are included here for the reader's convenience:

Neuville, H. 1919. On the extinction of the mammoth. Pp. 327-328, in the Annual Report of the Smithsonian Institution, 1919. Government Printing Office, Washington, D.C..

Pfizenmayer, E. W. 1926. Mammutleichen und Urwaldmenschen. Leipzig.)

The book by Hans Krause may be obtained from: Kameralamtsstr. 22, 7000 Stuttgart 40, West Germany.

Michael J. Schmidt. ELEPHANTS. Chapter 27, pages 709-752, in Zoo and wild animal medicine (Murray E. Fowler, ed.). W.B. Saunders Company, Philadelphia, 951 pp., 1978. Price U.S. $59.50.

The chapter is concise. The errors and some questionable statements detract from the content.

For example, the word Loxodonta is misspelled in the introductory paragraph. On page 711, right side, the author states that: "Each successive molar is pushed forward in the jaw by the replacement molar behind it and, ..." Sikes (1971:93) states: "The process by which the molars are propelled along each half-jaw in an anterior direction has not yet been fully elucidated." And on p. 94 she writes: "It is also clear that molar movement is not entirely dependent upon pressures exerted by the growing posterior molars, the dynamic and constantly self-adjusting bone formation within the mandible undoubtedly contributing to the molar movement in an anterior direction." The dental formula of the elephant (given on p. 710) should be written as:

$$I\frac{1-1}{0-0} \quad C\frac{0-0}{0-0} \quad P\frac{3-3}{3-3} \quad M\frac{3-3}{3-3} \quad \text{and not} \quad I\frac{1-1}{0-0} \quad C\frac{0-0}{0-0} \quad M\frac{6-6}{6-6}.$$

For practical purposes, such as aging techniques, it has become customary to call the three premolars, molars, but not to include them (the premolars) as molars in the dental formula (see Sikes 1971:80-81).

Figures 27-16 through 27-26 and Tables 27-1 and 27-2 have been labeled in radiographic terminology. I am unable to judge the veterinarian aspects, like clinical diagnosis and treatments, and specific items, such as needle sizes and dosages; these aspects should be looked at by professionals. But I was surprised to read human attributes ("great anxiety or stress", "severe pain", "painful urination", "terror", "trauma", and "fear") used in describing elephants' feelings on pages 735, 736 and 742-743.

There is a lack of references cited throughout the text. As an example, on page 709 in the section entitled "SKIN AND APPENDAGES" no reference is given for "sweat glands are present throughout the skin...". Also, on p. 713 in the section entitled "SPECIAL SENSES", no references are cited for the sentence: "The elephant has no lacrimal apparatus; the harderian gland ... for the eye." On p. 713 under "PHYSIOLOGY", references for the age of sexual maturity, musth and temporal drainage would be helpful. In the section on "REFERENCES" the generic names of Elephas and Loxodonta are not underlined or italicized anywhere. In reference number 14, the lower case of the letter "l" should be the upper case "L", since it stands for Linnaeus, as it appears in the original article in Behavior: "Elephas maximus maximus L." In reference 40 the year of publication is 1975 and not 1976. In references 47 and 48 the year of publication is 1878 and not 1877, and in reference 48 the first page is 385, not 384.

The following sections and items were well written: Introduction (p. 709); paragraph on heatstroke (p. 744); section on lymphatic system (p. 744); section on estrous cycle (p. 746); Table 27-5 (p. 746); Figures 27-33, 27-34, 27-35 (pp. 748-749); summary on hematology (p. 749); Table 27-6 (p. 750); and

the section on cerebrospinal fluid (p. 751). The 80 references listed are handy. **--Jeheskel (Hezy) Shoshani**, Department of Biological Sciences, Wayne State University, Detroit, Michigan 48202, U.S.A.

Clive Walker (ed.). THE RING FENCE. Endangered Wildlife Trust, Bedfordview, South Africa, 88 pp., 1978. Price: R 10.00 (USA $13.40).

The Ring Fence, a brief anthology of journal extracts, poems and photographs, offers two views related to African wildlife over the past one hundred and fifty years: hunting and conservation. The excitement and danger of the chase, the hardships endured, the vanity and greed and, at times, compassion of the hunter, as well as the suffering of the hunted, are presented through journals and drawings by 19th century hunters. Through their writings we perceive men unable to fathom that all resources--even elephants--are limited. These were sportsmen accustomed to vast wilderness areas and myriad game, men who felt that their right to kill was directly proportionate to the risks they took in the killing. A reader not so sensitive to the plight of endangered wildlife might find himself caught up in the adventure and fervor of the hunt. In contrast, Clive Walker, of the Endangered Wildlife Trust, has chosen several sensitively written 20th Century poems as well as numerous photographs and sketches. The juxtaposition of contemporary photographs and poems with the descriptions from the past century is effective. The two views are constantly contrasted rather than set apart physically in the organization of the anthology.

Generally, the materials compiled are well documented, and credit is given for the photographs and writings but not for the sketches which occur throughout the text. It would be helpful to have a table of contents and pagination.

The book's title is drawn from a poem of the same name. Cullen Gouldsbury, the author of the poem, laments the situation whereby animal reserves have formed a fence around civilized areas. In addition, the laws to protect the elephant, in a land where the hunter had been king, have stripped sportsmanship of its glory and rewards. Today the power of the ring-fence is lessening as population pressures and anti-conservationist legislation steadily encroach upon the areas for animal survival. It is the view of environmentalists such as the editor that the future of all African wildlife rests with those who believe that conservation is essential and who act to insure that others understand the consequences of past actions and use that knowledge so that other species will not suffer the same fate as the elephant. In Walker's words: "What the whale did for the herring, the elephant could do for the rhino." **--Dorit Yehiel**, 15321 Miller, Oak Park, Michigan 48237, USA.

The book by Clive Walker (ed.) may be obtained from: Endangered Wildlife Trust, P.O. Box 645 Bedfordview, South Africa 2008.

Laurie P. Winfrey. THE UNFORGETTABLE ELEPHANT. Walker and Company, New York, 96 pp. 1980. Price: $14.95.

This book gives man's perspective of the elephant at tne time of The Creation and within The Garden of Eden and carries it on through the ages and into the present time. The book presents the elephant as portrayed within our religion, our legends and folklore, and particularly our art. In the introduction there are some rather careless comments; however, there are good brief annotations with the various categories of art which are interspersed throughout the book. Some of the art material presented is of high quality, while other examples are so poor that they could hardly be referred to as being artistic. Another shortcoming is the omission of some of the more important examples of the elephant in art. Certainly examples of the painting of Friedrich Wilhelm Kuhnert (1865-1926) and David Shepard (1931-) and the sculpture of Carl Ethan Akeley (1863-1926) and Antoine Louis Barye (1796-1875) should be a part of any presentation depicting man's representation of the elephant.

The diversity of the subject matter is interesting. The most striking impression is that most of the material represented is not reproduced in other contemporary publications that depict the elephant. This gives the book its value. Much of the art is historical and in a variety of media - painting, sculpture, numismatics, toys, architecture, and even topiary. Consequently, one sees the elephant stylized from a variety of different cultures around the world. Except for a few old and intriguing photographs, very little of the art depicts the elephant realistically.

In the back of the book there are credits for the various picture sources utilized by the author. It was disappointing, however, not to find a table of contents, or an index or any references. In a pictorial book with little text, it is not necessary to include these sections but they would be more helpful than the list of sources by institutional names.

For all age levels and generations in time, the book's impact is beautifully visual. It is filled with appealing color and provides an unique view of the elephant as a symbol in cultures throughout time. —**Joseph G. Engelhard**, 2014 Geddes Avenue, Ann Arbor, Michigan 48104, USA.

RECENT LITERATURE (1970-1980) ON ELEPHANTS AND RELATED TAXA

Beard, Peter H. 1977. The end of the game. Doubleday & Company, Inc., Garden City, New York, 280 pp.
Black and white photographs by the author. The culmination of a twenty-year documentation of the rapidly changing state of elephants in East Africa, with emphasis on Tsavo National Park, Kenya. Historical materials included reach back to 1898 (E/SSL).

Carr, Norman. 1980. Valley of the elephants: the story of Luangwa Valley and its wildlife. Collins, London, 128 pp.
In this short, easy-to-read story, the ecology of 'the highest continuous population of elephants anywhere' is described by a safari leader. Particular emphasis is placed on elephant damage to the mopani woodland, and a regular cropping program is advocated (E/Swara, 3(1):16).

Douglas-Hamilton, Iain, and Oria Douglas-Hamilton. 1975. Among the elephants. The Viking Press, New York, 285 pp.
Color and black and white photographs. This book results from I. Douglas-Hamilton's 4½ year study on ecology and behavior of the elephant population of Lake Manyara National Park in Tanzania. It is written in novel form but contains most of the information gathered. Recommended (JH).

Hanks, John. 1979. The struggle for survival: the elephant problem. Mayflower Books, New York, 176 pp.
A lucid account of the elephant problem and introduction to the hard cold facts associated with the culling program. Data gained provides a basis for further studies. Suggests that revenue can be channeled towards conservation. Includes basic elephant biology, built-in birth control, mortality, ecology and behavior (JS).

Hartman, Daniel S. 1979. Ecology and behavior of the manatee (Trichechus manatus) in Florida. Cornell University Press, Ithaca, 153 pp.
A comprehensive study with significant observations on daily activities; food habits; interactions between animals, objects and other animals including man; and population dynamics (SSL).

Holbrook, John. 1977. A closer look at elephants. Franklin Watts, New York, 30 pp.
Junior Library, illustrated by Peter Barrett. Written for upper elementary students, this book gives an overview of the evolution of elephants, their anatomy and behavior, their growth and their relationships to man (SSL).

Holman, Dennis. 1980. Elephants at sundown. The story of Bill Woodley. W. H. Allen, London, 274 pp.
Biography of a remarkable individual recounted in an easy style with humor and set in a significant period of Kenya's wildlife history (E/Swara, 2(5):16).

Jackson, K., and B. Jackson. 1979. The saggy baggy elephant. Western Publishing Company, Inc., Racine, 22 pp.
Junior Library, color illustrations. To be read to young children by parents who may point out that the macaw parrot which lives in South America and the African elephant do not naturally meet. Similarly, the tiger and the African elephant live on different continents. There are two kinds of elephants: African and Asian (JS).

Krause, Hans. 1978. The mammoth - in ice and snow? Hans Krause, Stuttgart, 108 pp.
The author questions the adaptability of woolly mammoths to various climates. He gives extensive evidence to support his temperate climate hypothesis (SSL).

Laws, Richard M., Ian S. C. Parker, and Ronald C. B. Johnstone. 1975. Elephants and their habitats: the ecology of elephants in North Bunyoro, Uganda. Clarendon Press, Oxford, xii+ 376 pp.
Population dynamics, ecology of elephants and interaction with other species including man. Cropping elephants to avoid further damage to the habitat. Study based not only on Uganda's elephants but also on Kenya's and Tanzania's. Management proposals included (E/JS).

Lesburg, Sandy, and Nicolai Canetti. 1975. The book of elephants. Peebles Press International, Inc., New York, 12 pp. + 130 photograhs.
Commentary for laymen by Lesberg from trip througn Kenya and various readings; photographic record by Canetti (SSL).

Lewis, George "Slim", and Byron Fish. 1978. I loved rogues. Superior Publishing Company, Seattle, 184 pp.
One hundred-sixty black and white photographs. A revised edition of "Elephant Tramp" published in 1955. This book contains spellbinding accounts about elephants by a man who has spent almost a lifetime working with them (E/SSL).

Maglio, Vincent J., and H. B. S. Cooke, (eds.). 1978. Evolution of African mammals. Harvard University Press, Cambridge, ix + 641 pp.
Summary and overview on the origin and evolution of the class Mammalia in Africa. Illustrations, tables and extensive references augment the text describing and discussing the morphology, taxonomy, geographical distribution, major phyletic units, origin and specific evolutionary trends of fifteen mammalian orders (JS).

Mayer, Fred, and Angelika Bucher-Waldis. 1972. My elephant Sahib. Hill and Wang, New York, 34 pp. Translated into English by L. K. Conrad.
Junior Library. Twenty-nine black and white photographs, twelve of which depict Carlito and Sahib together. Carlito is a three year old boy; Sahib is a 30-year-old, 5 ton bull Asian elephant with large tusks. Good photography and narration for young readers (JS).

Moss, Cynthia. 1975. Portraits in the wild. Behavior studies of East African mammals. Houghton Mifflin Company, Boston, 363 pp.
Color and black and white photographs. The chapter on elephants is a good review of the most significant research which has been done with these animals (JH).

Murray, Neil. 1976. The love of elephants. Octopus Books Ltd., London, 96 pp.
The natural history of the living elephants is traced and interlaced with descriptions on family life, cult, Eastern myth and religion, man-elephant relationships, ivory trade and the elephant's future. Color photographs (JS).

Porter, Wesley. 1979. The hare, the elephant, and the hippo. Franklin Watts, New York, 20 pp.
Junior Library, illustrated by Joyce Behr. In this African folktale, a hare figures out a way to get the best of a big elephant and a huge hippo. (E/MB).

Sheldrick, Daphne. 1973. Animal kingdon: the story of Tsavo, the great African Game Park. The Bobbs-Merrill Company, Inc., New York, 288 pp.
This book contains an exciting firsthand review of the growing pains and unique ecstasies associated with Tsavo's development as a leader among the world's finest game preserves. Sheldrick spices up the history lesson with detailed personal accounts describing her own ever-changing menagerie of "wild" animals including elephants. (MJB).

Simon, Noel. 1978. Elephants. J. M. Dent & Sons Ltd., London, 46 pp.
Junior Library. This young reader's book on the life style of elephants has been written by a distinguished conservationist and color illustrated by Terry Riley; it nas received a special commendation from International Union for Conservation of Nature & Natural Resources (IUCN) (E/SSL).

Steig, William. 1971. Amos and Boris. Farrar, Straus and Giroux, New York, 30 pp.
Junior Library, illustrated by the author, for young readers. Amos the mouse and Boris the whale were loyal friends because Boris had saved his life. Later, when Boris was washed ashore, Amos managed to recruit two elephants who pushed Boris back to the sea (SB).

Time-Life Films (eds.). 1976. Elephants and other land giants. Time-Life Films, Inc., New York, 128 pp.
Color photography. Based on the television series "Wild, Wild World of Animals". Reptiles, birds, and mammals included. The relationship between surface area and volume and, consequently, the advantage of being large are illustrated. The chapter on elephants includes past and present works on both Asian and African. (JS).

Walker, Clive (ed.). 1978. The ring fence: an anthology of the southern elephants. Endangered Wildlife Trust, Bedfordview, South Africa, 88 pp.
Short collection of photographs, quotations from elephant hunters in the 19th century, and contemporary poems (SSL).

Wilson, Derek, and Peter Ayerst. 1976. White gold, the story of African ivory. Taplinger Publishing Company, New York, iii + 184 pp.
Black and white photographs. Hunted for food and sport; closely entwined with slavery; driven out by colonization; above all, prized and slaughtered ruthlessly for ivory, elephants' encounters with man have usually been violent. Told in vivid, historical detail (ED).

Winfrey, Laurie P. 1980. The unforgettable elephant. Walker and Company, New York, 96 pp.
Mostly color photographs and illustrations, little text - for all ages. The books traces man's perspective of the elephant from the Time of Creation, Garden of Eden, to the present. History, art, religion, legends, folklore, painting, sculpture, numismatics, toys, architecture and topiary are all incorporated (JGE).

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