

INTRODUCTION

We hope this glossary will be useful to anyone reading about elephants, while encountering an unfamiliar term.

Words have been collected from many sources, over a number of years. Please bear in mind that such a work will always be less-than-complete....very much a work-in-progress. It is an on-going project; many definitions will need modification. We invite you, please, to contribute your comments.

We realize that any such listing will always be a subjective choice and have tried to be "inclusive" rather than "exclusive", reasoning that a term can be skipped over more easily than searched for elsewhere.

Some words apply to animals in general. In those cases, we have tried to show how they relate to elephants, specifically. And several references are given, which will lead the reader to further information. These references are not meant to be exhaustive but merely to show how a term applies to elephants.

We have surveyed many publications that contain glossaries, and selected those items that have special relevance to elephants.

Non-English terms [listed in *italics*], are found especially in older regional publications. Synonyms are listed under the heading of the most commonly used term.

An online version of this glossary will reflect periodic updates and include changes and corrections. This version is intended to be "downloaded" into your personal computers, where a specific word can then be located with the "FIND" feature.

Readers are encouraged to send any comments/corrections/suggested changes to both authors. These may be sent by e-mail to: musthbull@sedona.net & csanti@slt.lk or by post to:

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We have created the beginning. Now it is up to other elephant-workers to contribute and make it more useful to all. An online version of this glossary ["Savanna Elephant Vocalization Project/Elephant Voices" at <http://www.elephantvoices.org>] will reflect periodic updates and include changes and corrections. This version is intended to be "downloaded" into your personal computers, where a specific word can then be located with the "FIND" feature.

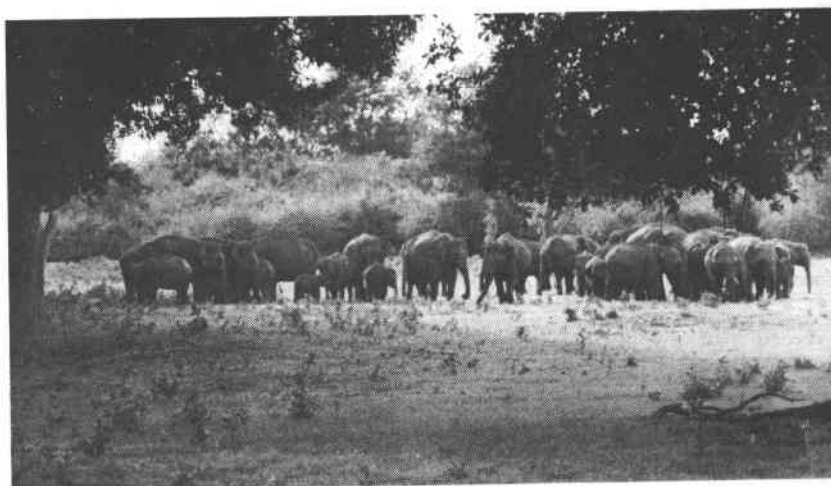
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(compilers)

Acknowledgements

Special thanks to Billie Armstrong, for assistance with the references and in many other ways.

The senior author wishes to express his appreciation to the MacArthur Foundation (Chicago, USA) for a fellowship which supported the compiling of this glossary and other research on elephants. We thank the following persons for their helpful comments on earlier drafts of this glossary:

Billie D. Armstrong, Fiona Capstick, Robert H. I. Dale, Marion Garai, Petter Granli, Melissa Groo, Cynthia Moss, Debbie Olson, Joyce Poole, Bruce A. Schulte, Hezy Shoshani, Sylvia I. Taylor.



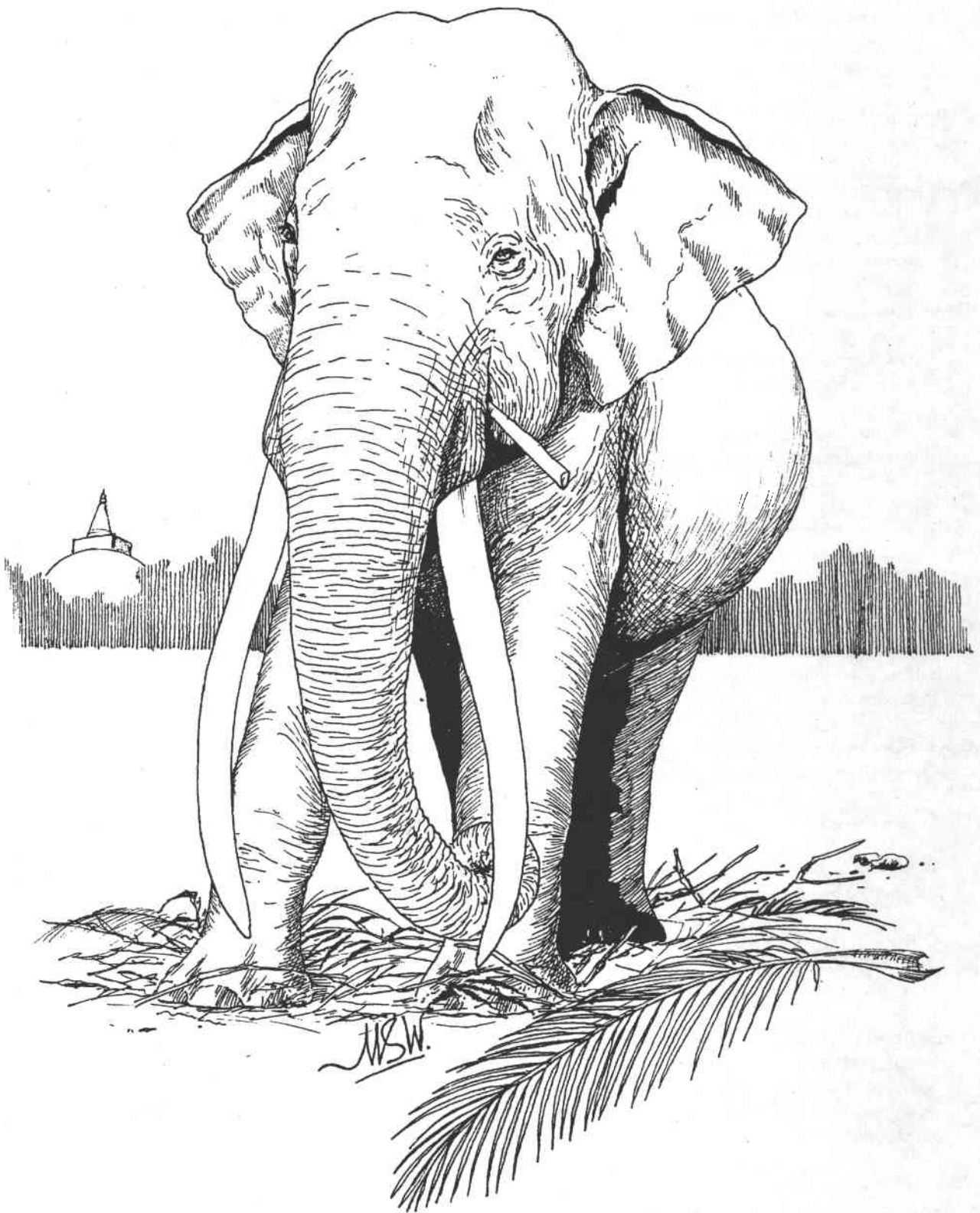
- Achin** (Burmese): [also: a-chin] (Gale 1974:157; Daniel 1998:140) Afterbirth; placenta.
- Activity-pattern:** [= time-energy budget] (Weir & Davison 1965:355,359; McKay 1973:53,61; Guy 1976:288-289,292) Amount of time spent each day in various activities (e.g. foraging, walking, resting, drinking, etc.). Elephants spend a majority of their time in foraging.
- Adolescent:** [see also: **age groups**] (Ford & Beach 1951: 268) Sub-adult; age-group between **puberty** and full reproductive **maturity**.
- Adult:** [see also: **age groups**] Mature individual.
- Age-groups:** [also: cohorts] (Lee 1987:279; Moss 2001:150-151) Rather imprecise grouping by age-class, roughly as follows, with some overlap:
- Infant:** [$\pm 0-1$ year] Can still pass under mother's belly.
- Calf:** [$\pm 0-4$ years] Still dependent on milk. Also a generic term for all immatures.
- Young juvenile:** [$\pm 2-5$ years] Still nursing, but can survive for some periods without milk.
- Older juvenile:** [$\pm 5-10$ years] Weaned, but still near mother; females start to look after younger siblings; males form play-groups.
- Immature:** [$\pm 0-10$ years] Not yet sexually mature.
- Adolescent:** [$\pm 10-15$ years] Sexually mature, but have not yet reproduced.
- Sub-adult:** [$\pm 15-20$ years] Females reproductively active; males reproductively "interested" but not usually successful. Not yet full-grown.
- Adult:** [$\pm 20-55$ years] Fully mature. (NB: males continue to grow throughout life.)
- Old adult:** [$\pm 55+$ years] Reproduction slowing slightly; losing molars; nearing death.
- Aggregation:** [see also: **social organization**] (Moss & Poole 1983:316,317,318; Poole & Moss 1989:112,114; Poole 1994:335) Gathering, which can be as large as 200-500; may include dozens of **family units** and a number of mature males; larger aggregations form mainly during the rainy-season in areas where food is plentiful and usually associated with peak mating activity [see also: **breeding, seasonal**]. Also sometimes seen in populations that have been heavily decimated by poaching or other disturbance.
- Agonistic behavior:** (Immelmann & Beer 1989:10; Estes 1991:263,559) Collective term for aggressive [dominant/offensive] and defensive [subordinate/submissive/fearful] behavior.
- Alidena** (Sinhalese): (Deraniyagala 1955:48; Jayewardene 1994:20,121; Cannon & Davis 1995:38) Female with no tushes.
- Aliya** (Sinhalese): [see also: **pussa, mukhna**] (Deraniyagala 1955:48; Jayewardene 1994:20,121; Spinage 1994:34; Cannon & Davis 1995:38; Katugaha 1997:67) Tusksless male; a male--without tusks--but with **tushes**; a tush elephant. Also a generic term for elephant.
- Allomother:** [see also: **auntie**] (Riedman 1982:405; Lee 1987; Buss 1990:15,110; Moss & Colbeck 1992:86) Maternal behavior by a female not the calf's mother; may include **comfort suckling**. Juvenile or adolescent female elephants that comfort, assist, and protect calves in the **family unit**, but are not the calves' mother (but may be their older sibling). Allomother and **auntie** are similar; in general the former is a more prolonged assistance with the young.
- Allometric:** (Hanks 1972a:252; Calder 1984:2; Lindeque & van Jaarsveld 1993; Lee & Moss 1995) Relative changes in proportions, of morphological body-parts or physiological measurements. Changes can occur during the evolution of the species or in the growth [ontogeny] of the individual.
- Anal-fold/anal-flap:** (Sikes 1971:frontispiece[photo]) Triangular flap of skin at base of tail, which when lowered covers the anus.
- Ani** (Tamil): [also: anay] (Lahiri-Choudhury 1999:455) Elephant.
- Anguli** (Sanskrit): (Edgerton 1931:114) "Finger" at the end of trunk.
- Ankus** : [also: angusam, ankusa, ankush, angkus, choon, crook, gajbag, goad, guide, haunkus, hawkus, hendoo, hendu, henduwa, thotty, bull-hook, hook, driving-spike] (Tennent 1867:155,156; Carrington 1958:174; Chadwick 1992:18, 297-298; Jayewardene 1994:51-52,121; Cannon & Davis 1995:110,113 [photo],172; Lair 1997:272; Lahiri-Choudhury 1999:455) Short stick with a sharp, curved, finger-length metal hook at the tip, used to control and direct captive elephants. A hooked goad for driving elephants. Euphemistically, sometimes, called "guide".
- Artificial-insemination:** [also: A.I.] (Schmitt, et al. 1998; Olson 1999) Impregnation of a female with semen by artificial means. Only recently has this procedure been successful with captive elephants, using modern techniques and fresh [rather than frozen] semen.
- Asana** (Sanskrit): (Edgerton 1931:115) Withers; place where mahout sits.
- Askari** (KiSwahili): (Buss 1990:42,43; Smith 1992:140-141) Word meaning "soldier" or "guard"; the attendant younger bull(s), often in the company of an old, very



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23/02/04

Ankus (drawn by Manjula Wijesundara)

- large bull. In Hindustani the term is **chela** (Krishnan 1972: 315; Daniel 1998:88).
- Atha** (Sinhalese): (Deraniyagala 1955:48; Jayewardene 1994: 20,121; Spinage 1994:34; Cannon & Davis 1995:38; Katugaha 1997:67) Male with tusks; a tusker.
- Ath-gala** (Sinhalese): [see also: **kheddah, kraal**] (Cannon & Davis 1995:172) Method of capturing large numbers of elephants by the use of a stockade.
- Athinne** (Sinhalese): [also: **atini**] (Deraniyagala 1955:48; Cannon & Davis 1995:38; Jayewardene 1994:20,121) Female with tusches.
- Auntie**: [see also: **allomother**] (Williams 1950:60-61) Female--often an older daughter--that stays with a mother and helps out with the newborn baby. Auntie and **allomother** are similar; in general the latter is a more prolonged assistance with the young.
- Babesiosis**: (McKenzie 1993:678) Tick-borne disease caused by a blood parasite, *Babesia* sp.
- Bai** (probably a creolization of the French baie, meaning bay): [see also: **salt-lick**] (Quammen 2003:54) In central Africa, a wet clearing in the rainforest, where elephants and other animals come to drink and eat minerals.
- "Bamboo"**: (Sanderson 1962: 216) Hollow, basal part of a tusk; also called the **nerve-cavity, pulp-cavity**.
- Bazaar, elephant**: [see also: **mela**] (Shand 1992:5,27,158-193; Hall 2000:35) A fair; in this case an elephant fair, where elephants are bought and sold. The largest in the world is an annual affair [November], held at Sonapur at the confluence of the Ganges and Gandak Rivers in Bihar, India.
- Bite-size**: (McKay 1973:56,95; Guy 1975:2; Ruggiero 1992: 145) Average amount of food taken in with each trunkful; estimated between 27-200 g, depending on observer and type of food eaten.
- Bolus**: (Benedict 1936:178-179,181-184; Guy 1976:290; Estes 1991:262) Single ball of feces. An average of 3-5 boli are dropped at each defecation, approximately 17 times per day, for an approximate total of 155 kg of feces/24 hr.
- Boma** (KiSwahili): (McKenzie 1993:678) Any kind of raised structure for defensive or protective purposes; a stockade. In East and southern Africa, the term also refers to an enclosure for the temporary containment of animals.
- Bond group**: [also: **kinship group**; see also: **social organization**] (Moss & Poole 1983:315,318,321; Poole 1994:332,334) Two or more related **family units**, who show a strong association over time; after a separation they greet each other with greeting rumbles or an Intense Greeting Ceremony.
- Boormeergah** (Hindustani): (Shand 1996:63) A type of elephant that is a blend of the **koomeria** and the **meergah**.
- Boro** (Wata [Kenya]): (Parker & Amin 1983:47) Male with tusks of about 35 lbs. each.
- Brachyodont**: [also: brachydont; see also: **hypsodont, molar**] (Shoshani 1998:481) Referring to molars with low-crowns; found in some early proboscideans.
- Breeding herd**: [also: **cow-calf group**; see also: **social organization**] Group of mature females and their offspring. Especially in southern Africa, the term is often used as synonymous with **family unit**.
- Breeding, seasonal**: (Laws 1969:199-200,203,215; Hanks 1972b:13,17,18,22-23; Williamson 1976:89,90,91; Craig 1984; Hall-Martin 1987:616-617,618; Poole 1987: 285,305,309,313) Time of year when the majority of conceptions take place. In areas with a pronounced wet/dry cycle, breeding peaks during and following the rainy season when elephants are in good condition; in areas with a less pronounced wet/dry cycle, breeding may occur throughout the year. "Breeding peaks are probably a product of an increase in water availability and the consequent dispersions....away from artificial waterholes [at Hwange NP, Zimbabwe], resulting in favourable breeding conditions under reduced stress, and to the seasonal availability of high quality food" (Williamson 1976:91).
- Brisket**: (McKenzie 1993:678) Lower chest region.
- Browse**: [see also: **graze**] (Owen-Smith 1982:360,372,373; Shoshani 1992:54) To eat leaves, buds, twigs, shoots of trees and shrubs (i.e. woody vegetation).
- Buccal depression**: (Albl 1971:135,138,140) Depression in the cheek region of the sides of the head, below the **zygomatic-arch**; depth is a good indication of age and--to a lesser extent--of physical-condition.
- Budi** (language ? [Tanzania]): (Rushby 1953:131; Capstick 1992:34) In Tanzania, a tuskless elephant.
- Bull**: (Ford & Beach 1951:270) Adult male.
- Bull area**: [see also: **retirement area**] (Moss & Poole 1983: 318,323; Hall-Martin 1987:616,618; Buss 1990:43; Moss & Colbeck 1992:109) Region inhabited mainly by mature males, during periods of sexual inactivity.
- Bull group**: [= bull herd, bachelor herd; see also: **social organization**] (McKay 1973:81-84; Moss & Poole 1983:316,318,322,323,325; Hall-Martin 1987:619; Buss 1990:28,36; Estes 1991:261) Gathering of mature, and sometimes a few adolescent [as young as 14-16 years] males; these males do not usually form any long-term bonds with each other, although some may [at Amboseli, Kenya, bull groups averaged 3.8, with a



A tusker (drawn by Manjula Wijesundara)

range of 2-25 (Moss & Poole 1983:316)]. Interactions between members of a bull group are usually relaxed and amiable; whether a bull associates with other bulls or with females depends on its age and sexual state [see also: **sexually active/inactive**, **musth**]; during the heightened sexual-stage of **musth**, males are typically found with females or alone (Poole & Moss 1989:116).

Bulling problem: (Alexander 2000:10) The problem of musth, in the keeping of captive male elephants.

Bunolophodont: (Savage & Long 1986:249; Tassy 1996: 21) Low-crowned tooth with domed cusps which are transversely linked by a loph or ridge. Referring to the structure of the grinding-surface of elephant molars.

Burying behavior: (Kühme 1962:68-69; Kühme 1963:117) By throwing objects (e.g. dirt, leaves, branches, etc.) on top of it, an elephant attempts to bury an object, such as a prostrate animal (elephant or other species).

Calf: [see also: **age groups**] (Lee 1987:279) A young elephant, generally less than 4 years old.

Calf-distress: (Lee 1987:287) When a calf is in distress, it gives a deep, low rumble or a loud bellow, cry, scream, or roar, which evokes dramatic responses by other elephants.

Capture myopathy: (McKenzie 1993:678) Disease induced by excessive anaerobic muscular activity, usually following exertion associated with capture; characterized by lesions of skeletal and cardiac muscle.

Carcass-decomposition, stages of: (Douglas-Hamilton & Douglas-Hamilton 1992:109-110; Poole 1996:194)

Fresh: bloated, blood, vulture-droppings.

Recent: less than one year; shrunken skin over bones, surrounded by bare patch of earth, the "rot patch".

Old: pile of white bones.

Very old: pile of gray, cracked bones.

Carcass-ratio: (Barnes & Douglas-Hamilton 1982:414; Douglas-Hamilton & Michelmore 1996:325) The numbers of dead elephants, expressed as a percentage of all elephants seen, both dead and alive; usually from aerial surveys.

Caste: (Cannon & Davis 1995:36,37,109,172) Separating elephants into categories, according to their attributes of usefulness in domestication.

Cathemeral: [see also: **diurnal/nocturnal/crepuscular**] Animals, such as elephants, that are or can be active in portions of the day and the night.

Cementum: (Espinoza & Mann 1992:29; Spinage 1994:219) Moderately calcified tissue surrounding the **dentine** of

a molar or tusk; softer than **dentine** and more like bone in structure. Its main function is to anchor the tooth to the jaw-bone.

Chang peuak (Thai): (Daniel 1998:36) A rare and revered "white elephant".

Chang samkhan (Thai): (Komar, *et al.* 2000:31) A "white elephant".

Char-jarma (Hindustani ?): [also: charjama] (Baker 1890: 48; Sanderson 1907:89; Carrington 1958:175; Lahiri-Choudhury 1999:455) Seat on an elephant's back in which riders sit back to back, facing sideways. For ordinary travel it is preferred to the **howdah**. Light riding harness, which can accommodate four or more persons, sitting back-to-back facing the flanks; it has protective rails at both ends.

Charkaatiya (Hindustani): (Shand 1992:6,24) Man who cuts fodder for a captive elephant.

Chela (Hindustani): (Daniel 1998:88) Asian term for askari.

Chena land (Sinhalese ?): (Tennent 1867:64; Lahiri-Choudhury 1999:455) In Sri Lanka, a patch of forest land that is cleared to raise a single crop, after which it is abandoned and reverts to jungle again.

Chryselephantine: (Sanderson 1962: 220; Parker & Amin 1983:98-99,99[photo]; Alexander 2000:70,71) Art form in which **ivory** is mixed with solid gold, cedar, and other woods, gems, and other materials. Greek statues which were faced with **ivory** plates and decorated with gold and gold leaf.

CITES: (Greaves 1996:141) Acronym for "Convention on International Trade in Endangered Species", a treaty signed in 1975 by many countries to regulate the trade in **ivory**, skins, and other animal products taken from the wild.

Clan: [see also: **social organization**] (Moss & Poole 1983: 315,317,322,323; Hall-Martin 1987:616; Moss 1988: 76,126,132; Estes 1991:261; Poole 1994:334) **Family units** that use the same dry-season **home-range** [@ Amboseli, Kenya, 4 clans contained 9,8,5,5 **family units**, respectively (Moss & Poole 1983:317)]. Playback experiments show that elephants distinguish between clan and non-clan members (McComb, *et al.* 2000).

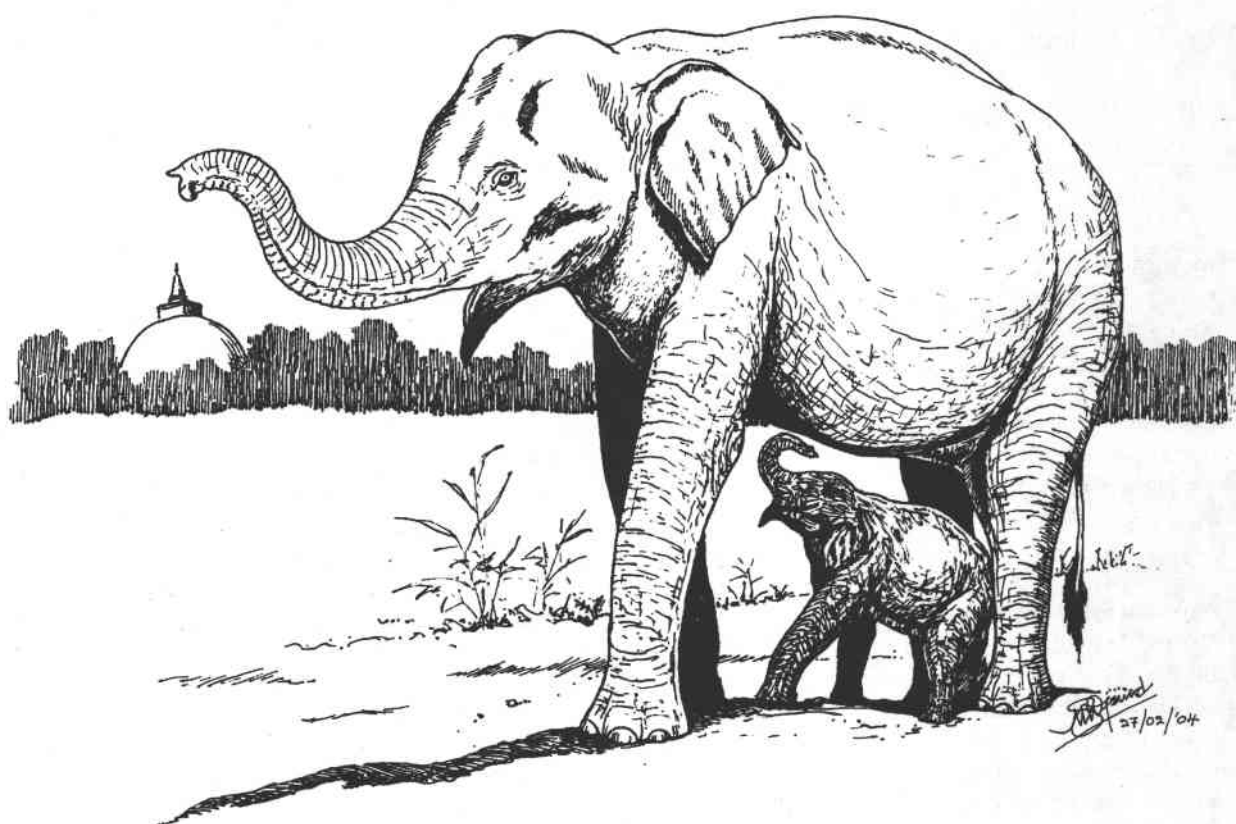
Color-vision: (Owen-Smith 1982:387; Sukumar 2003:140) Ability to see colors, as opposed to simply variations of intensity-of-grey (i.e. black & white). Elephants may see in shades-of-grey in bright light, but have limited color-vision in dim light.

Colostrum: (McKenzie 1993:678) First milk secreted by mother after birth; contains high levels of antibodies.



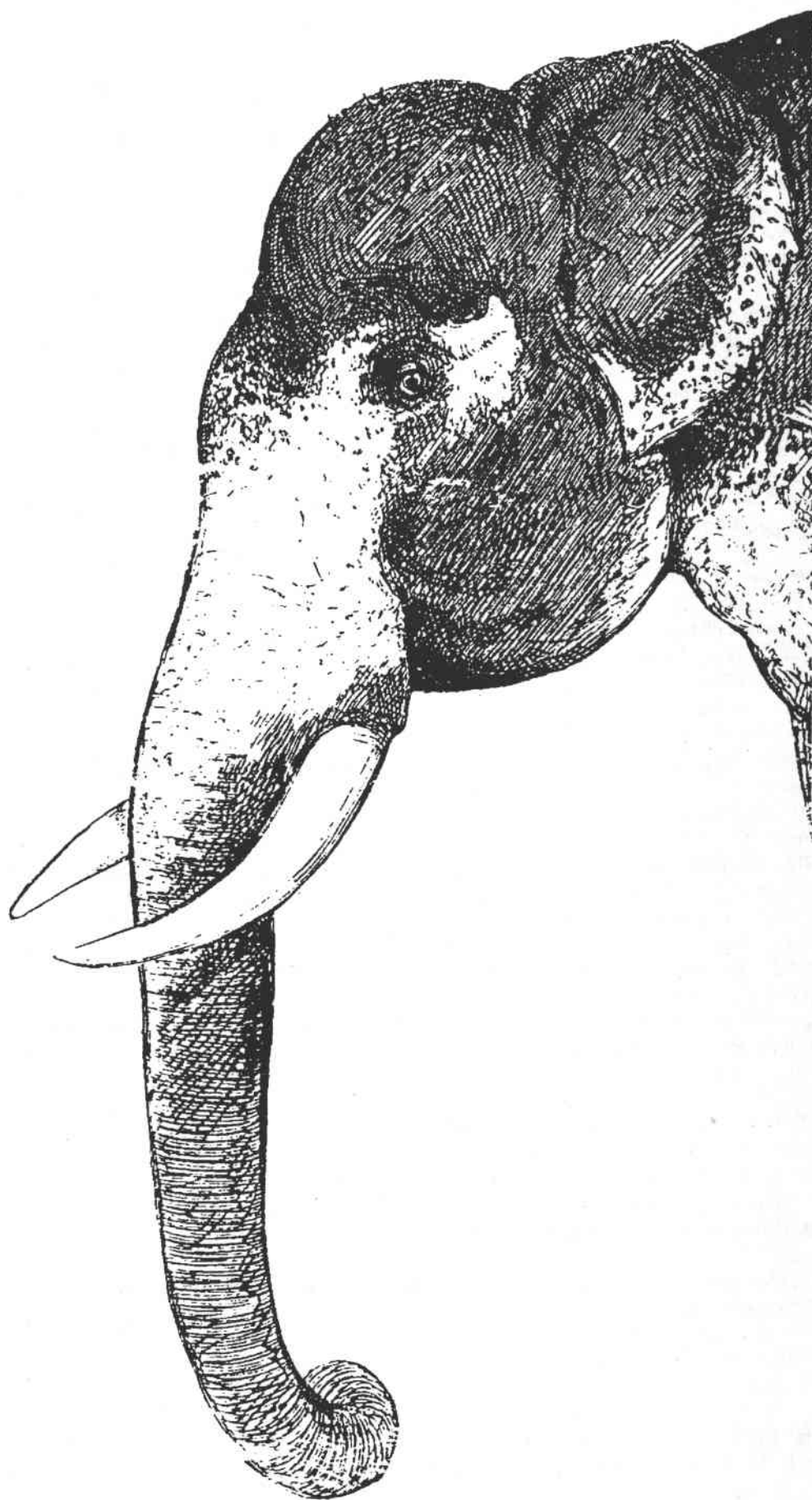
A herd of Asian elephants at Handapanagala, Sri Lanka
(photo: courtesy Dr. H. I. E. Katugaha)

- Comfort suckling:** [also: *allosuckling*; see also: *nursing*] (Lee 1987:288-290) Permitting a calf, not her own, to attempt to *suckle*. Usually observed in adolescent females who cannot provide milk; but adult females may also suckle calves not their own. In many cases these are the calf's grandmother, and the calf probably receives nourishment. May also be provided by the mother, to a calf that has experienced stress.
- Compression hypothesis:** (Sukumar 1992:99) Overabundance of elephants, owing to compression of their range by human settlement.
- Consort behavior:** [= consorting, consortship] (Moss 1983:176-177; Estes 1991:560; Moss & Colbeck 1992:177) Association of a male, usually in *musth*, with a female in estrus. May persist for several days, during which multiple copulations may take place.
- Contagious behavior:** [= movement, coordination of] (Kühme 1963:115; McKay 1973:4,75,77; Moss 1983:170) Behavior in which the actions of one individual result in similar actions by companions.
- Coppice:** (Greaves 1996:141) Secondary regrowth of damaged woody vegetation.
- Coprolite:** (Savage & Long 1986:249) Fossilized dung.
- Coprophagy:** (Kühme 1961:290) Eating of feces.
- Corpus luteum** [meaning "yellow body"; abbreviated C.L.]: (Plotka et al. 1988:310,313-314; Buss 1990:111-120) Yellow mass in the ovary formed when an ovum is discharged [ovulation]. If conception occurs, the C.L. secretes progesterone during *gestation*.
- Cow:** (Ford & Beach 1951:272) Adult female.
- Cow-calf group:** [also: *breeding herd*; see also: *social organization*] (Moss 1983:168; Poole & Moss 1989:113,114; Buss 1990:28; Moss & Colbeck 1992:40; Poole 1994:331,332) Gathering of one or more mature females and their offspring. There is some confusion in the use of the terms "*family unit*" and "*cow-calf group*", because families may not always be stable. Here a "*cow-calf group*" is any gathering of cows and calves, without regard to their relatedness. It may consist of anything from two to hundreds of individuals.
- Crupper:** (Baker 1890:50; Shand 1992:25) Unit that passes under an elephant's tail to help secure the *howdah*; often made of metal; smoothness, not softness, is important.
- Crush:** [also: elephant-restraint-device, E.R.D., E.R. chute, E.R.C.; see also: *silinguva*] (Williams 1950:70,87x[photo]; Sanderson 1962:191,197[drawing]; McKenzie 1993:679) Enclosure used for the mechanical restraint of elephants; a safety measure when performing procedures that may be dangerous.
- Culling:** [see also: *poaching*] (Hanks 1979:11,15,39-67,155,157,164; Spinage 1990:15; Gavron 1993:131-132,134-135,192-193; Hall-Martin 2000) The legal killing of excess animals in a population; used as a game-management tool by wildlife officials. With elephants, the usual aim is for entire *family units* to be removed at once.
- Dadnabas** (Wata [Kenya]): (Parker & Amin 1983:47) Large females.
- Dambo** (language ?): [see also: *vlei*] (Pratt, et al. 1966:380; Snelson 1997) In Zambia, a flat, grassy drainage channel that floods in the rainy season and supports no trees.
- Dana** (Sanskrit): [also: *temporal gland secretion*, T.G.S.] (Edgerton 1931:118) Fluid that flows from the temporal glands in *musth*.
- Danas** (language ?): (Shand 1996:50) Food for captive elephants, made from wheat and salt rolled in a banana stalk.
- Decoy elephant:** (Cannon & Davis 1995:172) Tame elephant used to lure wild elephants for capture.
- Dentine/dentin:** [see also: *ivory*] (Spinage 1994:218; Nelson 1997:24) Hard, mineralized connective tissue that forms the main substance of a molar or tusk. Formed of collagen, calcium, phosphate, and carbonate.
- Diestrus:** [also: *dioestrus*; see also: *estrus*, *pre-estrus*, *metestrus*] (Arey, et al. 1957:384; Jainudeen, et al. 1971:323) Period of sexual quiescence occurring between *metestrus* and *pre-estrus* in female mammals.
- Diploe:** Pneumatized bone containing air cells making the bone light-weight, yet strong; honey-combed bone. In elephants, the skull especially is of this form.
- Displacement activity:** (Tinbergen 1952; Estes 1991:561) Type of behavior, usually found in conflict situations, in which activities are performed that seem out-of-context (e.g. comfort-movements during a hostile encounter). Often the origin of behavior patterns shown in *ritualized displays* [q.v.].
- Display, ritualized:** (Tinbergen 1952; McFarland 1987:483-485; Estes 1991:561; Kahl & Armstrong 2000) Behavior-pattern that has been derived, modified, and stereotyped through evolution, and which communicates information to other animals about the sender's mood and/or intention. Approximately 100 such displays have been described in elephants.
- Diurnal/nocturnal/crepuscular:** (McKenzie 1993:679,681) [see also: *catheemeral*] Most active during the daytime/nighttime/around sunset and sunrise, respectively.

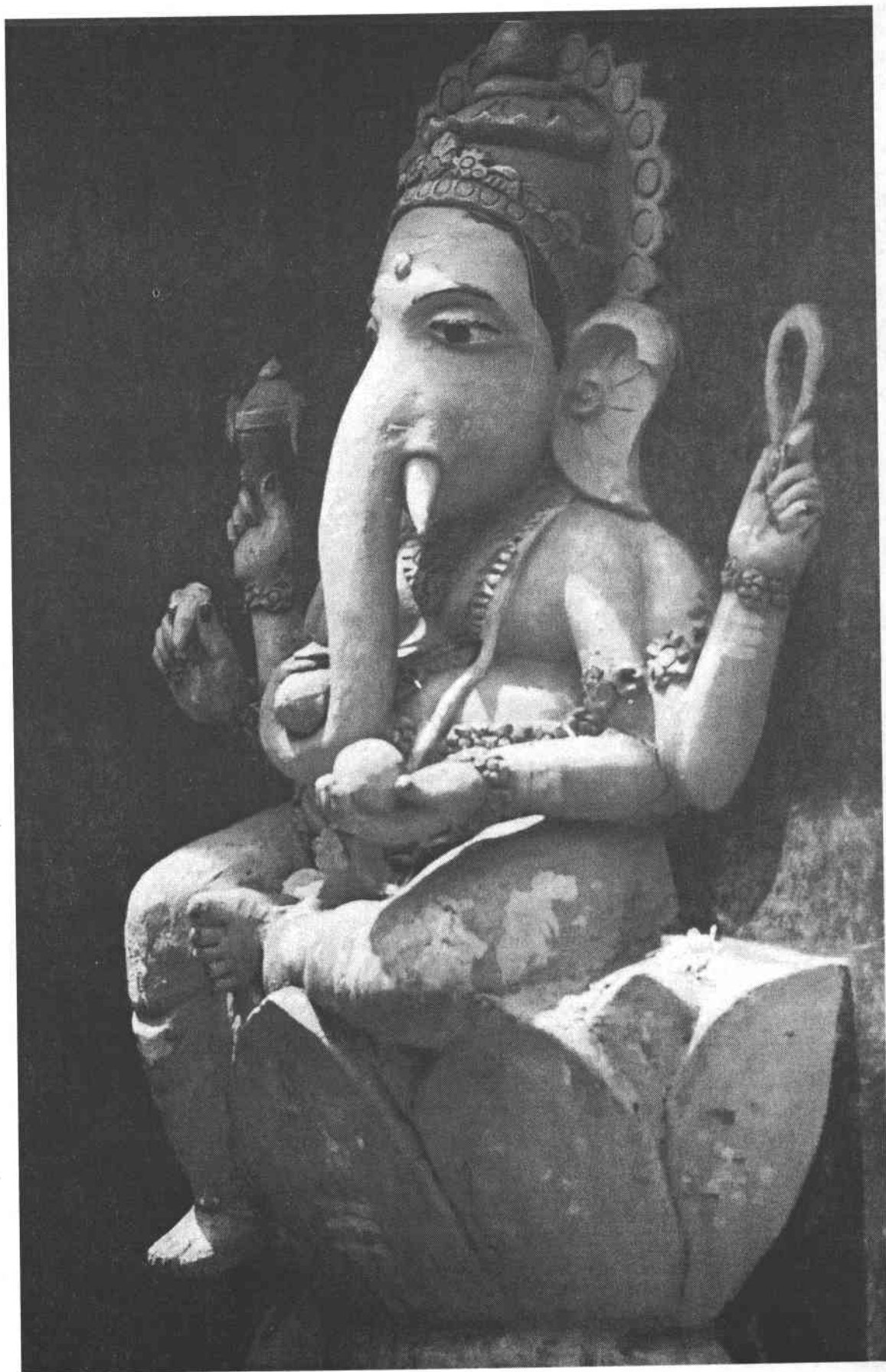


A female Asian elephant and her calf: if a calf can walk under the belly of its mother, it is less than one year old.
(drawn by Manjula Wijesundara)

- Dominant frequency** [abbreviated D.F]: [see also: **fundamental frequency**, **peak frequency**] (Berg 1983:65) Frequency of highest intensity in an elephant vocalization.
- Dudurucha** (Wata [Kenya]): (Parker & Amin 1983:44) Young male of less than 8 years old.
- Dwarf elephant**: (Caloi, *et al.* 1996; Roth 1996) Smaller forms of Proboscidea, usually found on islands in prehistoric times [= insular dwarfism]; now extinct. To be distinguished from **pygmy elephant** [q.v.].
- Dwasala** (language?): [also: **samkirna**, **misra**] (Edgerton 1931:12,16; Sanderson 1907: 83,84) Second-rate elephant, classed between a **koomeria** and a **meergah**. Probably a half-breed mixture of those other two. Most ordinary elephants are of this type.
- Eburnian**: Made of or pertaining to **ivory**.
- Ek-danteya** (Sinhalese): (Cannon & Davis 1995:38; Katugaha 1997:67) A single-tusked male.
- Enamel**: (Spinage 1994:219; Nelson 1997:24) Hard, glossy covering of tip-of-tusk when it first emerges; quickly worn away.
- Enrichment, environmental**: [= enrichment, behavioral] (Abramson & Carden 1998) Provision of social interaction (i.e. other elephants) and interesting things for captives to do, play with.
- Estrus**: [noun= estrus; adj.= estrous; also: oestrus/oestrous] [see also: **diestrus**, **pre-estrus**, **metestrus**, **reproductive cycling**] (Hess *et al.* 1983; Moss 1983: 179,180-181; Buss 1990:111-114; Poole 1994:336; Brown 2000:348) Period of "heat" in females; associated with ovulation and the time that conception is most likely to occur. Only during this period do females permit copulation by males; they usually show a preference for older males, especially those in **musth**. Estrus cycles are approximately 12-17 weeks (85-120 days) in sexually mature, non-pregnant females, and the estrous period usually lasts 2-6 days. In captivity estrus can be detected by a progesterone surge in the blood around the time of ovulation.
- Ethogram**: (Immelmann & Beer 1989:91-92; Abramson & Carden 1998:206) Descriptive inventory of the elements which make up the entire behavior of a species, especially the genetically-influenced **ritualized displays** that communicate signals from one individual to another.
- Ethology**: (Wilson 1975:584; Immelmann & Beer 1989: 92-93) Study of behavior under natural conditions, including the causation, external stimulation, internal physiological mechanisms, ontogeny, and evolution of behavior.
- Family unit**: [also: family, **matriarchal family**, matriarchal unit; see also: **social organization**] Related adult females and their immature offspring. They form very close long-term associations and, after a period of separation, greet each other with greeting rumbles or an Intense Greeting Ceremony. In *Loxodonta africana*, usually 9-20 individuals [e.g. at Amboseli, Kenya, family units averaged 9.4, with a range of 2-29 (Moss & Poole 1983: 315-316)]. African forest elephants (*Loxodonta cyclotis*), however, are usually found in smaller family units [e.g. averaging 2.7 in Central African Republic (Turkalo & Fay 1995:48)]. There is some confusion in the use of the terms "family unit" and "**cow-calf group**". Here a "family unit" consists of *related* females and their young that stay closely associated over time.
- Female-choice**: [also: mate-selection] (Moss 1983: 183,186,192,193; Poole 1987:311) Active selection, by females, of specific males [usually those in **musth**] as sexual partners.
- Fighting**: (Poole 1989a:143,145,147,150,151; Estes 1991: 263; Poole 1994:337) Generally refers to serious combat (e.g. the escalated contests between **musth**-bulls), as opposed to play-fighting (e.g. the Sparring often seen between young bulls).
- Fil (Arabic)**: Word for elephant.
- Flatlining**: [also: flatliner; see also: **reproductive cycling**] (Schulte 1998:220; Brown 2000:356-358) Lack of estrous cycling, especially in older captive females.
- Flehmen**: [see also: **testing**, **vomeronasal organ**] (Rasmussen, *et al.* 1982; Schulte & Rasmussen 1999b: 1269) In elephants, it refers to the placing of the trunk-tip in the mouth after olfactory **testing** of another elephant or its by-products. Presumably done in order to determine the sexual status (i.e. estrous or non-estrous) of the female. Mostly done by males to females, but may also be performed by females to males or other females.
- Free-contact**: [see also: **protected-contact**] (Doyle 1993) Working with captive elephants, in 'which there is no barrier between the human and the elephant.
- Frugivory**: (Savage & Long 1986:249; Estes 1991:561) Fruit eating.
- Fundamental frequency** [abbreviated F.F]: [see also: **peak frequency**, **dominant frequency**] (Berg 1983:65) Lowest frequency of sound in an elephant vocalization.
- Gajah** (Sanskrit/Indonesian): [also: **gaja**, **gadja**, **gadjah**, **hathi**] (Tennent 1867:viii) Elephant, generally with no tusks, in Sri Lanka.
- Gaja-mukta** (Sanskrit/Hindustani): [also: **gaja-moti**] (Shand 1996:143; Lahiri-Choudhury 1999:455; Hall 2000:162) See **Ivory-pearls**.



- Gaja-sastre (Sanskrit/Hindustani):** [also: gaja-sastra, gaja-shastra] (Cannon & Davis 1995:172; Shand 1996: 24; Lair 1997:269,277) Ancient text on the science of elephants, written about 600-500 B.C.; literally “elephant knowledge”, “elephantology” [In Thailand the term is *kochasaat* ; in Sri Lanka it is *hasti-silpe* ; in Burma it is *sin-kyan*].
- Ganai:** (Eltringham 1982:206) Hard ivory, especially that coming from forest elephants (*Loxodonta cyclotis*).
- Ganesh (Hindustani):** [also: Gunesh , Ganesa] (Sanderson 1907: 67; Sanderson 1962: 17; Krishnan 1972:300; Lahiri-Choudhury 1999:456) Elephant born with only one tusk--frightfully holy in India, especially if it happens to be the right tusk. Name given to an Asian bull that has only one tusk visible. Loosely, an elephant with a single tusk, as in the icon of the Hindu deity *Ganesha*.
- Ganesha (Hindustani):** (Cannon & Davis 1995:30-34,172) The elephant-headed Hindu god.
- Gestation period:** [see also: **pregnancy**] (Moss 1983: 180; Buss 1990:31; Estes 1991:265) Period between conception and birth of a calf; usually given as 22 months. At Amboseli, Kenya, the mean gestation period was 656 ± 4 days. Twinning occurs in less than 1% of births; Laws (1969:205) found twins in 3 out of 222 pregnancies, whereas Moss (2001:150) found only one instance in 1192 births .
- Goondah (Hindustani):** [also: goonda ; see also: **saun**] (Tennent 1867:48; Carrington 1958:170; Sukumar 1994: 139,169; Lahiri-Choudhury 1999:456) A wild single male elephant; a mischievous elephant. Hindustani for “thug”, bad character, rowdy. In Assam, this term refers to a **rogue**. There is some confusion over the meaning of this term. It refers to adult male elephants. Not generally used in S. India. In NE India, it refers to a large **mukhna** [= tuskless male]. May be used, loosely, to include any large--and probably dangerous--male elephant. A loner.
- G.P. Syndrome:** [= green penis; see also: **musth**] (Poole & Moss 1981; Hall-Martin & van der Walt 1984:148; Poole 1987:288) A pale greenish or grey/white discoloration on distal portion of penile-sheath, shown by **musth** males. Perhaps caused by a fungal growth.
- Graveyard, elephant:** [also: elephant cemetery] (Hall 2000: 256) Fictional place where elephants are said to go to die. Perhaps based on the fact that they frequently die near water, thereby causing carcasses to be clustered in certain areas.
- Graviportal limb:** (Savage & Long 1986:249) A thick, columnar leg; adapted for bearing great weight.
- Graze:** [see also: **browse**] (Guy 1976:288,289,291,293; Hanks 1979:167; Owen-Smith 1982:360,372,373; Shoshani 1992:54) To eat grass, forbs, etc. (i.e. herbaceous vegetation).
- Grooming:** (Laursen & Bekoff 1978:6; Estes 1991:262) Collective term for comfort-movements that deal with bodily-care; includes: **wallowing**, mudding, dusting, bathing, rubbing, scratching, etc.
- Group:** [also: **herd**] General term for number of elephants showing coordinated movement and behavior. The term “group” is preferred (e.g. bull group, cow-calf group, mixed group, etc.)
- Guda-marge (Hindustani):** [also **meet-put** (Burmese)] (Gale 1974:157,158) **Anal-fold** [q.v.].
- Gudda (Hindustani):** [also: **guddie**] (Shand 1992:24; Shand 1996:12; Lahiri-Choudhury 1999:456) Saddle or pad that goes under the howdah .
- Guide:** A euphemism for **ankus** [q.v.]. Short stick with a sharp, curved, finger-length metal hook at the tip, used to control and direct captive elephants. A hooked goad for driving elephants.
- Habituation:** (Immelmann & Beer 1989:126-127) Waning of original behavioral response to something that shows no significance. In general terms, learning to ignore something that does not matter.
- Hadâm (Arabic):** (Baker 1890:29) The **working tusk**--usually the right--is used more than the other to dig, etc., and is, therefore, more worn down.
- Han (Burmese):** [see also: **aliya, hine, hinge, mukhna, pussa, tai**] (Williams 1950:44; Gale 1974:157; Lahiri-Choudhury 1999:456) Bull with short, stout tusks. Tuskless bull with only small tushes, such as females carry.
- Hanko (Japanese):** (Williams 1989:158-159; Chadwick 1992: 217; Holt-Biddle 1994:75,78) Personal signature seals, commonly called “chops”, used in Japan to sign official documents. Using a hanko made from **ivory** confers an elevated status on the user.
- Hastyayurvedah, The:** (Edgerton 1931:viii,xvii) Ancient Sanskrit work on elephants, dealing primarily with medical treatment.
- Hathi (Hindustani/Sanskrit):** [also: haathi, hat’hi, hasti, hasthi, hasthin, gaj, **gajah**, pil] (Sillar & Meyler 1968: 112; Daniel 1998:196; Lahiri-Choudhury 1999:456) Word for elephant.
- Hathi jokar (Hindustani):** (Hall 2000:229) The “elephant-shivers”, a term used by **mahouts** to describe how it feels to come face to face with a wild **rogue**.
- Hathisar (Nepalese):** (Wemmer 2000:59) In Nepal, elephant stable with facilities for **mahout** families.



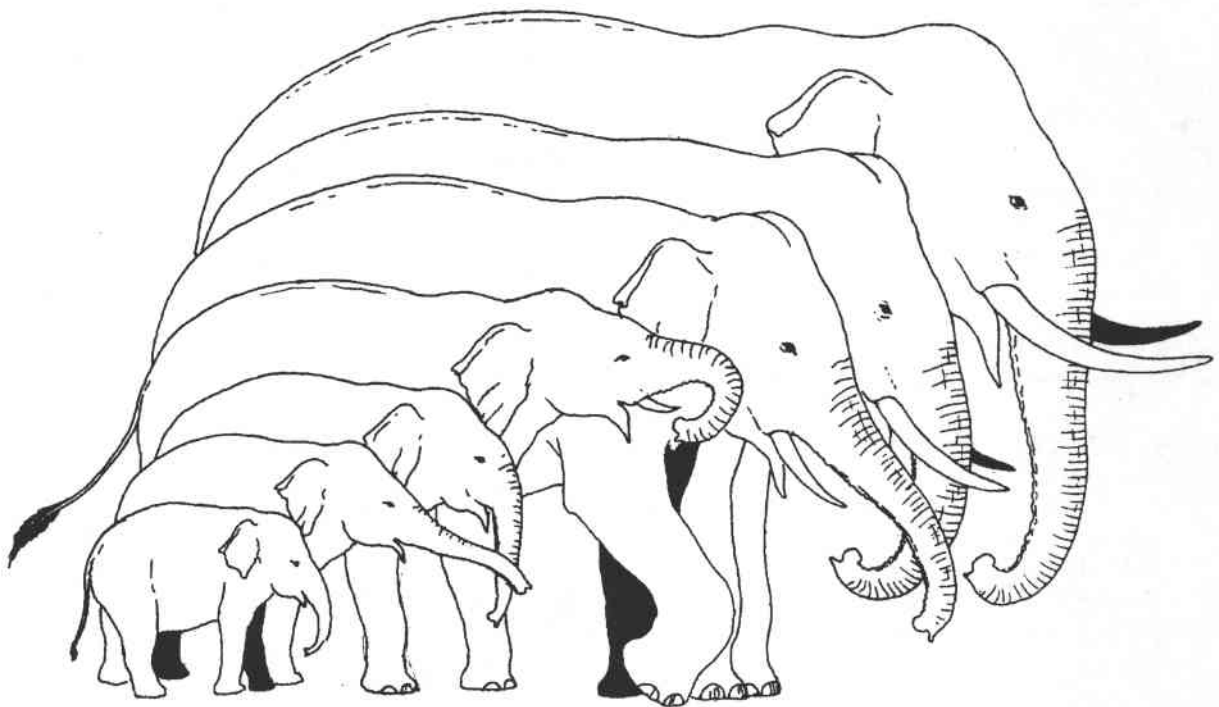
Ganesh (photo: Charles Santiapillai)

- Helper:** (M. Garai, pers. comm.) Females that help the matriarch defend the group.
- Herd:** [also: **group**] (Estes 1991:562) General term for number of elephants showing coordinated movement and behavior. The term "**group**" is preferred (e.g. **bull group**, **cow-calf group**, mixed group, etc.)
- Hindgut fermenter:** (Estes 1991:562) Nonruminant herbivore, such as elephant, in which breakdown of cellulose occurs in the cecum and large intestine.
- Hine** (Burmese): [also: haing, hinge ; see also: **mukhna**, **han**, **ta**] (Williams 1950:44; Gale 1974:157; Lahiri-Choudhury 1999:456) Tuskless bull.
- Home-range:** [see also: **migration**, **population-density**] (Owen-Smith 1982:388,392; Poole & Moss 1989:112; Estes 1991:261; Shoshani 1992:54) Area utilized by an elephant or group of elephants; depending on the productivity of the region, it may be as small as 14 km² (e.g. at L. Manyara, Tanzania) or as large as 3500 km² (in arid country, such as the desert of NW Namibia).
- Hora allia** (Sinhalese): [also: hora or ronkedoors (Dutch)] (Lahiri-Choudhury 1999:456) Term used in Sri Lanka for rogue elephants. It is not always clear whether it signifies all unattached males, or just aggressive, dangerous males.
- Howdah** (Urdu): [see also: **char-jarma**] (Chadwick 1992:383; Shand 1992:25; Sukumar 1994:169; Cannon & Davis 1995:172; Lahiri-Choudhury 1999:456) Riding chairs, for two or more, often with a canopy, used on domesticated elephants, primarily in Asia; used mostly for hunting. A box-like structure tied on an elephant's back to carry people.
- Human-Elephant Conflict:** [= H.E.C.] [see also: **Problem Elephant Control**] Situations where elephants and humans come into conflict, e.g. crop-raiding, attacking livestock or humans.
- Hyperthermia/hypothermia:** (McKenzie 1993:680) Higher/lower, respectively, than normal body temperature.
- Hypsodont:** [see also: **molar**, **brachyodont**] (Owen-Smith 1982:384; Estes 1991:562; Sukumar 1992:81; Shoshani 1998:481) Referring to molars with high-crowns and relatively flat grinding-surfaces. Tall teeth.
- Immobilization:** (McKenzie 1993:680) Term used for the chemical restraint of an animal. Tranquilizing.
- Incisor:** (Hanks 1979:168) Premaxillary tooth of a mammal. Elephants have one, the second upper incisor: the **tusk** or **tush**.
- Infrasound:** (Payne, *et al.* 1986; Poole *et al.* 1988:385,386,391; Poole 1994:332,341,344) Sound frequencies below the range of human-hearing [20-30 Hz]; in a 10 hr sample of rumble-vocalizations at Amboseli, Kenya, only 27% of the recorded calls were audible to the human observers (Poole & Moss 1989:117). Some of these low frequency calls are extremely powerful. Elephants are able to identify calling individuals up to 1.5 km away (McComb, *et al.* 2000), but infrasonic calls can probably be heard up to 5-10 km away.
- Inter-calf interval:** [see also: **lactational anestrus**, **recruitment**, **natality**] (Laws 1969:203-205,214-215; Hanks 1972b:13,18,24; Williamson 1976:89,90; Moss 2001:151-152,154) Interval between births by a given female; usually ranges from 3-9 yrs (extremes:2.75-13 yrs; Laws 1969:203), depending on environmental conditions.
- Inter-musth:** [see also: **musth**, **stages of**; **near-musth**; **peri-musth**] (Poole 1987:304) Periods between bouts of **musth**, shown primarily by younger [25-35 yrs] males, which seem to go in and out of **musth** more than older males.
- Ivory:** [see also: **tusks**] (Espinoza & Mann 1992; Shoshani 1992:47[photo],59) Material of which elephant-tusks are composed; made up mostly of **dentine**. It is used in the manufacture of a great variety of artifacts.
- Ivory, grades of:** (Eltringham 1982:205) Grades of commercial ivory, according to its weight and shape. Selling price roughly follows this sequence.
- Vilaiti:** Tusks weighing over 18 kg, usually originating from adult males.
- Cutchi:** (Parker & Amin 1983:149) Tusks weighing from 9-18 kg, mostly from males. Special grade of tusks used to make bangles.
- Calasia:** Tusks, from females, weighing more than 4.5 kg and between 5-7.5 cm in diameter.
- Fankda:** Tusks, from males, weighing from 4.5-9 kg.
- Maksub:** Tusks, from either sex, weighing from 2.3-4.5 kg.
- Dandia:** Tusks, from either sex, weighing less than 2.3 kg.
- Chinai:** Defective tusks of any weight.
- Ivory pearls:** [see also: **gaja-mukta**, **gaja-moti**] (Lahiri-Choudhury 1999:455; Hall 2000:162) Small, round inclusions that appear to be composed of the same material as the tusk, which are sometimes found in the tip of the **pulp** of a **tusk**. Highly valued in Asia. Necklaces of "elephant pearls" are frequently mentioned in ancient Sanskrit literature.



A bull elephant (drawn by Manjula Wijesundara)

- Jacobson's organ:** [also: **vomeronasal organ**; see also: **testing**] (Rasmussen *et al.* 1982:160; Rasmussen *et al.* 1984:360; Estes 1991:263,565-566) Area, located in the roof of the mouth, that is sensitive to olfactory cues, especially those associated with urine.
- Juvenile:** [see also: **age-groups**] (Lee 1987:279) Sub-adolescent individual; often divided into young juvenile [2-5 years old] and old juvenile [5-10 years old].
- Juvenile-care unit:** [see also: **nursing unit**] (McKay 1973: 72-75,79-80) A type of **cow-calf group** among *Elephas*, composed of females and post-weaning juveniles but no infants.
- Juvenile-musth:** [see also: **moda**] (Chandrasekharan *et al.* 1992:71-72; Rasmussen *et al.* 2002:975) **Near-musth** condition sometimes shown by young [11-20 years old] males in captivity. They may show some signs of **musth** but not attain full-**musth**.
- Kalasha** (language ?? [Kenya]): (Neumann 1898:46) Cow ivory.
- Karaka** (KiSwahili): (Smith 1992:146,148) KiSwahili term for the worn patch on the hind edge of the heel of an old elephant; a good indication of age/size....and, therefore, possible tusk-size.
- Kari** (Sanskrit): (Shand 1996:55) Ancient word for elephant. Disease of the feet of elephants.
- Katapurna** (Sanskrit) : [see also: **kherr musth**] (Edgerton 1931:116) "Full-in-the-temples"; bull in the first stage of **musth**, with swollen **temporal** glands.
- Keystone species:** (Shoshani 1993) A species that has major ecological effects on its habitat and, therefore, on other species living in the same area. Elephants are second only to humans in the alteration of their habitat: e.g. by destructive feeding they change bush to grassland, by digging for water they provide drinking places for other animals, etc.
- Kheddah** (Hindustani): [also: keddah, khedda, kheda, kheddha, khedna, k'hedah, gad shikar] (Tennent 1867:104; Sanderson 1907: 72; Sukumar 1992:38,217; Spinage 1994:280-282; Daniel 1998:208a[photo],208b-c[photo],210,212-225) Method of capturing elephants, in India, where entire herds are driven into a corral or stockade using trained elephants as "drivers". The high-walled stockade, made of logs or wooden poles, into which elephants are driven. In Sri Lanka the term is kraal; in Burma it is kyone ; in Sanskrit it is vari .
- Kherr musth** (Hindustani): [see also: **katapurna**, **near-musth**, **peri-musth**] (Edgerton 1931:37; McGaughey 1963:105; Daniel 1998:124) First stage of **musth**; sometimes called "temple-filled", which refers to the swollen **temporal** glands.
- Kinship group:** [also: **bond group**, kin group; see also: **social organization**] (Moss 1988:34,35; Poole 1994: 331,332) Two or more related **family units**, who show a strong association over time; after a separation they greet each other with greeting rumbles or an Intense Greeting Ceremony.
- Kalouk** (language ?): [also: khalauk] (Gale 1974:158) Wooden or iron bell tied on the neck of an elephant to track its whereabouts; mostly used in Asia.
- Koomeriah** (Hindustani): [also: koomerah, komeria, koomra, bhadra] (Sanderson 1907: 83,84,85x[drawing],85,92; Sanderson 1962: 260; Lahiri-Choudhury 1999:457) Thoroughbred; a high caste of elephant that is calm, brave, disciplined, deliberate, ingenious, and strong, favored as a work elephant. In India, captive elephants are often referred to, as to which caste of elephants they belong. The most prized body-structure in elephants.
- Koonkie** (Hindustani/Burmese): [also: koomkie, khoonki, koonki, kunkie, kumchee, kumki] (Sanderson 1907: 70-71,126; Lair 1997:47,80; Daniel 1998:110,208d[photo]) Burmese for "schoolmaster". A well-trained domestic elephant; often a tuskless male between 45-50 years of age, chosen for his docility and patience. Used for catching and training working elephants. Sanderson (1907: 126) says in Bengal they were all females; word derived from Hindustani "kumuk ", meaning aid. Can be either male or female, depending on the area in which the word is used. [See long discussion in Lahiri-Choudhury 1999:457-458.]
- Kraal** (language ?): [also: korahl, corral; see also: **kheddah**, **ath-gala**] (Jayewardene 1994:9,121; Cannon & Davis 1995:172; Lahiri-Choudhury 1999:458) Small enclosure. In Sri Lanka, the method of capturing large numbers of elephants by the use of a stockade.
- Kumbha** (Sinhalese): [also: kumbastale] (Edgerton 1931: 71,117; Jayewardene 1994:121) Two large domes on the top of an Asian elephant's head.
- Kumla** (Hindustani): [see also: **mela-shikar**] (Daniel 1998: 211) Man who remains in camp and is responsible for feeding the **koonkies**.
- Kyan zit** (Burmese): (Sanderson 1962: 215) Odd tusk-form "in which both tusks are regularly ringed, constricted, and ridged throughout their length and right up to their roots, like a bamboo."
- Lactating female:** [see also: **nursing**] (Lee 1987:280) Female who is producing milk.
- Lactational anestrus:** [see also: **inter-calf interval**] (Hanks 1972b:18; Williamson 1976:90) Period during lactation in which a female does not come into **estrus** and, therefore, does not conceive. Usually lasts 2-4 yrs, resulting in 4-6 year interval between births (extreme intervals can be much wider, depending on



Asian elephant size classes: it is difficult to assess the age of an elephant in the field but after some experience one can get a rough idea of the immature ones by comparing their size against that of a full grown adult.
(picture drawn by Manjula Wijesundara)

environmental conditions).

Laibat : (Gale 1974:158) Breast-band which is part of the dragging gear.

Lanugo: (McKay 1973:73; Eltringham 1982:12) Term for the fetal-hair remaining on a newborn; the fine hair on the body of the fetus.

Lateral recumbency: [see also: **sternal recumbency**] (McKenzie 1993:681) Lying on the side.

Lohitiya (Hindustani): [see also: **mela-shikar**] (Daniel 1998: 211) Man who hangs on behind and prods the koonkie near the root of the tail when speed is required.

Lop-ear: [also: floppy-ear] (Sikes 1971:120,204) Pathological condition in which a portion of the ear is folded forward and hangs down at an abnormal angle. May be due to arterial disease or injury.

Lumbar: (McKenzie 1993:681) Area of the back between the last rib and the pelvis.

Lumbar depression: (Albl 1971:134,135,137,139,140) A longitudinal depression in the lumbar region of the sides of the spine; depth is a good indication of physical condition.

Machan (Hindustani): (Gale 1974:158) Platform used for shooting or photographing; a hide or blind.

Mahout (Hindustani): [also: carnac, carnax, cawadie (S. India), cornac, kornack (French; possibly originally Sinhalese), mahawat, **oozie**/uzi (Burma), ponnekella (Sri Lanka), kao-Chang (Thailand); **pawang** (Indonesia)] (Tennent 1867:122; Jayewardene 1994:52,121; Cannon & Davis 1995:109,112,172; Iversen 1995:66; Lair 1997: 85,209-211; Lahiri-Choudhury 1999:458) Trainer, keeper, driver of an elephant.

Male-male Mounting: [also: femoral copulation, interfemoral intercourse] (Ford & Beach 1951:274; Kahl & Armstrong 2000:20) Sexual mounting of one male by another. Penis is rubbed on inside of thighs; ejaculation often occurs, penetration does not. Generally found among young adult males, who have little success in mating with mature females.

Maligawa tusker (Sinhalese): (Cannon & Davis 1995:172) Generic term for the tusked elephant that carries the relics of the Buddha in the Kandy, Sri Lanka, procession [= Esala **perahera**] in July/August each year.

Mammae: Mammary glands or breasts that secrete milk. In elephants they are between the front legs (i.e. pectoral mammae).

Mandible: [see also: **maxilla**] (McKenzie 1993:681) Lower jaw.

Manswe (Burmese): [see also: **swe-pyat**, swe-byat] (Daniel 1998:93) Tusk, or piece of tusk, broken off in a fight between two bulls; a good luck charm that should be kept.

Marfi: [also: karivenna (Malayalam), kankushta (Hindustani); see also: **ordure**] (Menon, *et al.* 1997:40); Capstick 1991: 182) Elephant dung.

Masturbation: [see also: **Male-Male Mounting**] (Kühme 1961:290[drawing]; Kühme 1963:117) Sexual gratification by other than normal male-female copulation.

Mate-searching: [see also: **estrus**, **musth**] (Poole *et al.* 1988: 386,391; Poole & Moss 1989) Process of searching for a suitable, receptive member of the opposite sex.

Matriarch: (Buss 1990:30-32; Estes 1991:2560; Moss & Colbeck 1992:155-156) Mature female who acts as leader of a **family unit**; typically the eldest and most experienced individual in the group.

Matriarchal family: [also: **family**, **family unit**, matriarchal unit; see also: **social organization**] Group of related mature females and their young; ranging between 2-45 individuals (@ Amboseli, Kenya). See discussion under **family unit**.

Maturity, sexual: [see also: **puberty**] (Laws 1969:193,197-198,214-215; Hanks 1972b:13,17,19,20; Williamson 1976:89,90,91; Buss 1990:110-111,175; Poole 1994:335-337) Age at which reproduction becomes physically possible; approximately 9-12 years for females, 14-15 years for males. Under adverse environmental conditions (e.g. very high population-densities) maturity may be delayed until 20± years (Laws 1969:197,214). In captivity, both sexes may reach sexual maturity much earlier (e.g. 4± years in a female [Dieringer 1997]). Especially in wild males, physical maturity does not mean they will mate successfully. Successful mating is often delayed until males become significantly larger and attain **musth**, at 29+ years of age.

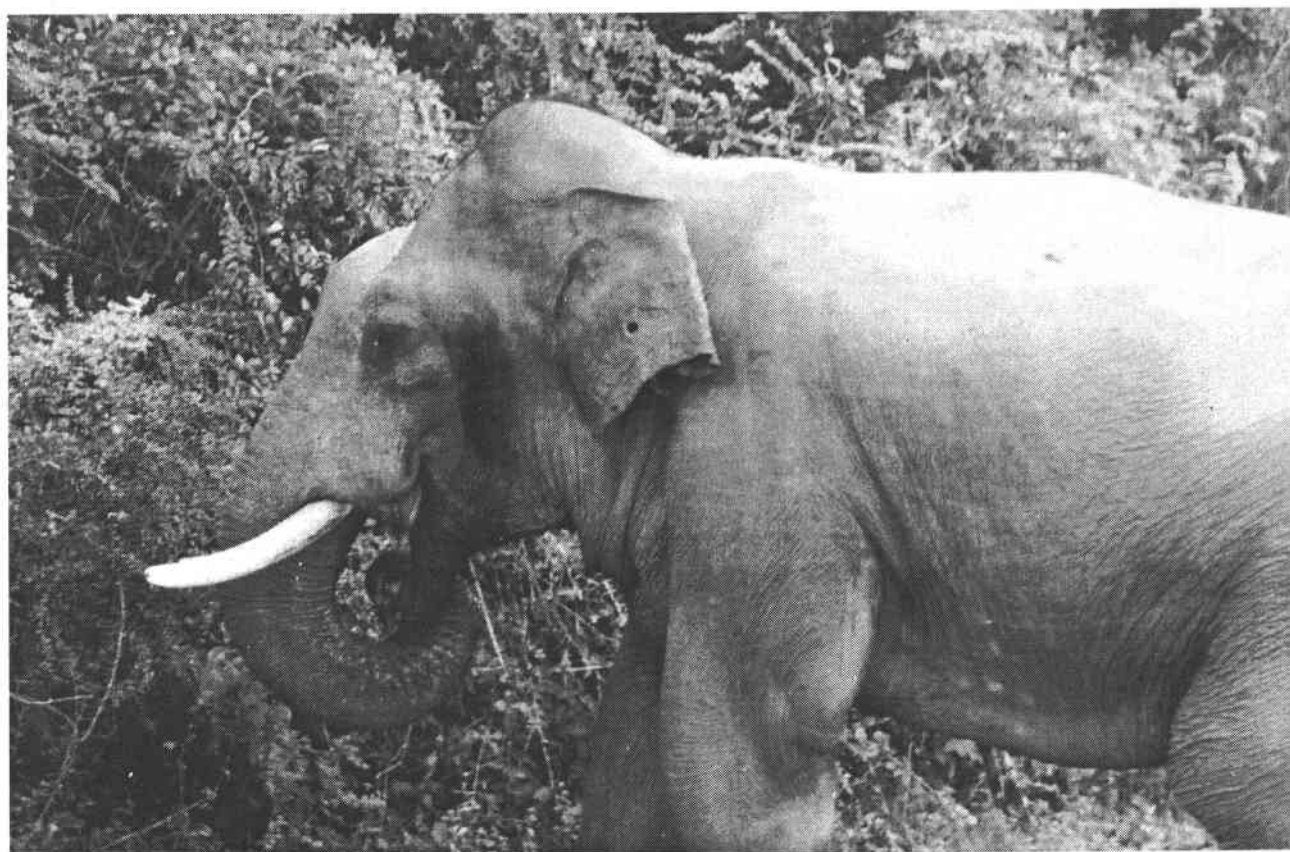
Maxilla: [see also: **mandible**] (McKenzie 1993:681) Upper jaw.

Meconium: (Poole 1996:94) Fetal stool, passed by a newborn an hour or so after birth.

Meergah (Hindustani): [also: meerga, meergha, mirga, mrga ; see also: **sowari**] (Sanderson 1907:83,84,84x[drawing],85; Sanderson 1962:260; Lahiri-Choudhury 1999:458) Long-legged elephant, favored for use as a transport animal and taught to carry loads on its back or haul carts. According to Sanderson (1907: 84) it is not a very desirable elephant. A body-type: thin, long legs, small head, light body; usually faster than the **koomeriah**, but lacking in courage and endurance.



- Mela** (Hindustani): [see also: **bazaar, elephant**] (Shand 1992:5,27,158-193; Hall 2000:35) A fair; in this case an elephant fair, where elephants are bought and sold. The largest in the world is an annual affair [November], held at Sonpur/Sonepur at the confluence of the Ganges and Gandak Rivers in Bihar, India.
- Mela-shikar** (Hindustani): [also: **kyaw-hpan** (Burmese), **peti shikar**; see also: **phandi**] (Shand 1996:38,150-151; Lair 1997:114,148,214,223,251; Daniel 1998:210; Lahiri-Choudhury 1999:459; Hall 2000:35) Method of elephant-capture--originating in Assam, India--using nooses by men mounted on trained elephants; a method of catching single elephants, one-by-one.
- Metestrus**: [also: metoestrus/metoestrous; see also: **estrus, pre-estrus, diestrus**] (Arey, et al. 1957:384,826) Period of subsiding follicular function following **estrus** in female mammals.
- Migration**: [see also: **home-range**] (Owen-Smith 1982:389; Buss 1990:5-7,11; Shoshani 1992:54) Regular, seasonal movement from one area to another.
- Milk-tusk**: (Spinage 1994:217-218; Shoshani 1996:14; Luckett 1996:26) Same as deciduous-tusk or deciduous incisors, which are better terms; these are the deciduous precursors of the true tusks, which replace them after about one year of age.
- Miombo** (Swahili): (Pratt, et al. 1966:380; Barnes & Douglas-Hamilton 1982:412; Spinage 1994:173) In East, central, and south-central Africa, a type of mixed woodland of both trees and shrubs, dominated by broadleaved, deciduous trees of the genera *Brachystegia* and *Julbernardia*.
- Mkono wa tembo** (KiSwahili): Literally, "the arm of an elephant". Used to refer to an elephant's trunk.
- Moda** : [see also: **juvenile-musth**] (Chandrasekharan et al. 1992:71-72; Rasmussen et al. 2002:975) **Pre-musth** condition sometimes shown by young [11-20 years old] males in captivity.
- Molar**: (Laws 1966:3-16; Roth & Shoshani 1988; Buss 1990: 58-67) Rear grinding teeth. During their lifetime, elephants have six sets of molars in each half of the upper and lower jaws; they progress forward, in linear progression toward the distal end of the jaw, and replace each other at specific ages.
- Monitor elephant**: [see also: **koonkie**] (Cannon & Davis 1995:92,172) Tame elephant, used to capture and control wild elephants.
- Mon-kyathi** (Burmese): [also: mon-kyatti, mong-gyin] (Daniel 1998:123) Burmese term for **musth**.
- Monovular**: [see also: **polyovular**] (Hanks1979:168) Ovulation of one egg at a time.
- Mortality**: (Buss 1990:12-17,37; Moss 2001:152-153) Referring to the death-rate, or loss, in a population; includes factors such as disease, accidents, starvation, predation.
- Mrigahastin** (Sanskrit): (Shand 1996:49) "the beast with one hand": referring to the trunk of an elephant.
- Mukhna** (Hindustani): [also: mukna, muckna, makna, makhna] (Sanderson 1907: 53,66,119; Sanderson 1962: 15,190; Chadwick 1992:304-305; Sukumar 1992: 35,165; Lair 1997:40[photo]; Daniel 1998:60-61; Lahiri-Choudhury 1999:458) Term for tuskless male elephants in India. Approximately 90% of bulls in S. India, 50% in N. India, and 5-10% in Sri Lanka do carry tusks. [The term is **aliya** or **pussa** in Sri Lanka; the term is **sidor** in Thailand; the term is **haing** or **hine** in Burma (Daniel 1998:145; Lahiri-Choudhury 1999:411); the name is **tondo** in Mozambique (Capstick 1988:90).] A male without tusks suffers from an inferiority complex and is often very dangerous (Shand 1992:6).
- Multiparous female**: [see also: **nulliparous, primiparous**] (Lee 1987:279-280) A female that has given birth to two or more offspring.
- Murrain**: (Lahiri-Choudhury 1999:40,458) Fatal epidemic disease; probably anthrax. It is found in cattle and elephants, both wild and domesticated.
- Musth** (Urdu/Hindustani): [also: mada, madha, mast, mudda, must ; see also: **sexually-active/inactive**] (Jainudeen, et al. 1972; Poole & Moss 1981; Hall-Martin 1987; Poole 1987; Poole 1989a) From the ancient Sanskrit word (mada) which means "intoxication, excitement, rapture". Period of heightened sexual-activity in mature males [average onset 29 years-old], characterized by **urine-dribbling**, **G.P.**, strong odor, increased aggression, swollen **temporal glands**, T.G.S., and elevated testosterone-levels. Sometimes called a form of "sexual insanity" (Williams 1989:125). Musth has also been used to refer to the dark, strong-smelling, oily substance exuded from a male Asian elephant's **temporal gland**, although this term is not used for African elephants where both sexes secrete from the **temporal glands**. [The term is mudda or madha in Sri Lanka; **mon-kyathi**, mon-kyatti, mone, or mong-gyin in Burma.]
- Musth, stages of**: [see also: **pro-musth, near-musth, peri-musth, inter-musth**] (Poole, et al. 1984:259; Poole 1987: 304; Schulte & Rasmussen 1999a:385,387) **Near-musth** is the same as **peri-musth**, and includes **pro-musth** [before], **pre-musth** [before] and **post-musth** [after]. **Full-musth** is the same as **deep-musth** and **heavy-musth** and denotes the peak condition of musth.
- Musth gland**: [see also: **temporal gland**] (Laursen & Bekoff 1978:2; Estes 1991:259; Shoshani 1998:480) Gland, with a vertical slit-like opening, located between the eye



An Asian bull elephant in musth

and ear which produces **temporal gland secretion**.

Temporal gland is a much better name than "musth gland", as its secretion sometimes has nothing to do with **musth** (e.g. in females and young, especially of *Loxodonta*).

Natality: [see also: **recruitment**] (Hanks 1972b:13,20; Calef 1988; Buss 1990:86,93-94) Referring to the birth-rate in a population. Usually 6-8% per year, in a healthy elephant population.

Nautch-khana (language ?): [see also: **bai**, **salt-lick**] (Shand 1996:121) A clearing in the forest that is devoid of vegetation; the elephants' ballroom.

Near-musth: [see also: **musth**, **stages of**; **inter-musth**, **peri-musth**] (Poole *et al.* 1984:259; Rasmussen *et al.* 1984:354,358; Poole 1987:295) Period immediately before and after full-musth, when testosterone levels may be partially elevated and some--but not all--of the manifestations of full-musth are seen. When shown by young males, it may be called **juvenile-musth**. **Mahouts** call it **kherr musth** (McGaughey 1963:105).

Nerve-cavity: [also: **pulp-cavity**] (Laursen & Bekoff 1978: 2) Hollow of a tusk, filled primarily with mesenchymal connective tissue with vascular and lymph sinuses.

Netsuke (Japanese): (Chadwick 1992:207) Round ornaments--often made of **ivory**--with a hole in the center, used in Japan to secure the sash of a kimono.

Nictitating-membrane: (Sikes 1971:43) Unpigmented third eyelid, approximately 4 X 1 cm in size.

Nila (Sanskrit ?): (Sikes 1971:137; Deraniyagala 1955:68-70,140-142; Cannon & Davis 1995:109,111,132,172) Sensory points on an [Asian] elephant, which may be stimulated by the **mahout** to discipline, control, or direct the animal.

Nipples: (Kardong 1998:213[drawing]) Raised epidermal papilla that include multiple lactiferous ducts, releasing milk to the infant. They are prevalent among mammals; humans and elephants have pectoral **mammæ** with nipples. ["Teats", sometimes erroneously said to be found in elephants, include a cistern and a single lactiferous duct; they are found in derived artiodactyls, such as deer, sheep, cows.]

Nulliparous female: [see also: **multiparous**, **primiparous**] (Lee 1987:279-280) A female that has not conceived or given birth.

Nursing/nurse: [see also: **lactating female**, **weaning**, **comfort suckling**, **suckle**] (Moss & Colbeck 1992: 90,144-145; Shoshani 1992:53,54) To obtain milk from the mother.

Nursing unit: [see also: **juvenile-care unit**] (McKay 1973: 72-75,79-80) Type of **family unit** among *Elephas* in

which females and infant calves occur.

Nyika (Kiswahili): [also: **osilalei** (Maasai)] (Pratt, *et al.* 1966: 381; Spinage 1994:187) *Commiphora-Acacia* thorn scrub, found in much of SE Kenya and Tanzania.

Oozie (Burmese): [also: oozy, oozi, uzi ; see also: **mahout**] (Williams 1950:50-56; Williams 1989:124,127-128,135; Lair 1997:129) Trainer, keeper, driver of an elephant.

Ordure: [see also: **marfi**] (Stockley 1953:94,95-96) Another, more gentle, name for dung.

Ovarian cycle: (Moss 1983:179,180,181; Brannian *et al.* 1988: 357,359,363; Plotka *et al.* 1988:309,310,312,314) Period between ovulations, in females that do not become pregnant during their first cycle. Generally believed to be 12-17 weeks in *Loxodonta* and *Elephas*.

Pachyderm: (McKenzie 1993:682) Historical name for large, thick-skinned hoofed mammal (e.g. elephant, rhino). Not a natural taxonomic grouping.

Pakala (Sanskrit): (Edgerton 1931:26,104,120) A fever of elephants.

Pan: (Greaves 1996:131; Ben-Shahar 1999:316) In southern Africa, another name for a waterhole or depression that fills during the rains. The bottom is permeated with calcium (calcrete), which forms a hard pan that holds water.

Pannikan (Sinhalese): [also: **Pannikers**, **Panickeas**] (Tennent 1867:97; Jayewardene 1994:121; Cannon & Davis 1995:87-88,173) Muslim tribe in N and NE Sri Lanka, known for capturing elephants.

Parturition: (Ford & Beach 1951:283) Giving birth.

Pawang (Indonesian): (Lair 1997:85) Indonesian name for a **mahout** or elephant-handler.

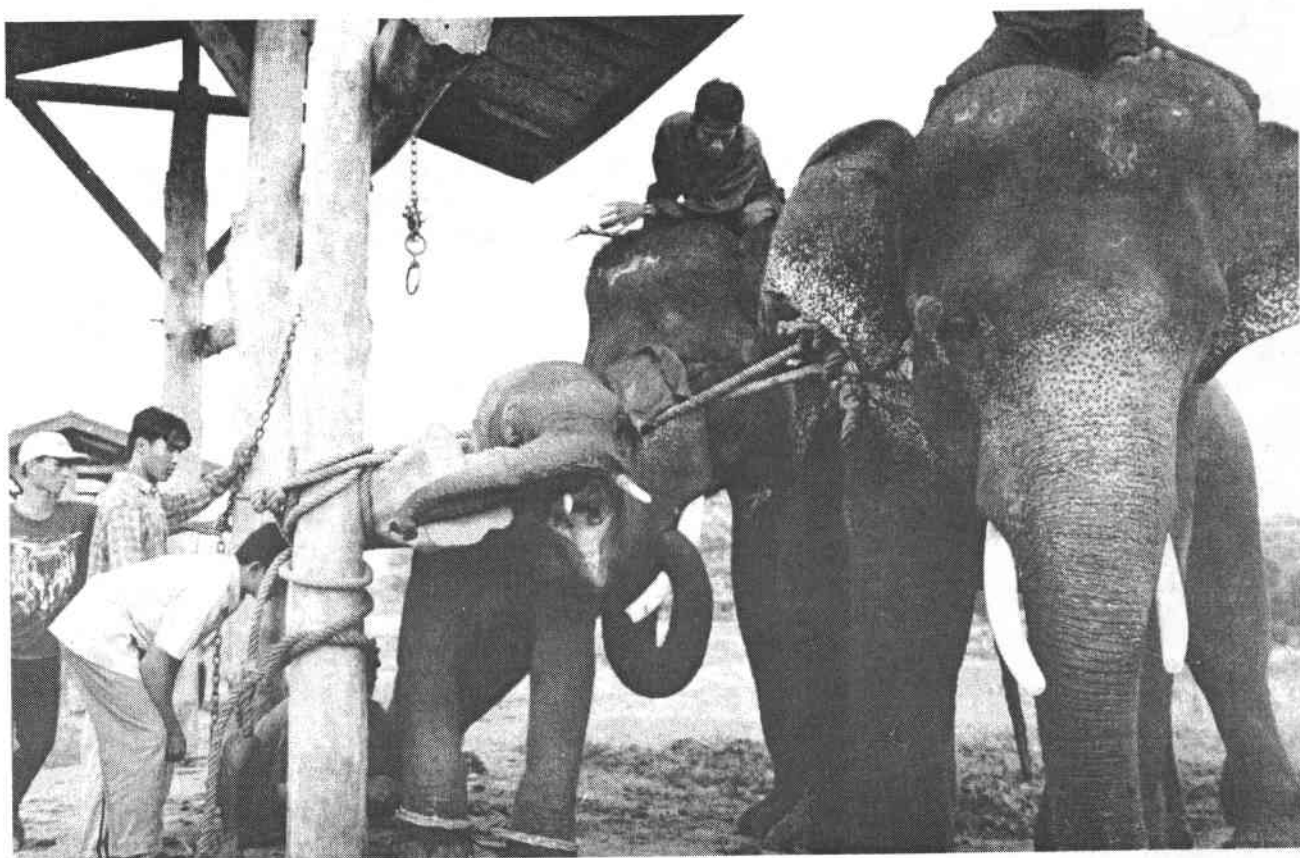
Peak frequency [abbreviated P.F.]: [see also: **fundamental frequency**, **dominant frequency**] (Berg 1983: 65) Highest frequency of sound in an elephant vocalization.

Pejeik (Burmese): (Gale 1974:159) Attendant who does odd jobs for the **oozie**.

Pengasoh (Malay): [see also: **auntie**] (Daniel 1998:102) Foster-mother.

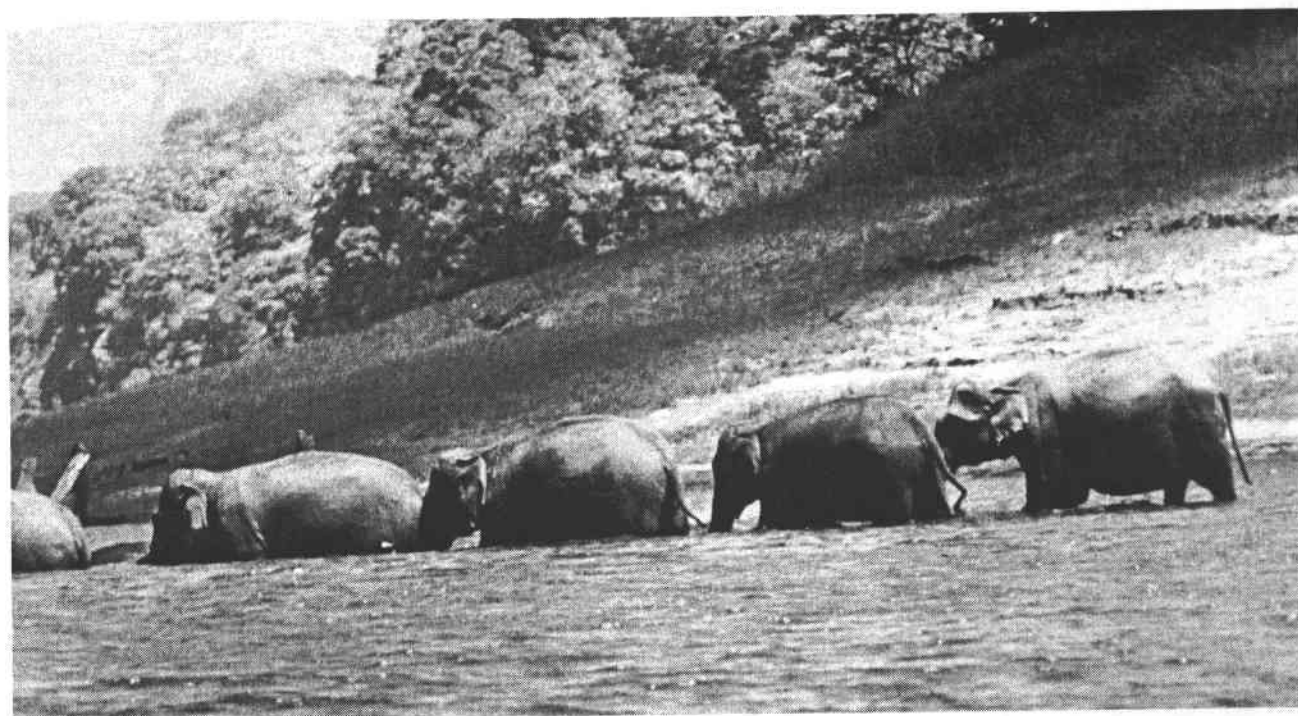
Perahera (Sinhalese): (Jayewardene 1994:121; Cannon & Davis 1995:135-149,173) In Sri Lanka, a procession--mainly of a religious nature--in which domesticated elephants often participate.

Peri-musth: [see also: **musth**, **stages of**; **inter-musth**, **near-musth**] (Poole *et al.* 1984:259; Rasmussen *et al.* 1984:354,358; Poole 1987:295) Period immediately



Elephant Training Centre at Way Kambas National Park, Sumatra

- before and after full-musth, when testosterone levels may be partially elevated and some--but not all--of the manifestations of full-musth are seen. **Mahouts** call it **kherr musth** (McGaughey 1963:105).
- Phand** (language ?): [see also: **mela-shikar**] (Shand 1996:38,150; Daniel 1998:211,212) Noose used to capture elephants, by a rider on the back of another [domesticated] elephant.
- Phandi** (language ?): [also: nooser; see also **mela-shikar**] (Shand 1996:38; Lair 1997:67; Hall 2000:35,245,249) Rider who captures wild elephants with a noose, from the back of a domesticated elephant. A **bor-phandi** is a master catcher.
- Phara** (language ?): (Shand 1996:150) A broad belt that is wound around the chest of the koonkie during **mela-shikar**.
- Pil-khana** (Hindustani/Urdu): [also: **pil khana**, **pilkhana**, **peelkhana**, **pheel**] (Sanderson 1907:91,125; Sukumar 1994:152,169; Lahiri-Choudhury 1999:459) Stable, camp, or training place--usually permanent--where domestic elephants are kept.
- Piosphere**: (Western 1973; Ayeni 1977:376) Area around a water-source that shows ecological effects (i.e. damage), owing to proximity to that water-source.
- Plant secondary compounds**: (Owen-Smith 1982:367,394) Protective chemical compounds in plants that make the vegetation relatively unpalatable or indigestible to herbivores.
- Poaching**: (Poole 1989b) Illegal killing, usually for the ivory, but can also be for meat. May have serious effects on social structure of the population.
- Pocketed herd**: (Seidensticker 1984:12; Sukumar & Santiapillai 1996:329) Group of elephants confined in a relatively small area, from which they are unable to leave; usually surrounded by human development. May be thought of as "islands of elephants in a sea of humanity".
- Polyovular**: [see also: **monovular**] (Hanks 1979:168) Ovulation of two or more eggs at a time.
- Population**: [see also: **social organization**] (Moss & Poole 1983:315,318,322) All the elephants in a region, including **sub-populations** of females and their offspring, plus the adult males; they may all have some contact with each other, especially during the wet-season when large **aggregations** may form.
- Population-density**: [see also: **home-range**] (Spinage 1990:15,16,17; Barnes, *et al.* 1999) Average number of elephants per unit area in a region; usually given as elephants/km².
- Post-pubertal**: [see also: **pre-pubertal**] (Hanks 1979:168) A female that has ovulated at least once, or a male that has produced sperm.
- Pouch, pharyngeal**: (Sikes 1971:79; Shoshani, *et al.* 1997; Shoshani 1998:485; Shoshani & Dudley 2000) A receptacle in the floor of the mouth, in which water can be stored; such water can be drawn out, later, and sprayed on the ears to cool the body-temperature.
- Pranidhi** (Sanskrit): (Edgerton 1931:120) Direction; methods of a **mahout** in driving an elephant...by means of verbal commands, feet, and **hook**.
- Pre-estrus**: [also: proestrus, pro-estrus, pro-oestrus; see also: **estrus**, **diestrus**, **metestrus**] (Arey, *et al.* 1957: 384,1110; Jainudeen, *et al.* 1971:323; Poole & Moss 1989: 120) Period of heightened follicular activity preceding true **estrus**.. Cow may exhibit some--but not all--of the signs of **estrus**.
- Pregnancy**: [see also: **gestation period**] (Buss 1990:31; Moss & Colbeck 1992:52-53) Having conceived but not yet borne an offspring.
- Pre-musth**: [also: **pro-musth**] (Fernando, *et al.* 1963: 111) Period before full-**musth**, during which the manifestations of musth slowly begin to appear; most likely caused by a gradual increase in testosterone levels in the blood.
- Pre-pubertal**: [see also: **post-pubertal**] (Hanks 1979:168) A female that has not yet ovulated, or a male that has not yet produced sperm--owing to young age.
- Primiparous female**: [see also: **multiparous**, **nulliparous**] (Lee 1987:279-280) A female that has conceived and is about to give or has given birth to one offspring.
- Problem Elephant Control**: [= P.E.C.] (Poole 1996:254) Means of dealing with "problem elephants"--repeat offenders of certain elephantine crimes, such as fence-breaking, crop-raiding, killing of livestock and humans. Solution is sometimes translocation or exclusion (i.e. with ditches, electric-fencing) or, often, killing.
- Proboscidean**: (Shoshani & Tassy 1996; Nelson 1997: 24) A member of the order Proboscidea. Elephants and elephant-relatives--living and extinct--with a long, flexible snout, such as a trunk.
- Proboscis**: [see also: **trunk**] (Sikes 1971:39-41; Shoshani 1997) The long, muscular, prehensile extension of an elephant's upper-lip and nose.
- Protected-contact**: [see also: **free-contact**] (Doyle 1993) Managing unconfined captive elephants through or from behind a shielding barrier.
- Puberty**: [see also: **maturity**, **sexual**] (Laws 1969:193,197-198,214-215; Hanks 1972b:13,17,19,20; Williamson



1976:89,90,91; Buss 1990:110-111,175; Poole 1994:335-337) Age at which reproduction becomes possible; approximately 9-12 years for females, 14-15 years for males. Under adverse environmental conditions (e.g. very high population-densities) **maturity** may be delayed until 20± years (Laws 1969:197,214). In captivity, both sexes may reach sexual maturity much earlier (e.g. 4± years in a female [Dieringer 1997]). Especially in wild males, **maturity** does not mean they will mate successfully. Successful mating is often delayed until they attain **musth**, at 29+ years of age.

Pulp: (Laursen & Bekoff 1978:2) Material that fills the hollow [**pulp-cavity**, **nerve-cavity**] of a tusk; it is composed primarily of mesenchymal connective tissue with vascular and lymph sinuses.

Pulp-cavity: [also: **nerve-cavity**] (Laursen & Bekoff 1978: 2) Hollow of a tusk, filled primarily with mesenchymal connective tissue with vascular and lymph sinuses.

Pussa (Sinhalese): [see also: **mukna**] (Deraniyagala 1955: 48; Jayewardene 1994:20; Cannon & Davis 1995:38; Katugaha 1997:67) In Sri Lanka, a tuskless male; a male with no vestige of tusks or tushes.

Pygmy elephant: (Noack 1906; Western 1986; Matthiessen 1991:135-138) Reputed small form of elephants (*Loxodonta africana pumilio*), in the Central/West African rain-forests. Now believed to be young individuals of the forest elephant, *L. cyclotis*. To be distinguished from **dwarf elephant** [q.v.].

Recruitment: [see also: **natality**] (Calef 1988; Spinage 1990: 15; Spinage 1994:184) Increase in a population, usually as the result of births exceeding deaths; may also be augmented by immigration.

Reinforcement: (Shyan 1993:23) In animal training, any condition that strengthens learning or increases the probability that a response will occur. Positive **reinforcement** increases the likelihood that a response will be performed by giving it a "good/pleasant" [positive] consequence after the response has occurred, whereas negative **reinforcement** also increases the likelihood that a response will be performed to avoid a "bad/unpleasant" [negative] consequence.

Reproductive cycling: [see also: **estrus**, **flatlining**] (Laws 1969:205; Laws, Parker, & Johnstone 1970:174; Hanks 1972b:13,21,25; Williamson 1976:91; Shoshani 1992: 57; Moss 2001:150-151,155) Periodic ovulation of mature non-pregnant females; rate of reproductive life. In wild female elephants [@ Amboseli, Kenya] the reproductive-rate seems to peak by 18-19 years, slows after about 40-50 years, and nearly ceases by 56-60 years of age. We have little evidence of complete cessation of breeding (sometimes referred to as "menopause") in wild elephants.

Retirement area: [see also: **bull area**, **sexually-active/inactive**] (Moss & Poole 1983:318; Estes 1991:261; Moss & Colbeck 1992:50,109,111) Region inhabited mainly by bulls--either singly or in **bull groups**--in a **sexually-inactive** condition. When they become **sexually-active**, bulls leave the retirement area and associate with females; individual bulls usually return to the same retirement area after their period of association with females.

Rogue: (Williams 1950:41,139-147; Deraniyagala 1955:148; Carrington 1958:51; Estes 1991:267) Vernacular term for a particularly aggressive and dangerous elephant, most often a bull. The animal may be sick or injured and may also be in **musth**. They seem to have a deep hatred of people. [In Sri Lanka, the term is **hora allia** or **hora** or **sora** (from Sanskrit *chora*) or **ronkedoors** (Dutch).]

Rutting: (Poole 1987:283,284,311,313) Heightened sexual state in male ungulates; similar in many respects to **musth** in elephants, except that rutting is generally synchronous and **musth** is asynchronous among males in a population.

Sahn (Hindustani): (Sillar & Meyler 1968:113) Group of elephants.

Salt-lick: [see also: **bai**] (Weir 1969; Ruggiero & Fay 1994; Holdo, *et al.* 2002) Localities--e.g. termite-mounds, waterholes with clay substrates--where elephants eat soil rich in minerals.

Saun (language ?): [see also: **goondah**] (Carrington 1958: 160) Wild, single, male elephant.

Savanna: (Hanks 1979:168; Estes 1991:564) Subtropical or tropical grassland with widely spaced trees, characterized by extended wet and dry seasons.

Schreger pattern/lines: (Espinoza & Mann 1992:30; Spinage 1994:220) System of crossing lines, which is unique to cross-sections of **proboscidean ivory**.

Scrimshaw/scrimshanding: (Parker & Amin 1983:147; Espinoza & Mann 1992:30) An art form, developed mainly in North America, in which designs are engraved on the surface of **ivory**. [Also performed on walrus-ivory and sperm-whale-teeth.]

Scrivelloes: (Lyell 1924:175; Sanderson 1962: 217; Daniel 1998:39) Name used in the ivory-trade for small tusks, under 10-20 lbs. [4.5-9 kg]; short tusks, projecting a few inches from the lips. May sometimes be synonymous with **tushes** [see Krishnan 1972:300].

Senescence: (Hanks 1979:18; Moss 2001:151,153,155) Deteriorating physical condition, owing to old age.

Sexual-dimorphism: (Laws 1969:196; Poole 1994) Physical or behavioral differences between the sexes.

Sexually-active/inactive: (Moss & Poole 1983:318,322; Poole *et al.* 1984:256,258,259; Poole 1987:286,290; Poole 1989a:141) Adult males who are sexually-active associate with females and can mate successfully even though not in **musth**; adult males who are sexually-inactive usually stay with all-male groups or alone. The various categories of adult male sexual condition are: non-musth inactive, non-musth active, **inter-musth**, **near- [peri-] musth**, full-musth; they probably represent increasing levels of plasma testosterone. Older adult males who periodically come into **musth** are referred to as “socially mature”; younger males who do not come into **musth** are referred to as “socially immature”. [Females are receptive to sex only during the short period of **estrus**.]

Shikar (Hindustani/Bengali/Assamese): (Lahiri-Choudhury 1999:458,459) The sport of hunting or shooting game. **Shikari** [also: **shikarie**, **shikaree**, **shekarry**; **moksoh** (Burmese)] is the “sportsman-hunter”.

Sibling: (Ford & Beach 1951:287) Offspring of the same mother, i.e. brothers and sisters.

Sidor (Thai): [see also: **mukna**, **tusklessness**] Term for tuskless males in Thailand.

Sikara (Sanskrit) : (Edgerton 1931:36) Fluid that a **musth** bull sprays from its trunk.

Silinguva (Sanskrit ?): [see also: **crush**] (Deraniyagala 1955: 142; Cannon & Davis 1995:109) Structure restricting a captive elephant while it receives treatment.

Singoung (Burmese): (Gale 1974:159) Head elephant-man. **Oozies** and **pejeiks** come under him.

Sin-oke (Burmese): (Gale 1974:159) Very senior and experienced elephant-man. **Singoungs**, **oozies**, and **pejeiks** come under him.

Sinpyudaw (Burmese): [also: **Sin-byu-daw**] (Gale 1974: 159; Daniel 1998:35) A rare “white elephant”, with 20 toes, pearly eyes, red mouth, light colored and smooth skin.

Social organization: (Moss & Poole 1983; Moss 1988; Poole & Moss 1989:112) Hierarchical organization, below. See definitions under each term, individually.

Female & young groupings [also: cow-calf group]

Family unit [also: family, **matriarchal family**, **matriarchal unit**]

Bond group [also: kinship group]

Clan

Aggregation [with no adult males present]

Sub-population [with no adult males present]

Mixed groupings [with adult males and cow-calf groups both present]

Aggregation
Sub-population
Population

All-male groupings Bull group: [also: bachelor herd, bull herd]

Sowari : [see also: **meergah**] (Sanderson 1907:88; Lahiri-Choudhury 1999:459) Light-weight elephant, trained for riding.

Spoor: [see also: **twizzle**, **bolus**] (Sikes 1971:320-321) Sign left by passing elephants; composed mainly of **twizzles**, dung, tracks.....also broken trees, mud rubbed on tree-trunks, diggings in dirt [to dust], etc.

Sternal recumbency: [see also: **lateral recumbency**] (McKenzie 1993:683) Lying on the brisket or sternum.

Stereotypical behavior: [= stereotypy] (Immelmann & Beer 1989:291) Pattern of repeated movements, most often seen in captive elephants. Probably related to anxiety, frustration or thwarted intentions. Some such behavior-patterns may be found--in a very low-intensity or abbreviated form--in wild individuals.

Sub-population: [see also: **social organization**] (Moss & Poole 1983:315,317,322) Families that occupy distinct dry-season **home-ranges** but may mix freely in the wet season [@ Amboseli one sub-population contained 27 **family units** in 4 **clans** (Moss & Poole 1983:317)].

Suckling/suckle: [see also: **lactating female**, **weaning**, **comfort suckling**, **nursing**] (Moss & Colbeck 1992: 90,144-145; Shoshani 1992:53,54) Permitting a calf to nurse and obtain milk; to nourish from the breast.

Swe-gar (Burmese): (Gale 1974:159) Elephant with his tusks growing outward.

Swe-pyat (Burmese): [also: **swe-byat**; see also: **manswe**] (Gale 1974:159) Elephant with his tusks cut or broken off, owing to accident or other causes.

Tactile: (Ford & Beach 1951:288) Referring to the sense of touch. Elephants show many tactile social behaviors, most of which are probably related to the collection of olfactory cues about the physiological status of other elephants.

Tai (Burmese): [see also: **mukhna**, **han**, **hine**] (Williams 1950:44; Gale 1974:160) Bull with only one tusk, either left or right.

Tal-betal (language ?): (Shand 1996:60) Referring to tusks, one of which points upward, the other downward.

Tan (Burmese): (Gale 1974:160) Elephant born with only one short tusk, either left or right.

Taphonomy: (Haynes 1991; Nelson 1997:24) The study of how fossils are formed. How bones are affected by geological and biological processes.

Taxonomy: (Shoshani & Eisenberg 1982; Laursen & Bekoff 1978:1,6; Shoshani 1992:43,45) Branch of science dealing with the classification of organisms.

***Elephas maximus*:** Asian elephant; usually divided into 3-4 subspecies:

E.m.maximus,

E.m.sumatranus,

E.m.indicus, *E.m.borneensis*

[For derivation of names, see Shoshani 1992:43,44,58]

***Loxodonta africana*:** African savanna elephant; recently divided into 2 species:

L. africana and *L. cyclotis*

[For derivation of names, see Shoshani 1992:43,44]

Paenungulata: (Estes 1991:249) [paene, Latin for "nearly" or "almost", i.e. almost an ungulate] = hyraxes, elephants, and dugongs/manatees

Proboscidea: = elephants and their [extinct] allies

Tethytheria: = Sirenia (dugongs/manatees) & Proboscidea

Temporal dent, upper & lower: (Albl 1971:135,138,140)

Two depressions in the temporal region of each side of the head, above the **zygomatic-arch**. Their depth is a good indication of age and--to a lesser extent--of physical-condition. The lower temporal dent contains the **temporal gland**.

Temporal gland: [also: T.G., **musth gland**] (Jainudeen, *et al.* 1972:256; Laursen & Bekoff 1978:2; Rasmussen *et al.* 1984:352; Poole 1987:287,288[drawing]) Gland located midway between the eye and ear, which resembles salivary tissue and secretes **temporal gland secretion**. Weight: up to 3 kg in males, rarely over 1 kg in females. It swells significantly in males during **musth**. [In South India, the term is **kuppoo** (McGaughey 1963:105).]

Temporal gland secretion: [also: **temporin**, T.G.S., rut water] (Deraniyagala 1955:132; Rasmussen *et al.* 1984:353,354,358-360,361; Poole 1987:286,287,288[drawing],307,311) In *Elephas*, there is one type of T.G.S.: in males only, which signifies **musth**. In *Loxodonta*, there are two types of T.G.S.: watery and short-term, in males/females/young, which signifies social excitement or stress; more viscous and durable, in males only, which signifies **musth**.

Temporin: [also: **temporal gland secretion**, T.G.S.] (Poole

& Moss 1981; Poole 1987:286,307) See definition under **temporal gland secretion**. Perhaps it is better to reserve the term **temporin** for the non-musth secretion only, as is done by Sukumar (1994:38,39-40,95-96).

Terai (Hindustani): [also: **tarai**] (Sukumar 1994:169; Wemmer 2000:60) Moist land; the region in the foothills of the Himalaya of northern India and southern Nepal, characterized by sal (*Shorea robusta*) forests.

Testiconda: (Glover 1973:45) Having the testes permanently and normally in the abdomen, as in the elephant and the hyrax.

Testing: (Schulte & Rasmussen 1999b:1269) Olfactory response shown mainly by bulls to sample, with the trunk-tip, a female's genitals, urine, or dung. After testing, the trunk-tip is often then placed in the mouth [see also: **flehmen**, **Jacobson's organ**, **vomerionasal organ**]. Presumably performed in order to determine the sexual status (i.e. **estrous** or non-estrous) of the female. Less frequently, testing can be done by females or calves.

Testosterone: (Hall-Martin & van der Walt 1984; Poole *et al.* 1984; Rasmussen *et al.* 1984:356-358,360,361; Poole 1987:285,308,311) Male sex hormone, produced primarily by the testes; found to be significantly higher in the plasma and urine of males in **musth**.

Thiringeye (Sanskrit?): (Cannon & Davis 1995:109) Pole used with a tourniquet for controlling elephants.

Toenails: (Spinage 1994:52-53; Shoshani 2000:39) Hard, keratinized material at end of some digits along the front edge of feet. Generally 4-5 on forefeet and 3, 4, or 5 on hindfeet.

Tofa (Wata [Kenya]): (Parker & Amin 1983:45) Large male with tusks 70-100 lbs. each.

Tondo (Shangaan [Mozambique]): [see also: **mukna**] (Capstick 1977:99-100; Capstick 1988:90) Term for tuskless male elephants in Mozambique.

Trail: (Gavron 1993:79) Foot-path used by elephants [and other animals]; often of great age and tradition.

Translocation: (McKenzie 1993:683) Capture, transportation, and release of animals into a new area.

Tree-breaking: [also: **tree-shaking**] (Hendrich 1971:148-156) Trees are knocked down, often so that leaves or fruit can be reached and eaten. Also done, apparently for social reasons, especially by certain bulls.

Tripy ivory: (Spinage 1994:220) Tusks with a mottled or speckled appearance, perhaps the result of calcium deficiency.

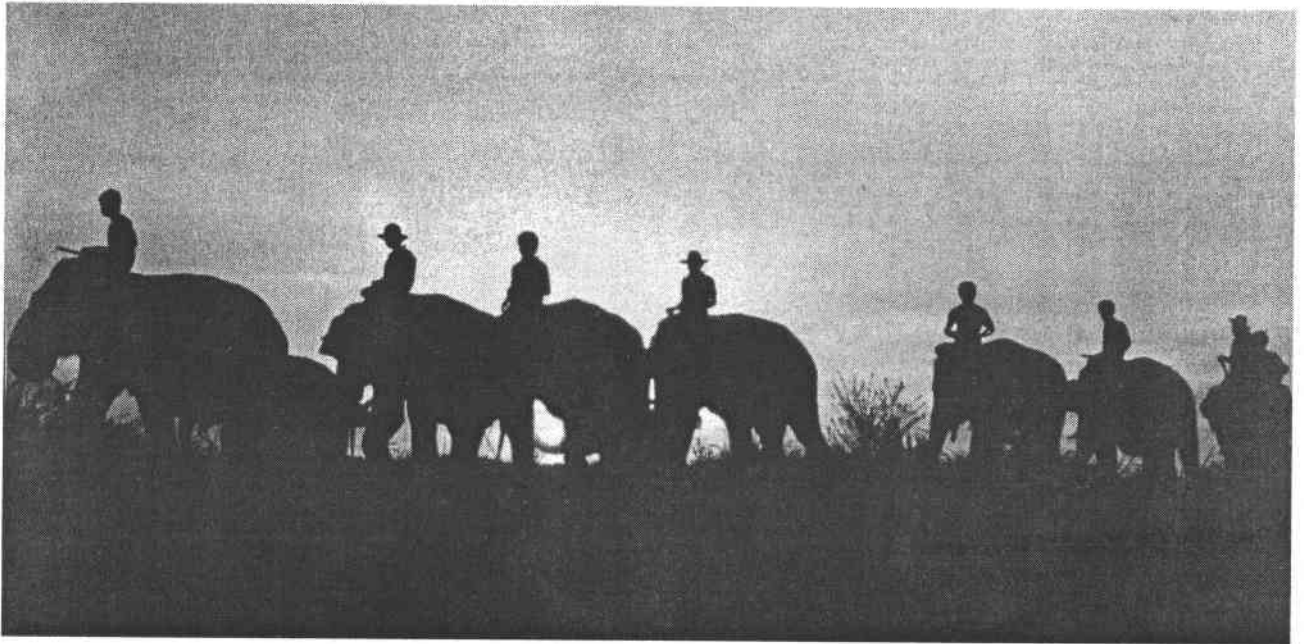
Trunk: [see also: **proboscis**] (Shoshani 1992:44[drawing],46-

- 47,54; Gavron 1993:46-47) Extended, flexible appendage produced from a union of upper-lip and nose; highly dextrous and of many uses: e.g. eating, drinking, touching, vocalizing, signalling intentions, smelling, throwing water/mud/dust, as a weapon, and others.
- Tush/tushes:** (Sanderson 1907: 67-68; Deraniyagala 1955: 40; Shoshani & Eisenberg 1982:2) Small **tusks** with no pulp inside that barely protrude past the lip. They are short, downward-pointing prongs in the upper jaw; seldom retained long, being generally broken off early in life. If broken they are not renewed. About 50% of Asian females have tushes, the others nothing. It has been claimed that tushes have softer **ivory** than tusks.
- Tusk:** [see also: **ivory**] (Deraniyagala 1955:40; Buss 1990: 69-72; Shoshani 1992:46[drawing],47-48,59) Permanent second upper incisors, composed mostly of **dentine**. The only source of real **ivory**. In *Laxodonta*, both sexes normally have tusks. They grow throughout life at a rate of about 17 cm/year, averaging 61 kg at 60 yrs in bulls and 9.2 kg in cows; record-weight = 106 kg, record-length = 355 cm. In *Elephas*, only some males have tusks.
- Tusker:** [see also: **mukhna**] (Cannon & Davis 1995:173) An elephant with tusks. In Asia, nearly always a male.
- Tusk, master:** [see also: **tusk, working**] (Spinage 1994:75) The tusk that is not used for digging, etc.; usually longer and less worn.
- Tusk, working:** [also: servant tusk; see also: **tusk, master**] (Eltringham 1982:6; Spinage 1994:75) The tusk that is used for digging, etc.; is usually, therefore, more worn down. [In Tanzania the term is **lukombilo** (Rushby 1953:139); in Arabic, it is **hadām** (Baker 1890:29)].
- Tuskless/Tusklessness:** (Owen-Smith 1966; Abe 1996; Whitehouse 2002) Born without the ability to produce tusks; apparently a genetically inherited trait. In Asia, most females and some males (varying with location) are tuskless. In Africa, certain areas (e.g. Queen Elizabeth NP, Uganda, and Addo Elephant NP, South Africa) have a largely tuskless female population. Tuskless males are uncommon in Africa.
- Twizzles:** [see also: **spoor**] (Eisenberg & Lockhart 1972:22; Sikes, 2000:223) Sticks that are chewed and dropped--often in a road or track--by passing elephants. One can tell from how fresh and green they are how recently the elephants have passed.
- Urine-dribbling:** (Poole 1987:287,289[photo],295; Kahl & Armstrong 2002:163-164) Leakage of urine from the sheathed penis, shown by males in **musth**; during full-musth bulls may lose more than 300 l. of fluid per day in this manner (Poole 1989:148).
- Urogenital sinus:** [= U.G.S.] (Rasmussen *et al* 1982:160)
- Cloaca-like common opening to the urinary and genital tracts in a female elephant.
- Usho** (Wata [Kenya]): (Parker & Amin 1983:45) Male with tusks of more than 100 lbs. each.
- Vasa-lobha** (Sanskrit): (Edgerton 1931:122-123) Method of catching wild elephants, using the enticement by females.
- Veld** (Afrikaans): [also: bushveld, veldt] (Pratt, *et al* 1966: 382; Greaves 1996:131) In southern Africa, open country or grassland; bush.
- Vidu** (Sanskrit): (Edgerton 1931:71,123) Furrow in the middle of the top of an elephant's head, between the domes or **kumbhas**.
- Villus** (Tamil): (Eisenberg & Lockhart 1972:4; Sukumar 1992:164) In southern India and Sri Lanka, seasonally inundated marshy areas and small ponds.
- Vlei** (Afrikaans): [see also: **dambo**] (Greaves 1996:131) In southern Africa, a flat, grassy drainage channel that floods in the rainy season and supports no trees; marshy ground.
- Vomeronasal organ:** [also: V.N.O., **Jacobson's organ**; see also **testing**, **flehmen**] (Rasmussen *et al* 1982:160; Rasmussen *et al* 1984:360; Poole & Moss 1989:114) Area, located in the roof of the mouth, that is sensitive to olfactory cues, especially those associated with urine.
- Vyala** (Sanskrit): (Edgerton 1931:124) Term for a **rogue** elephant.
- Wallowing:** (Guy 1976:289,291; Estes 1991:262; Shoshani 1992:55[photo],57) Collective term for **grooming** and bodily-maintenance that includes: water-spraying/bathing/mudding/dusting/rolling in dust or mud.
- Weaning:** [see also: **nursing**] (Laws 1969:207; Moss & Colbeck 1992:86-87,99,114,188; Shoshani 1992:53,54) Cessation of nursing; usually starting at 1-2 years and usually completed by 4-5 years; occasionally continues until 8± years.
- Wun-bike-kyo** (Burmese): (Gale 1974:160) Girth band.
- Yaarba'hd** (language ?): (Sanderson 1907:97) Common ailment among working Asian elephants. Especially among those freshly captured and, therefore, perhaps related to stress.
- Yata** (Sanskrit): (Edgerton 1931:122) Guidance of an elephant, by the **mahout**, with the feet.
- Yaudha** (Sanskrit): (Edgerton 1931:66) Male in full-musth. Literally a "fighter".
- Zoochory:** (Brahmachary 1995:389) Dispersal of seeds-

-and their subsequent germination--by being passed through an animal's alimentary tract.

Zygodontodont: (Savage & Long 1986:250) Proboscidean teeth with high-pitched transverse lochs or ridges.

Zygomatic-arch: (Albl 1971:135; Shoshani 1996:12) Cheek-bone. Bony ridge running approximately horizontally across the side-of-the-head behind the eye. Separates the **lower temporal dent** and the **buccal depression**. The **temporal gland** lies just above the **zygomatic-arch**. The **zygomatic-arch** is composed of parts of three bones: the maxilla, jugal [= malar], & squamosal.



Sumatran elephants at the Elephant Training Centre in Way Kambas National Park, Sumatra
(photo: courtesy Alain Compost)

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