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The knowledge of elephants in ancient times

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[The following article is summarised from the presentation made by Professor Sukumar at the start of the 2016 Bangalore conference.]

For knowledge of the elephants in ancient times we have on the one hand artistic depictions of the elephants, and on the other hand texts such as the *Vedas*, the two great Epics, the Greek texts, the *Jatakas* and other Buddhist sources, the Sangam poetry, Palakapya's *Gajashastra* or *Hastyayurveda*, the Kautilya *Arthashastra*, the *Manasollasa*, the *Hastividyarnava*, the *Akbarnama* and the *Ain-i-Akbari*.

In Indian literature, the origin of elephants is traced to a cosmic event in which Brahma held two halves of the cosmic eggshell in his two hands and chanted seven Vedic mantras. Eight male and eight female elephants sprang out of each half shell, and went on to populate the earth. Brahma created elephants for the benefit of offering sacrifice to the gods, and *especially for the welfare of kings*.

For the rulers of ancient India, the elephant was more useful alive (in armies and as a beast of burden) than dead (for meat or ivory). The elephant was regarded as a very positive force that had to be protected. Perhaps this is the reason why the elephant was elevated to sacred status, first in Buddhism as the white elephant, and later in Brahminical Hinduism as Ganesha.

The *Ramayana*¸the epic of the life of prince Rama, states that the elephants at Ayodhya were born in the Vindhya and the Himalaya. This indicates knowledge of the occurrence of wild elephants both to the north and to the south of the Ganges. The increasing use of elephants in armies to the south of the Vindhyas perhaps indicates larger populations in the peninsula. The *Aitareya Brahmana* (7th century BCE) speaks of Bharata Dushyanta, the ruler of Anga, gifting 10,000 tusked elephants (an evident exaggeration) on the occasion of the Ashvamedha sacrifice ritual. However, it is clear that present-day Bihar-Jharkhand would have supported a large population of elephants.

The *Jatakas* (the record of the births of the Buddha, dating from the 5th century CE, but with tales that go back to Buddhist canonical literature of 4th century BCE). Here we find the Boddhisatva as the leader of a great herd of 8,000 elephants [*Kasava Jataka* 22] or 80,000 elephants [*Chhaddanta Jataka* 514] in the Himalaya.

In the Kautilya *Arthashastra* (c. 300 BCE – 300 CE) there is mention of eight Gajavanas or "elephant forests". These are Prachya Vana, Kalinga Vana, Chedikarusa Vana, Dasarna Vana, Angareya Vana, Aparanta Vana, Saurashtra Vana and Panchanada Vana. Interestingly, the range of the elephant portrayed on the map does not extend to the extreme south, perhaps because of lack of knowledge in the days of the Mauryan empire.

In the *Manasollasa* of the western Chalukyan king Somadeva III (12th Century CE) the description of *Kalinga vana* is extended to *Dravidadesha*. Significantly, the *Manasollasa* adds the *Aparanta vana* to *Saurashtra vana* and *Panchanda vana* as producing the worst elephants. Might this suggest that ecological degradation had extended to the northern Western Ghats (Maharashtra) by this time? Certainly we know that wild elephants had already disappeared from this region centuries ago.

From the *ecological* point of view, the feeding preferences of the elephant have been recorded in many ancient sources. For instance, the tendency to uproot trees, strip the bark, and feed on several plants including grasses, bamboo, the pith of the palmyra tree,

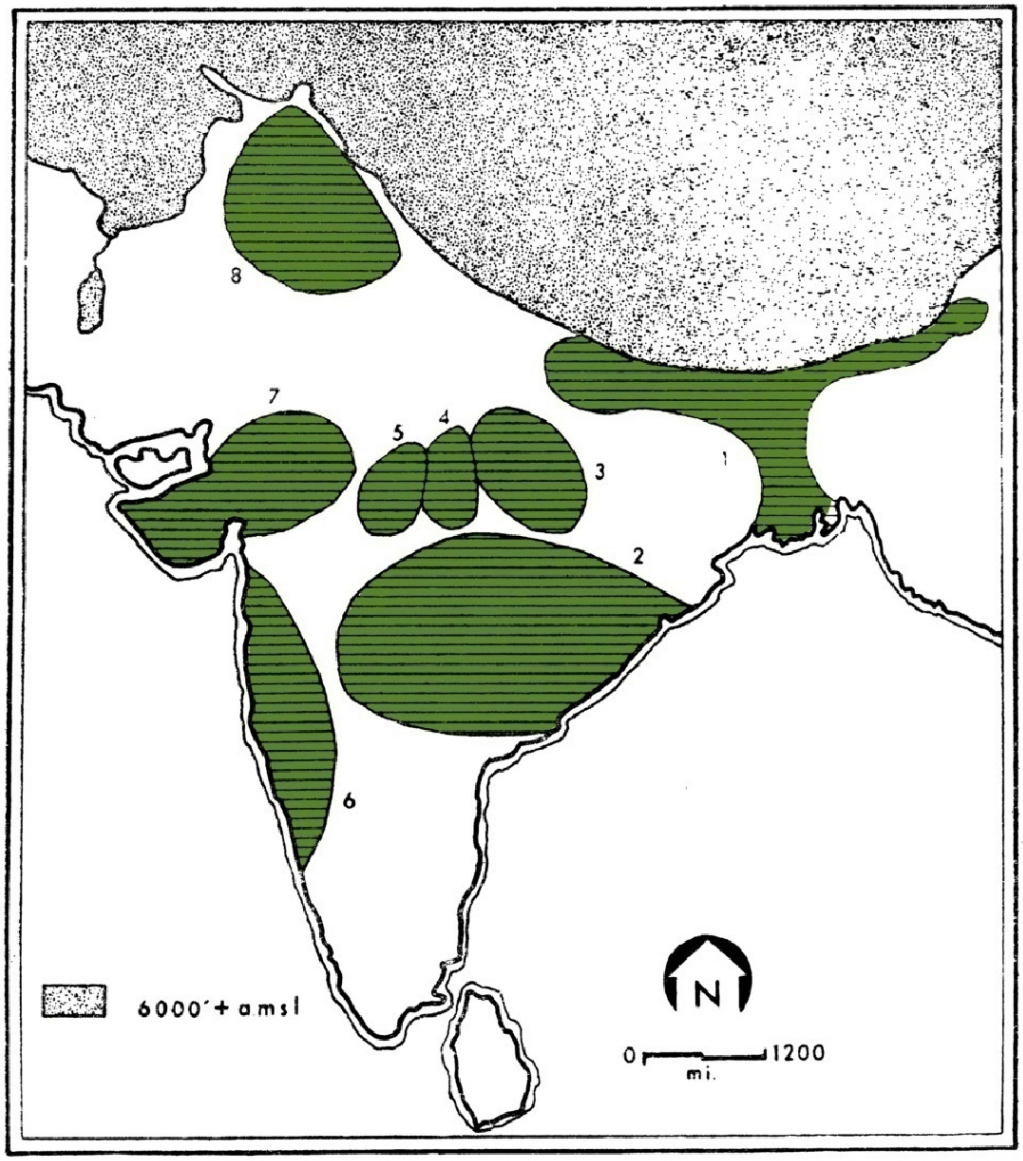

Figure 1: The eight elephant forests. [Source: After Trautmann, 1982]

the branches and leaves of *Trema orientalis* and *Wrightia tinctoria*, and even dry twigs, is recorded in the (Tamil) Sangam texts. One Tamil poem states that when a cow elephant in advanced stage of pregnancy feeds on the tender, leafless shoots of the bamboo, it aborts its foetus. We know today that young shoots produce cyanogenic compounds that can be poisonous.

As regards, *elephant-human conflicts*, the *Gajashastra* (*Matangalila*, study of elephants) begins with an account of elephants ravaging the crops in the kingdom of Anga. The king captures these elephants. The sage Palakapya pleads with the king to release them. [See Chapter 23 below] The Sangam texts contain many references to elephants raiding crops, especially solitary male elephants leaving their herd and raiding millet fields at night. This greater propensity of male elephants to raid crops is well recognised today.

As regards the *behavioural traits of elephants*, the ancient Sanskrit treatise *Arthashastra* recognises elephants not amenable to training as being mischievous, vicious, genuinely mad, or clever enough to feign madness. The sagacity and individual character of the war elephant is a topos that is often encountered (King Puru's Ajax; Duttagamini's Kandula; Akbar's Hawa'i). The Mughals recognised three behavioural types among their bull elephants, based on the Hindu differentiation of dispositions of the human mind: *sat* (handsome, submissive, moderate in eating, practically celibate, and enjoyed a long life);

raj (savage in looks and behaviour, voracious eater, and seeker after sensual pleasures); and *tam* (self-willed, destructive, sleepy, and with a voracious appetite).

There are texts that mention the *chemical signals* of elephants. For instance, "Upon smelling their own dung and urine, let them always be producing a tickling of the palate (an attraction for it)" [*The Matangalila of Nilakanta*, trans. Edgerton]. Similarly, Sanskrit and Tamil Sangam poetry allude to "bees hovering around the rut of a bull elephant", and to "gathering sweetness from the temples of young musth elephants".

As shown by Rasmussen, Riddle and Krishnamurthy (*Nature*, 2002), the musth secretion of young adult males at Mudumalai was qualitatively different from that of old musth males. Young males secreted sweet-smelling 3-hexen-1-ol, two ketones (2-heptanone and acetophenone) and isoamyl acetate. Old males secreted foul smelling 2-nonanone, acyclic ketones and substituted cyclohexanones, including 3-methyl-2-cyclohexen-1-one and frontalin (1,5-dimethyl-6,8 dioxabicyclo[3.2.1] octane).

Musth in the bull elephant is a long-standing obsession. For instance, King Ashoka's *Gajatamé,* the rock engraving depicting the supreme elephant (in musth) of Buddhist India. Similarly, the **e**lephant in the Tamil land, with the musth bull of the Pallavas.

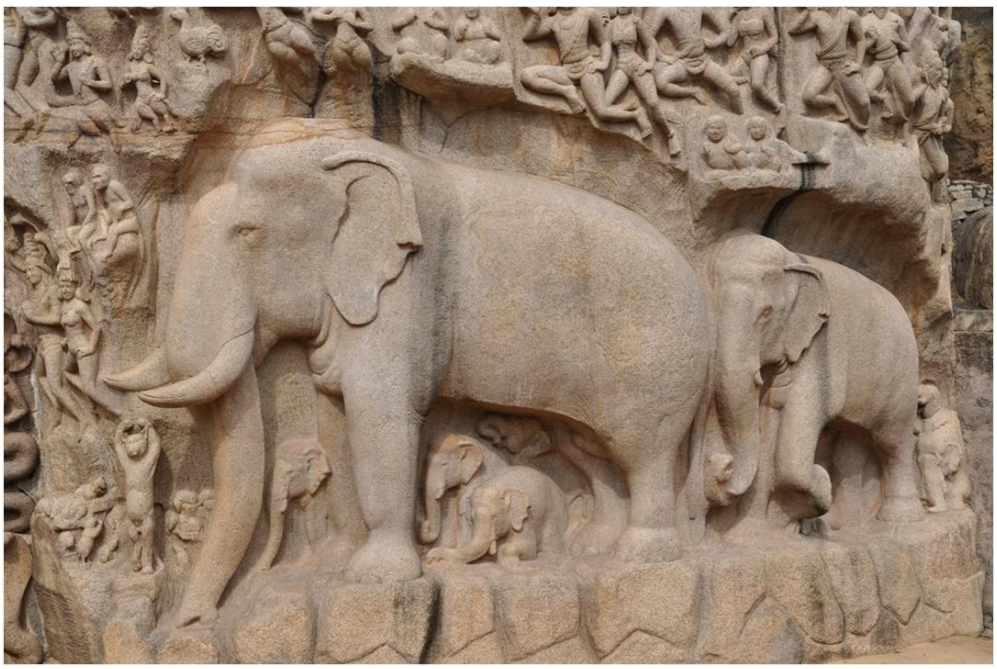

Figure 2: Bas relief representation of bull elephant, The Great Relief at Mamallapuram, Tamil Nadu, 7-8th century CE.

And later, the musth bull of the Mughal emperor Akbar, as depicted in the picture of Akbar riding the elephant Hawa'i, in the *Akbarnama* (V&A Museum, London).

Musth is also referenced in Sanskrit literature. For instance: "Excitement, swiftness, odour, love passion, complete florescence of the body, wrath, prowess, and fearlessness are declared to be the *eight excellences of musth*." [*The Matangalila of Nilakantha*] This single sentence captures what modern-day biologists know about musth in bull elephants, namely: a heightened sexual state; an increase in rate of movement and home range; chemical signaling; the search for females in oestrus; change in physiology (increased testosterone); and increased aggression towards other male elephants.

As regards musth in the Sangam texts, one passage speaks of a mighty bull elephant, with musth fluid flowing down its temples, resting its trunk on its shining tusks, as its pairs off with its mate within a forest grove. Here the sexual significance of musth is recognised. A

musth bull that has killed its adversary, the tiger, also roams the jungle in wrath without joining its mates. Here the aggressive behaviour of musth bulls is recognised. One poem describes the elephant vanquishing a tiger which lay in wait to attack the elephant: "and after wiping out the blood in its tusk, walked …. full of pride in having overcome its adversary, got united with its mate and lay asleep with the humming bees hovering round it in the hill full of plantain trees". Perhaps this references a chemical attraction to musth?

There is also the question of the temporal spacing of musth in elephants. "…The *bhaddar* ruts in Libra (Sept 23 – Oct 22) and Scorpio (Oct 23 – Nov 21); the *mand* in spring (April – May); the *mirg* in Capricorn (Dec 22 – Jan 19) and Sagittarius (Nov 22 – Dec 21); the *mir* in any season." [the *Ain-i-Akbari* of A'bul Fazl, 16th century CE]. Joyce Poole (*Animal Behaviour*, 1989) has used game theory to argue that spacing out of musth among older, dominant bulls and younger, subordinate bulls was a mechanism of conflict avoidance.

A major matter of concern is the *capture of elephants*. The *Arthashastra* gave detailed prescriptions about the type of elephant to be captured. Summer was given as the best time to capture elephants The capture of a calf (*vikka*), an elephant with small tusks (*modha*), a tuskless male (*makkana*), a diseased elephant (*vyadhita*), and a pregnant or a suckling female (*garbini*; *dhenuka hastini*) were prohibited. On the other hand, a 20-year old tusked male was to be caught – this was presumably for use in the army. The frequency of tusked versus tuskless bull elephants in the northeast may reflect this form of selective capture of tusked bulls historically.

The *methods of capture of elephants* are described in various sources. In Megasthenes we have capture by the stockade method, but using 3-4 female elephants to lure bulls and female-led family groups. The *Arthashastra* speaks of tracking elephants in the jungle and using trained females as decoys to trap young desirable bulls. In the Sangam texts we have the use of pits to capture elephants, as well as decoy females to trap bull elephants. The *Matangalila* offers five methods, with the rider that "pit" method and "pursuit and assault" should be shunned as they may destroy the elephants. And in the *Ain-i-Akbari* we have *kheddah* (drive), *chor kheddah* (female used to noose wild), *gad* (pit), *bar* (ditch), and Akbar special (decoys).

There is much to be learned about *training and management in captivity*. The most elaborate accounts of the elephant relate to the following aspects: (a) morphology/anatomy (body type and favourable/unfavourable marks (presumably because of the need to select the right elephants for use in war); (b) growth and development (the need to put the elephant to the right kind of use); (c) the required steps for training (for instance, *Arthashastra*'s prescriptions of training for deployment in battle; (d) diet: supplementary diet for different situations (e.g. musth); (e) treatment of ailments and diseases (many ancient sources such as *Hastiaryurveda* provide detailed accounts of treating ailments and disease).

As regards the *management of elephant forests* in the Mauryan period: the *Arthashastra*, a manual of statecraft, advocated the setting up of sanctuaries controlled by a Superintendent of Elephant Forests for the protection of elephants, and imposing the death penalty for the killing of an elephant. We find a *utilitarian view of conservation* – it is required to ensure a supply of elephants for the king's army:

> Some teachers say that land with productive forests is preferable to land with elephants because [it] is the source for a variety of materials…….while the elephant forests supply only elephants. Kautilya disagrees. One can create productive forests on many types of land but not elephant forests. *For one depends on elephants for the destruction of an enemy's forces.*"

By the 12th century CE, the form of elephant management seems to have changed. The *Manasollasa* of Somadeva III repeats the assertion of the *Arthashastra* that an elephant forest is the best type of forest, but with the rider that the king should *protect it with the help of forest dwellers* (and not a *nagavanadhakshya* as in the *Arthashastra*). Thus a

concern for participatory wildlife management. The *Manasollasa* adds the Aparanta vana to the Saurashtra vana and Panchanda vana as being inferior for elephants, and this might perhaps suggest a situation of ecological degradation.

Coming into the colonial period, and the *development of veterinary science*, we find a number of concerns. Forest preserves were set up from the mid-19th century, to ensure an adequate supply of timber for railways and shipyards. Elephants were used extensively in logging teak forests. There was scientific management of timber elephants, and a development of European veterinary science of the elephant (of course, drawing upon local traditions). A major development was sport hunting and the management of game preserves. Knowledge of elephant anatomy was used for knowing how best to shoot an elephant.

[Presentation summarised by E.E.]

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