

Aristotle's Notices on the Elephant

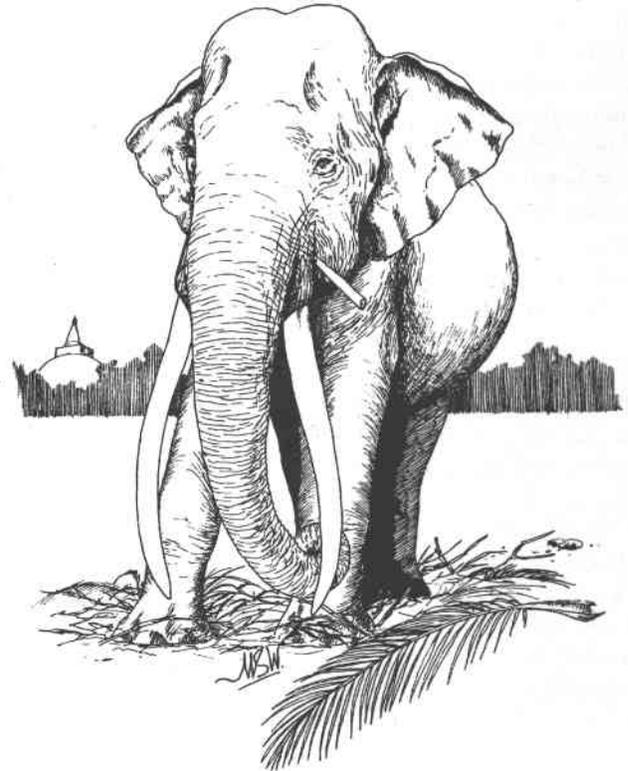
Merlin Peris

Few of those who know of Aristotle's reputation as a philosopher would be aware of his extensive researches in the field of biology. In fact it was his scientific approach to natural phenomena that influenced his study of all other subjects, including metaphysics, ethics, and literature in which his analytical approach is no less manifest. What would be most interesting to readers of *Gajah* in this context would of course be his observations on elephants, in which also is evident a scientific approach to their study the like of which nothing has been known till recent times.

Asia is reputed to have tamed and trained elephants – if we go by the evidence of the Indus Valley civilization – from as far back at 1500 B.C. at least. They have since then been captured, singly by trap and pit, or in numbers by *kraal* and other devices and employed for labour, ceremonial, war, and indeed even execution. Yet of the very few works that have been handed down to us in India and Sri Lanka on elephant lore – and these are also of more recent antiquity – hardly any devotes itself to a biological or zoological study of the animal that can be deemed scientific.

Notable among these writings are the Indian *Gaja Sastra*, and in Sinhala, the *Gajayoga Satakaya*, *Hasti Lakshana Vidyava*, the *Gajatu Lakshanaya*, the *Maha Gaja Lakshana Sangarabava*, and the Medieval *Atunge Lakshana*, all of which either concern themselves with a classification of the breeds and castes among elephants by arbitrary interpretation of physical appearance, prognostications based on crass superstition⁽¹⁾, and (which is perhaps the least ridiculous) an attempt to lay down the physical, psychological and behavioural features of the first ten years, and thereafter, of ten-year periods (*dasa*) of the animal's life. To this hocus-pocus must be added the pretence of such elephantology to a knowledge of the nerve-centres (*nila*) of the animal – the truth of which, as far as I am aware, remains unverified – by the pricking or pressing of which it is believed the animal could be manipulated to do the bidding of the mahout like a robot, but which, to my thinking, may be no more than conditioned reflexes⁽²⁾.

In contrast to the superstitions and fantasies that fill these works and are of no credit to civilizations that have developed in close association with elephants for centuries, come the observations of Aristotle, hailing from a land to which



(Tusker by Manjula Wijesundara)

elephants were exotic, making his study of them in a far greater antiquity than the authors of those aforementioned oriental treatises, and having at best a few specimens, themselves removed from their natural habitats, to work upon. Nor, it must be remembered, were elephants the only – or even the chief concern of the philosopher's study, as will be seen.

Aristotle was born in the small city of Stageira in the Chersonnese in 384 B.C. and acquired his interest in biology from his father, Nicomachus, who was personal physician to Amyntas, king of Macedon. In 357 B.C. he joined Plato's

Merlin Peris

Professor Emeritus
Department of Western Classics
Faculty of Arts
University of Peradeniya
Sri Lanka

Academy in Athens, studying, researching and lecturing for 20 years. When Plato died, he left Athens and spent some years in Asia Minor and the island of Lesbos, then was invited by King Philip of Macedon to Pella (343 B.C.) to be tutor to his young son, Alexander. The advance Aristotle made in his biological studies, especially of marine life, belongs to these years in Asia Minor—but as it now seems, also of his studies of other animals as well, including elephants, even if it raises the question of how he came by them before the campaigns of Alexander.

With the campaigns of Alexander, however, his acquaintance with elephants must have increased considerably, as of other exotic animals as well of which he wrote. For though he did not accompany the conqueror, Alexander took along with him scientists and scholars of all sorts and is said to have instructed hunters, fowlers and the like of his rapidly expanding empire to report to Aristotle anything they encountered that was of zoological curiosity. There is also mention of a handsome grant of 800 talents that he made to the philosopher to pursue his researches.

By this time Aristotle was back at Athens, where he established his own school in the Lyceum. Alexander died in 323 B.C., Aristotle the year after, having left Athens following a wave of anti-Macedonian feeling, which was bound to have caught up with him due to his close association with Macedonia and Alexander. It was in the Battle of Hydaspes against Porus, king of the Pauravas, that Alexander faced a formidable array of elephants. But there can be no doubt that war-elephants were also present in the Indian contingents of the Persian army at the Battle of Gaugamela (329 B.C.) and others. We know that the Greek, Ctesias of Cnidus, who was at the Battle of Cunaxa in 401 B.C., at which the rebellion of Cyrus was crushed, had even then seen elephants deployed in battle, so that there is no reason to think that Greeks were not familiar with elephants before Alexander's invasion of India.

But, as mentioned earlier on, the question is how Aristotle himself had acquaintance with elephants before Hydaspes to be able to come up with all his information on them in his writings, which really belonged to the middle period of his scholarship—the years in Asia between his studies under Plato and Alexander's campaigns in the East. For, even if he may have expanded his knowledge of elephants in these later years, the information that comes to us in his biological works already show, not only a considerable familiarity with these animals through association and observation, but an anatomical knowledge that could only have been possible by clinical examination involving dissection.

Aristotle's notices on elephants, their zoology and anatomy, do not come down to us in a single treatise or even a single continuous account anywhere in his writings. Instead, they are sporadic references in the midst of his discussions of all manner of other creatures, big and small.

In the collected works of the philosopher there are four separate treatises on biology, viz:

<i>Historia Animalium</i>	History of Animals
<i>De Partibus Animalium</i>	Parts of Animals
<i>De Motu et de Incessu</i>	The Motion and Gait of Animals
<i>De Generatione Animalium</i>	The Generation of Animals ⁽³⁾

Taken together these form the bulkiest group in the collection of Aristotle's writings. Altogether he describes in them five hundred species of animals; of these he himself had dissected specimens of fifty. The topics he discusses there are (a) the classification by genera and species (b) the distinction of the meanings of the term "parts" i.e. as materials, like flesh, bone, sinews, skin etc., or according to function, like heart, liver, head, hand, etc. (c) differences in physiology, psychology, character and habits, and (d) the question of the appropriate method to be pursued in natural science.

How different all this is from the oriental works which I have mentioned—even when they belong to a considerably late age, is best left without comment. But before I get on to Aristotle's observations on the elephant, and more particularly its trunk, which is the focus of this note, I need to draw attention to his constant use of a type of causation in nature different from the mechanical in the inorganic sphere. This is the teleological cause (Gk: *telos* = an end) or final cause (Lat. *finis* = an end) which implies that Nature has an intention for everything. This kind of causation visualized by Aristotle has been criticized, and if it is as a substitute for observation, the criticism is justified. It would be like positing that the purpose of the hand is to play the violin, says Benjamin Farrington⁽⁴⁾. Besides, every natural organ develops a variety of functions which seem to be the result of the existence of the organ than its cause.

Yet Aristotle was wise enough to realize that theories must yield to observation, and credit given to theories only to the extent that they are confirmed by facts. This is the manner and temper of this great collection of biological works which resulted in the classification of living things, a *scala naturae* not superseded till the time of Linnaeus and which drew from Darwin that oft-quoted remark, "Linnaeus and Cuvier have been my gods; but they were only children compared to old Aristotle".

Aristotle's most extensive information on the elephant has to do with its trunk, for it seems to have intrigued him as much as it did (and does) most scientists and writers. It is for this reason also that I will dwell on it in some greater detail, giving also the references to the several notices for the benefit of those who desire them. Not that Aristotle did not have surprisingly good observations on several other anatomical and behavioural features of the animal.

For instance, he observes that the elephant has four teeth on either side, present at birth itself, with which it grinds its food like so much barley-meal; that besides these it has two "great teeth"—the tusks, though he may have been misled by the specimens he had into thinking that in the male these curved upwards, and in the female in the opposite direction. Again Aristotle speaks of the scantiness of the elephant's

hair, its thick skin, the relative smallness of its tongue, the two mammae of the female as located under the axillae of the front legs and also being quite out of keeping with the size of its frame; of the intestines being “so constructed that the animal appears to have four stomachs”; of the remarkable absence of a gall-bladder, though it has a liver; of the penis of the male as (like the tongue) being disproportionately small; the invisibility of the testicles, concealed as they are inside the body in the vicinity of the kidneys; of the semen as not hardening so much when dry as to become (as Ctesias had stated) like amber.

Regarding the manner of sexual intercourse too Aristotle knew far better than the absurd notions prevalent even today and in lands that bred elephants as well – though it is the male who might seem to be squatting (and on the haunches of his rear legs, with forelegs on the female’s back) than the female herself, usually a much smaller animal, who receives him, standing on all fours⁽⁵⁾. With regard to the life of the elephant, Aristotle observes that the age at which a female becomes sexually receptive is between ten and fifteen years, and of the male as being potent when five or six – and again, that both are fitted for breeding by twenty. He is nearly correct about the period of gestation, which he opines is about 22 months – elsewhere, 3 years, observing philosophically “for it is not easy for large masses to arrive at perfection in a small time”. But he did know of opinions which put it at 2 ½ and 3 years, accounting for the discrepancy as “due to the fact that there are never human eye-witnesses to the intercourse between the sexes”, for “elephants copulate in lonely places, and especially by river-sides in their usual haunts”. “The female”, he says, “settles down on its rear to cast its young, and obviously suffers greatly in the process. The young one, immediately after birth, sucks the mother, not with its trunk but with its mouth; it can walk about and see distinctly the moment it is born”.

As to the elephant’s age, Aristotle says, “Man lives longer than any animal of which we have credible experience except the elephant.”⁽⁶⁾ But he will not commit himself to a definite period, being content to give the opinions of others as 200, 120 and some even 300, perhaps because, as with the period of gestation, one was usually not aware, or had not kept a record of its age at the time of capture or birth. On the other hand, it must be our own misunderstanding of Greek measures (*medimni, mareis, cotylae*) which is responsible for the confusion regarding the elephant’s intake of food and liquid, which Aristotle was definitely in a position to have observed and assessed. He is aware that elephants do not sleep standing, as some used to say, but bent its legs and settled down – only, that in consequence of its weight it cannot bend its legs on both sides simultaneously but falls into a recumbent position on one side or the other and in this position goes to sleep. He also knew of their being easily tamed and of their use by Indians for war, and the manner in which they were captured by employing tame ones.

And now to the trunk itself. Of it Aristotle says, “In no animal is this part (the organ of smell) so peculiar as in the elephant, where it grows to an extraordinary size and strength” (*Part. ii.16:658b30*), and again, “The nose of the

elephant is long and strong, and the animal uses it as a hand” (*Hist.ii.1:479b23*).

Thus Aristotle observes the fact that the trunk is an elongated nose, and at the same time, by appreciating “the causes operative in living nature and how they relate to each other,” sees the phenomenon as related to the inadequacy of the forefeet to serve as hands. “In the polydactylous quadrupeds, the forefeet are intended not merely to support the weight of the body, but to serve as hands” (*Part. ii.16:658b30 f.*). “In elephants, however, though they must be reckoned polydactylous, as their foot has neither cloven nor solid hoof, the forefeet, owing to the great size and weight of the body, are reduced to the condition of mere supports; and indeed their slow motion and unfitness for bending, makes them useless for any other purpose” (*Part. ii.16:658b30 f.*). Consequently the elephant’s toes are undivided and only slightly articulated, negating their use as effective hands. And this disadvantage it is that the trunk makes good, though it retains at the same time its own specific function as a breathing organ.

“The elephant uses its nose as a hand, this being the instrument with which it conveys food, fluid and solid alike, to its mouth. With it too it tears up trees, coiling it around their stems. In fact it applies it generally to the purposes of a hand (*Part ii. 16: 658b30 f.*). Elsewhere he says: “The nose of the elephant is long and strong, and the animal uses it like a hand; for by means of this organ it draws objects towards it, and takes hold of them, and introduces its food into its mouth, whether liquid or dry food, and it is the only living creature that does so (*Hist. Ii.1:492b17 f.*). Afterwards he writes: “It has a nose such in properties and such in size as to allow its using the same as a hand. For it eats and drinks by lifting up its food with the aid of this organ into its mouth, and with the same organ it lifts up articles to the driver on its back; with this organ it can pluck up trees by the roots, and when walking through the water it spouts the water up by means of it; and this organ is capable of being crooked or coiled at the tip but not of flexing like a joint, for it is composed of gristle” (*Hist. ii.1:497b23*).

Besides its extreme pliancy, Aristotle is aware that the trunk is boneless, for he says that, had it been hard and incapable of bending, it could not have been a proboscis; “for its very length would have prevented the animal from supplying itself food, being as great an impediment as the horns of certain oxen that are said to be obliged to walk backwards while they are grazing” (*Part. ii.16:658b30 f.*).

As is well known among elephantologists, George Cuvier and his colleagues had estimated that an elephant’s trunk was made up of as much as 40,000 muscles – while others found the effort of counting absolutely futile. These muscles themselves are constituted of units, or muscle fascicles, which, if so counted, would exceed 150,000, or near four times Cuvier’s estimate! Notwithstanding the pliancy of the trunk, the fully developed tusks of an adult elephant could prove somewhat the kind of impediment Aristotle visualized had the trunk been rigid – as is evident in an African elephant of the stature of the famous Ahmed of Kenya⁽⁷⁾. What is

however more surprising is Aristotle's failure to take into consideration the absence of much neck in the elephant (perhaps due to having to carry the tusks) and again the height it had attained. For even without differentiated toes and pliant forefeet, the animal could have fed without a proboscis like the rhinoceros and hippopotamus, if it had shorter legs and a longer head and neck to help it to reach the ground. On the other hand, granting the height, an elongation of the neck, as with giraffe, camel and other long-necked animal was a possibility. (It is interesting that *Moeritherium*, the oldest ancestor of the Proboscideans, was a short, pig-like creature which was able to scrape the vegetation off the floors of marshes directly with its lower jaw). Nor must it be thought that the trunk merely off-set a feeding problem caused by the height developed by the elephant in its evolution, for now it was able to feed, like the long-necked, not only upon pasture and underbrush but reach up to the fodder provided by the branches of trees above it.

The elephant, says Aristotle, has the double character, both of a land animal and one that lives in swamps, and besides this, that it got its food from the water (*Part. ii.16:658b30*). "Seeing that it got its food from water⁽⁹⁾, yet must necessarily breathe, in as much as it is a land animal and has blood: seeing also that its excessive weight prevents it from passing rapidly from water to land, as some sanguineous viviparia that breathe can do, it becomes necessary that it shall be suited alike for life in the water and for life on dry land. Just then as divers are sometimes provided with instruments for respiration, through which they can draw air from above the water, and thus may remain for a long time under the sea⁽⁹⁾, so also elephants have been furnished with their lengthened nose; and wherever they have to traverse the water, they lift its tip up above the surface and breathes through it. For the elephant's proboscis, as already said, is a nose."⁽¹⁰⁾ (*Part ii.16:658b30 f.*) And soon afterwards, he adds, "The nostril, then, is given to the elephant for respiration, as to every other animal that has a lung, and is lengthened out and endowed with its power of coiling because the animal has to remain for considerable periods of time in the water, and is unable to pass thence to dry ground with any rapidity." (*Part.ii.16:659b30 f.*)

The mistaken notion that elephants (surely in their wild state in the lands that bred them) got their food from) the water (however true it may have been of the *Moeritherium* and its close successors in evolution) must have been held by Aristotle from hearsay, not having seen them in their life before captivity. It is true, as he says, that the elephant is often found by the banks of rivers but he is not a river animal; it is also true that he can make his way through water, but he is wrong when he says it can do so only as long as the tip of his trunk can be above the surface (for he blows with his trunk and breathes through it), if by this he implies that elephants habitually submerge themselves for long period of time in their quest for food like the hippopotamus or in crossing water. This mistaken notion that the trunk by nature (not by accident) was meant to serve as a kind of snorkel and that the elephant can only remain beneath the water in depths which allowed the tip of its trunk to be raised above the surface, have both arisen from Aristotle's mistaken notion

that "the animal is a poor swimmer owing to the heavy weight of his body" (*Hist. ix.46:630b25*).

The truth is quite the contrary, and with it discredits his notion that the trunk was designed by nature for this purpose as well. For the elephant, with his pneumatised bones, is an excellent swimmer and does not hesitate to enter water well out of its depth. Various people have reported elephants swimming across rivers, lakes, oceans and to and from the islands of Kenya, among the Andaman islands, off the coast of Sri Lanka, and captive elephants off the coast of South Carolina, U.S.A – single elephants, mothers and calves, and groups (as many as 79 individuals in one report)⁽¹¹⁾. An elephant can swim six hours at a time without touching the bottom, travelling as much as 30 miles at a stretch and swimming as fast as 1.3 miles an hour, while it seems swimming came instinctively to calves.

There was no necessity for them to traverse underwater, holding the trunk up like a snorkel, as Aristotle imagined, though they might do so over brief distances in depths permitting this, as Emerson Tennant⁽¹²⁾ noted; otherwise they would lie down partially or totally immersed in water, holding their trunks up sideways for breathing. I cannot understand what the difficulty elephants had of passing rapidly from water to land, which Aristotle mentions, which also called for the use of the trunk as a breathing apparatus – for, as said, unlike the hippopotamus, it does not graze in water – and would not be capable of doing both at the same time, grazing and breathing. Or is he meaning the ability to coil the trunk?

Equally accidental must be the elephant's use of the trunk as a weapon. Aristotle writes "Excessive bulk, such as has been given in still greater measure to elephants, is sufficient in itself to protect the animal from being destroyed by others" (*Part. iii.2:663a5*). Elsewhere he says "Elephants fight fiercely with one another and stab one another with their tusks" (*Hist. ix.1:610a15*). But at the same time he sees one of the several uses of the trunk to be as a weapon "as does also the sting, when placed in connection with the tongue, as in some insects, answer more than one end" (*Part. ii. 661a25*, also *Part. ii.17:661a26*).

Included in the versatility of this organ of the elephant Aristotle notes its use in the animal's vocalizations. Writes he, "The elephant makes a vocal sound of a wind-like sort by the mouth alone, unaided by the trunk, just like the sound of a man panting or sighing; but if it employs the trunk as well, the sound produced is like that of a hoarse trumpeter" (*Hist. iv.9: 536b22*).

"Elephants have a large and varied repertoire of vocal behaviour, ranging from their well-known trumpets to the infrasonic calls which are too low in pitch for humans to normally hear", write Katherine B. Payne and William R. Langbauer Jr.⁽¹³⁾ but they can no more than presume that all these originate in the larynx. Others think the frightening sounds involve the trunk as well – that it is used by means of muscular movements to produce screams, squeals and

trumpetings, especially when the animal is infuriated, excited or making certain calls.

The elephant Aristotle has been dealing with in these studies is without doubt the Asian (*Elephas maximus*) trained and handled by Indian mahouts, which Pyrrhus, the king of Epirus afterwards led against Rome in 279 B.C., not the African forest elephant (*Loxodonta africana cyclotis*) which Hannibal was to lead against Rome nearly sixty years later. It is clear from a passage in the *De Caelo* (ii.14:298a) that he was aware of the existence of two species, but found no reason to differentiate them when making his observations, since he seems to have taken these to be true of both. It is doubtful whether he had himself seen an African, though there is little doubt he would have learnt, from those who had, the significant physical differences of that species from the Indian, which he seems to have known so well, indeed even dissected in his researches.

Notes

1. Peris, M. (1998) Abusing the Elephant: Pseudo-specification and Prognostication in Ancient Elephant Lore. *Gajah*, 20: 51-59.
2. Peris, M. (1992) Nila in Elephants. Physical Fact or Human Input. *Loris*, 9:199-203.
3. See the Loeb Class. Libr. Edition by A.L. Peck. With Peck's demise the work (vol. III, bks 7-10 of the *Hist. An.*) was completed in 1984 by Prof. D.M. Balme, under whom the author of this brief article was privileged to work for his Ph.D. – though by no means on elephants!
4. Farrington, B. (1965) *Aristotle: Founder of Scientific Philosophy*. London. p.48
5. "The female squats down and settles with her legs and the male mounts and covers her" (*Hist.* v.2:540a20).
6. The Indian *Gaja Sastra* gives the elephant 120 years (12 dasa of 10 years each). The life of the animal is nearer the three score and ten of man, dying through inability to digest its food when the last set of teeth in the molar succession that is a distinctive feature of elephants undergoes wear.
7. His tusks were about 3 metres in length, and the pair weighed about 300 pounds. A fibre-glass replica of the animal is mounted outside the National Museum in Nairobi.
8. William Ogle (*De Partibus Animalium* ed. J.A. Smith & W.D. Ross, Oxford (1911) n. *ad loc.*) writes "The elephant is much given to bathing; but Aristotle appears to have entertained an exaggerated idea of its aquatic habits, and to have misinterpreted its reasons for betaking itself to the water, imagining that it went there not merely to slake its thirst or for the luxury of a cool bath, but because it depended, of course in its wild state, on water-plants for its sustenance".
9. "From this curious passage", writes Ogle (n. *ad loc.*) "it would appear that the ancients were already acquainted with some form of diving apparatus corresponding to the submarine helmet and tubes in use at the present time".
10. From the Greek *pro:* in front, and *boskein:* to feed. Jeheskel Shoshani's translation "before the mouth" (*Elephants: Majestic Creatures of the Wild*. R.D. Press, NSW. Australia (1992). p. 74) is not quite right.
11. L. Calor & Maria Polombo in *Elephants: Majestic Creatures of the Wild*. p. 60.
12. *Ceylon* II. London (1860) p. 310 "In crossing deep rivers, although his rotundity and buoyancy enable him to swim with less immersion than other quadrupeds, he generally prefers to sink till no part of his huge body is visible except the tip of his trunk, through which he breathes, moving beneath the surface, and only now and then raising his head to look that he is keeping the proper direction". In the accompanying footnote 3 Tennant adds, "A tame elephant, when taken by his keeper to be bathed, and to have his skin washed and rubbed, lies down as his side, pressing his head to the bottom under water, with only the tip of his trunk protruded, to breathe".
13. *Elephants: Majestic Creatures of the Wild*. p. 120.

