

## CHAPTER IV

### Animal Science

*Yathottamā narā loke ganyante sṛṣṭikarmaṇi |*  
*Tathā mṛgā madhyamāste baiḥīnā buddhi samjūtāḥ ||*  
*Nānā kāryakṣamā nityaṃ naradevahitapradāḥ |*  
*Rāṣṭrānām kṣemajanakāḥ sarvasadguṇa samjūtāḥ ||*

Hamsadeva.

Human beings have co-existed with the beasts and birds since the beginning of human origin. During the period when human society turned from the hunting stage towards agricultural and pastoral life, the domestication of animals was also carried on. This could be feasible only when people became gradually conversant with the habits and habitats of animals. The time sequence of domestication of wild animals during that period was goat and sheep at the first step; Cattle and pigs at the second step followed by drought and transport animals like the horse ass and llama<sup>1</sup>.

The earliest concrete evidence of familiarity with the animals in India is furnished by the hematite drawings (Fig.1) made by the Neolithic people in India, on the rocky walls at the Vindhya Hills in Mirzapur district of Uttar Pradesh. That these Neolithic people of the country out of sheer necessity for existence must have acquired familiarity with the animals is self-evident. This familiarity and association with the progress of time steadily increased and again accumulated knowledge on animal life was developed into a systematic branch of study ultimately leading to the emergence of animal science in the remote past. Ancient Indians collected information about the living world but their contributions in this field have been overlooked by the modern authors in the books of history of biology. As for example, the

remarks of one modern historians of biology may be quoted: ‘The civilized peoples of Eastern Asia, the Hindus and Chinese, have likewise contributed very little of importance to the development of the science of biology. Hindu Science indeed, especially in the sphere of mathematics, reached a high standard ...’<sup>2</sup> This kind of remark perhaps is due to the lack of knowledge in Sanskrit and other regional Indian languages on the part of the scholars in the field.

The animal remains excavated from the Indus site fall under three categories: domestic, semi-domestic and wild-beasts. The commonest domestic animals were the humped bulls, buffalo, sheep, goat and pig. The elephant and bull were quite familiar (Figs.2,3). Perhaps they did not know the use of horses and remains of horses are not found in the earlier stratifications. The horse became much popular with the Aryan people. The animal remains excavated from the pre-historic sites give clear evidence of close association of the people with the animal world. The animal representations on pottery, seals, figurines and toy also give some idea about their extent of mental involvement with these living creatures. Domestication of animals and study on their particular behavioural characteristics remain at the root of the origin and development of animal science in its archaic stage. There is hardly any doubt that this knowledge bank is a product of social needs and continuous developmental process. The exact utility of the process of domestication of animals may be grasped from the view of S. Bokonyi where he depicts domestication as ‘the capture and taming by man of animals of a species with particular behavioural characteristics, removal from their natural living area and breeding community, and their maintenance under controlled breeding conditions for profit’<sup>3</sup>.

There are different views on the question of why men domesticated animals. In a logical analysis of all the proposed theories, it may be stated that the factor of economic benefit can not be overlooked. To make it more clear we may quote Sahu, Given the prehistoric hunter’s knowledge of the ecology, the introduction of domestication must have been related to its adaptive advantage when domestication

produced greater yields than did hunting, it would have been economically more efficient to pursue that course<sup>4</sup>.

Large number of seals with engravings of animals have been unearthed from Harappa and Mohenjodaro. Some of the animals depicted appear to be mythical having fabulous external morphology, but others are vividly reproduced. Among the animals, the most popular animals regularly reproduced on seals are various types of bulls. The next popular one on the seal is elephant figure.

Quite interesting is the non-representation of cows on the seals. But the regular presence of bulls on the seals proves beyond doubt the abundance of cows as a natural phenomenon. Why the cows are absent on the seals is an interesting question to be investigated to get at the inner most nature of the culture.

The accuracy and perfection of the artists of the Harappan Culture in depicting figures of animals stir our imagination and it clearly indicates that the artists had a deep interest on and close acquaintance with the animals. Such perfection can be reached only by clear and close observation.

The animal bone remains studied by Sahu strengthens the proposition regarding the association of the Harappan people with kinds of animals. Animal bone remains were more ubiquitous at Harappa than at Mohenjodaro. Further, the numerous sling balls of clay, the copper fishhooks, the arrowheads, the flaying knives constitute sufficient proof of the degree and extent to which the Harappans depended for their food on birds, beasts and aquatic fauna<sup>5</sup>. The present climatic conditions in the Punjab and Sind are hardly suitable for the type of fauna that this tract supported in prehistoric times.

The engraved figures of wild animals like elephant, tiger and rhinoceros (Figs.4,5) bear eloquent testimony to the abundance of these animals in pre-historic times. This further provides evidence in favour of the existence of thick forested area in that region. The huge amount of bricks used in Harappan sites also indicate the presence of wood tracts

which also might have been the shelter of wild beasts including tiger, elephant, rhinoceros or the buffalo.

One of the most celebrated finds from Mohenjodaro is a seal bearing the image of a horned three-faced male deity, seated in a yogic position and surrounded by the animals like elephant, tiger, buffalo, rhinoceros and deer. This is evidently a prototype of the great god *Śiva*, the lord of the beasts (*Śiva Paśupati*) (Fig.6).

### Advent of the Aryans

With the advent of the Aryans and the development of the vedic literature, prehistory passes into history in India. The *R̥gveda* is replete with referenes to beasts and birds. That the Indians knew the use of horse, cattle and elephant in hoary antiquity is attested by the *R̥gveda*.

But animal world to the vedic people, was not a separate entity, but a part of the great cosmic system embracing the whole world<sup>6</sup>. Biological phenomena, it is true, are not separately treated in the vedic literature but information on the aspect are diffused throughout the whole literature. A few extracts may be cited from the *R̥gveda* on the references of horses, cattle or elephants<sup>7</sup>.

### On Horse

- (i) They who for *Indra*, with their mind formed horses harnessed by a word,

Attained by works to sacrifice (*RV.*, I. 20.2.,p.11).

- ii) Best strength-givers, ye stretch wide jaws,

O Sacrificial Implements,

Like two bay horses champng herbs (*RV.*, I. 28.7., p. 17).

Both the horse and kine have been mentioned in the following verses:

- (iii) Thou, Indu, as a vigorous horse, hast neighd together steeds and kine:Unbar for us the doors to wealth (*RV.*, IX.64.3., p.492-493).

- (iv) Out of desire of cows and steeds and horses potent soma-drops,  
Brilliant and swift, have been effused (*RV.*,IX.64.4.,p.493).
- (v) Like a dark steed adorned with pearl, the Fathers have decorated  
heaven with constellations. They set the light in day, in night the  
darkness. *Bṛhaspati* cleft the rock and found the cattle (*RV.*, X. 68.  
II., p.582).
- (vi) Mighty, with wondrous power and marvellously bright, self-strong  
like mountains, ye glide swiftly on your way,  
Like the wild elephants ye eat the forests up when ye assume your  
strength among the bright and red flames (*RV.*, I. 64.7., p. 43).
- (vii) Exceeding wise they roar like lions mightily, they, all possessing,  
are beauteous as antelopes; stirring the darkness with lances and  
spotted deer, combined as priests, with serpents' fury through there  
might (*RV.*,I. 64. 8.,p. 43).

The watchful eyes of birds have been used as simili in the following  
verse of the *R̥gveda*:

- (viii) Like birds who keep their watch, plashing in water,  
Like the loud voices of the thundering rain cloud, Like merry  
streamlets bursting from the mountain, thus to *Bṛhaspati* our hymns  
have sounded (*RV.*, X.68.1.,p. 581).
- That the *R̥gvedic* people attached great importance to cattle as the  
most essential component of agricultural infra-structure is reflected  
in many verses of the text. A *R̥gvedic* hymn says:
- (ix) We through the Master of the Field, even as through a friend, obtain  
what nourisheth our kine and steeds. In such may he be good to us  
(*RV.*, IV.57.1.,p. 235).
- (x) As the cow yieldeth milk, pour for us freely, Lord of the Field, the  
wave that beareth sweetness.  
Distilling meath, well-purified butter, and let the Lords of holy law  
be gracious (*RV.*, IV.57.2., p.235).

Thus we get many verses from which we may form an idea about the level of knowledge of the *R̥gvedic* people regarding the behaviour, strength and appearance of different animals both tamed and untamed. It is clear from the *R̥gveda* that cow was highly venerated and regarded as symbol of fortune.

It is said —

- (xi) The kine have come and brought good fortune: let them rest in the cow pen and be happy near us. Here let them stay prolific, many coloured, and yield through many morns their milk for *Indra* (*RV.*, VI.28.1., p.302).

Longing for abundance of cattle was a natural desire of the people. But simultaneously in the chapter VI of the *R̥gveda*, we have very curious information regarding the health and hygiene of the kine and people's concern for it. In this verse it is clearly expressed that cattle should drink pollution free water. The exact lines are quoted below:

- (xii) Crop goodly pasturage and be prolific:

drink pure sweet water at good drinking places (*RV.*, VI. 28.7., p.302).

This verse in particular, is very significant from the scientific point of view. Full nutrition and pure water, both are the pre-condition of good health for every living being. In the case of cattle, good pastures and sources of pure water may help the creature to grow with strength and vigour which in turn make them prolific and abundant.

Hence glimpse of proto-scientific knowledge of the *R̥gvedic* people is discernible in the concerned verse.

There are hymns in the *Atharvaveda* praising the kine<sup>8</sup>:

The kine have come and have done what is excellent; let them stay (sad) in the stall (*goṣṭha*); let them take pleasure with us; may they be rich in progeny here, many formed, milking for Indra many dawns (*AV.*, Vol.I.IV.21. 1., p.186).

The excellent service extended by the cows to the human being is again substantiated in this verse of the *Atharvaveda*.

That the awareness of the Vedic people about the utility of good drinking water and good pasture for the cattle was taking a concrete shape throughout the period is amply borne out by a verse of the *Atharvaveda*. The verse in fact repeats the same urge as that in the *R̥gveda* (VI. 28.7) as is already mentioned. The verse runs thus: Rich in progeny, shining in good pasture, drinking clear waters at a good-watering place — let — not the thief master you, nor the evil plotter; let *Rudra*'s weapon avoid you. (A V. IV. 21.7.p.187).

Thus the verses taken together throw considerable light on some scientific aspects of animal life. Biological information, though not presented in a scientific method, but may be sifted from the vast mass of literature which may help us to trace the origin of animal science in India at the dawn of history.

Animal remains especially the bones, unearthed from different sites, terracotta figurines of the Harapan Culture and the literature of the Vedic people bring out that the Indian people had long association with the animals and domestication was done to realize the economic benefit from the animals. Cow, buffalo, goat, and sheep practically were reared as dairy animals and the main food stuff constituted of meat as well as milk. The development of dairy culture in ancient India is nothing but a historical truth. The practice of keeping a number of animals under a single shade (which is very much a practice even today) often might bring disaster in the events of infectious diseases.

Such events, even if not been mentioned or documented, must have occurred repeatedly as it is a truism. A rational analysis then urges upon to think that animal science had its origin in the process of domestication of animals. Hypothetically it may be stated that some preventive and remedial measures against health hazards of the animals were evolved on the basis of observational data.

The *Samhitās*, the *Brāhmaṇas*, the *Āraṇyakas* and *Upaniṣads* contain several names of animals. In the *Brāhmaṇas* we find two broad classes of animals, viz. *grāmya* (rural) and *āraṇya* (wild) probably meaning domesticated and untamed<sup>9</sup>.

A list of over 260 animal names has been compiled by Macdonell and Keith<sup>10</sup>. Rao has also dealt with Vedic animals<sup>11</sup>.

The cow continues to enjoy reverence of the people due to its all round utility to the mankind (Fig. 7). Horse also has been accorded an exalted position. Various species of the deer have been mentioned in the *Brāhmaṇas*. Among other animals may be mentioned the names of goat, mule, camel, porcupine, wolf, elephant, lion, wild cow, cat, wild dog and tiger. Besides these, small creatures like the tortoise, the frog, the mouse, earth-worm and various types of serpents are mentioned in the *Brāhmaṇas*. That considerable zoological knowledge was possessed by the people of ancient India is attested by *Pāṇini*. He refers to the determination of the age of an animal by the number of its teeth, the growth of horns and hump<sup>12</sup>. The two great medical works, the *Caraka Saṃhitā* and *Śūsruta Saṃhitā* give an almost complete list of animals of various groups known till then as also some details about anatomy, zoological classification, ecology and dietary value of animals and physiology of man.

*Caraka* mentions four primary divisions:<sup>13</sup>

1. *Jarāyuja*
2. *Andaja*
3. *Svedaja*
4. *Udvijja*

*Praśasta pāda* begins with two divisions: (1) *Ayonija* (2) *Yonija*

*Suśruta* mentions four great divisions<sup>14</sup>. ‘*Sansvedaja, Jarāyuja, Andaja* and *Udvijja*. *Suśruta* mentions man, *Vyāla* (carnivorous quadrupeds) and *Paśu* (herbivorous quadrupeds) as examples of the viviparous; birds, snakes, and *sarīsrīpas* as examples of the oviparous; *Krimis, kīṭas* and *pipīlikās* as examples of the moisture-born; frogs and the *Coccidae* (the *Coccinella*) as examples of the animals that burst forth’ (eruptive or metamorphic)<sup>15</sup>.

The asexually generated animals, are called *Kṣudrajantus*. *Patañjali* in the *Mahābhāṣya* gives several alternative definitions or

descriptions) of this class of animals. They are defined (1) as animals without bones or (2) as animals that do not possess any blood of their own; or (3) as numbering more than thousand in a palmful, i.e. minute in size; or (4) as not easily crushed; or (5) as comprehending all animals up to the ichneumon (in the animals series).

Panchanan Ghosal gets hints of evolution of life in the texts of ancient India. He quotes from *Patañjali*:

*Dravyaṃ karma kālaśca svabhābo jīva eva ca |*

*Yadānugrahataḥ santi na santi yadupekṣayā ||*

According to him, Hindus had belief in the changing nature of the living beings due to changes in the environment, a central concept of organic evolution. He quotes a series of verses from the *Viṣṇupurāṇa*, *Mārkaṇḍeyapurāṇa*, *Pātañjala*, *Garuḍapurāṇa*, *Nibandhadhṛtabṛhad-  
viṣṇu-purāṇa* and *Karmavipāka* and other ancient texts to construct an idea on the attainment of the Hindus (or ancient Indians) in scientific pursuits<sup>16</sup>.

The *Dharmasūtras* mention a number of beasts, birds, aquatic creatures, etc. The beasts, mentioned in them, admit of four broad division, viz. (1) *Ekaśapha*, having one hoof, (2) *Dvikhurī*, having two hoofs, (3) *Pañcanakha*, having five nails, (4) *Ubhayatodat*, having two rows of teeth, one each in the upper and lower jaws.

From the foregoing account of the fauna we find that the ancient Indians possessed considerable knowledge about biology, zoology, ichthyology and ornithology.

A more thorough classification of animals is found in the ancient Jaina work, the *Tattvārthādhigama* of *Umāsvatī*, which, the Jaina chronological lists enable us to assign to the first half of the first century A.D. *Umāsvatī*'s classification according to B.N. Seal, is a good instance of classification by series, the number of senses possessed by the animal being taken to determine its place in the series. Most probably, only senses were counted as determinant of life habits by *Umāsvatī*. Ghosal thinks that the repeated use of some terms in different texts to indicate

particular species or group of animals gives a clue to the existence of texts on ancient animal science.

For reference, he cites two terms *ekatodata* and *ubhayatodata*, both the words are used in the *R̥gveda*, the *Bhāgavata* and *Manusamhitā*. These three texts are distanced from each other by time gaps. But the repetitive use of the same terminologies, according to Ghosal is highly indicative of the existence of a distinct science in the past on animal life.

Both Seal and Ghosal refer to the description of *Dālvan*. *Dālvan* flourished during the first/second century A.D.<sup>17</sup> *Dālvan*'s descriptions of deer and birds are brief, dealing with coloration, habits, of life, etc. e.g. the descriptions of the *Ruru* (a kind of spotted or black antelope), the *kāraṇḍava* (a sort of duck) and the *kañka* (a heron) are quoted from some (unnamed) hand books:

*Kūlecaramāha ... ruruḥ śaradi śṛṅgatyāgī |*  
*Tallakṣaṇam uccate-vikaṭabahubiṣāṇaḥ śambarākāradehaḥ,*  
*solilataṭacaritvāt, sañcarebhyo vicitraḥ |*  
*Tyajati śaradi śṛṅgam rauti — ityasau ruruḥ syat |*  
*Kāraṇḍavaḥ śuklahamsabhedoalpaḥ anye karaharamāhuḥ |*  
*Uktañca-kāraṇḍavaḥ kākabaktro*  
*dīrghā ṅghriḥ-kṛṣṇavarṇabhāk iti |*  
*Prasahānāha- kañkaḥ dīrgha cañcurmmahāprāṇaḥ |*  
*Uktañca-kañkaḥ syāt kañkamallākyo bāṇapatrartha pakṣakaḥ |*  
*Lohapṛṣṭho dīrghapādaḥ pakṣādhaḥ pāṇḍuvarṇabhāk ||*

*Iti* (quoted by Ghosal and Seal).

The source from which *Dālvana* derives detailed information about these varied forms of animal life are not available, but these extracts leave no doubt about the development of animal-study and abundantly testify to the minute Nature Study of the Hindus. The value of accurate identification of animals was not unknown to the ancient Indian people. The nomenclature adopted by them, and their classification of the animals are adequate testimony to the efforts in this direction.

## **Birth of Imperialism and its Effect on the Study of Animals and their Habitats**

With the birth of imperial kingdoms a significant change may be viewed in the attitude of the ruling authority. Uptil that time there was absolutely no state control over the forests and any person could utilize forest products like plant, trees, animals according to their needs. But a change came with the birth of imperialism in Northern India. King *Bimbisāra* ascended the throne of Magadha in or about B.C. 543 and it may be stated that with his accession, imperialism had its birth. From that time onwards, the rulers in Northern India became mindful of the forest products which they considered to be the sources of revenue<sup>18</sup>.

As it appears, the measures adopted by the rulers in Northern India, up to about B.C. 321, were mostly for the purpose of defending their respective kingdoms against foreign aggression and to some extent also for filling up the royal treasury. But with the establishment of the Mauryan dynasty, a new chapter began in the Indian history, the impact of which is discernible in all spheres of life. The study of plant and animal science could not remain isolated from the all pervading influence of a strong monarchy like that of the Mauryas.

The association of animals with the tribal and primitive polity is amply borne out by the practice of rituals like cow-raid or chariot race. The ceremony of cow raid primarily must have meant the ability to capture cows from the enemies of which we have many instances in the Vedic period, the very term *gaviṣṭi* having the secondary meaning of war.

The chariot race, the product of a developed social stage, seems to have been a late version of an older method to test the competitor's superiority in valour and physical power; it was intended to detect the military qualities of the candidate for the post of the king or the chief of the tribe<sup>19</sup>.

An inference may be drawn on the basis of these information that the animals accompanied man in every stage of their development. Their

utility was fully realized by the state authority consequently. Thus scattered knowledge on different subjects began to be codified and an organized knowledge data base came to be accumulated. The state authority began to show more concern for promoting the cause of elephant, horse, and cattle and other animals. *Kauṭilya's Arthaśāstra* is a production of this social and political milieu.

Man's keen interest for sustainable live stock development has been profusely illustrated in *Kauṭilya's Arthaśāstra*. *Arthaśāstra* contains an elaborate analysis regarding various aspects of livestock with prescriptions for their better management. *Kauṭilya* was also highly conscious of the benefits man derives from different species of animals. Since *Kauṭilya* considers animals as wealth, it is only logical that he would be concerned about the upkeep and welfare of the same. *Kauṭilya* gives instructions for each domestic animal separately and it may be inferred that with better knowledge about the animals, man can take proper care for their health and hygiene and make arrangement for treatment of ailments and diseases.

**Cattle:** *Kauṭilya* has defined the functions and responsibilities of the superintendent of cows<sup>21</sup>. He says: The superintendent of cattle should know about (cattle) look after in return for a wage, tended with a tax and a fixed return, become useless and cast off, entered (in the state herds) by payment of a share, the total number of (cattle in) herds, (cattle) that are lost or have perished, and the total produce of milk and ghee (*K.A.*, II.29.1.p.165).

There should not be more than one hundred animals under charge of each herdsman. Each animal of the state stable must be distinguished by some marks. The *Go-adhyakṣa* should maintain a register where the branded marks, natural identification marks, colour, the distance of one horn from the other of each animal should be recorded meticulously<sup>20</sup>.

The Superintendent of Cattle must ensure that the cows and other cattle are regularly taken to graze in forests, which are severally allotted as pasture grounds for different seasons. The grazing areas should be cleared of thieves, tigers and other predatory beasts. Cowherds should

play an important role in the maintenance of cattle. Herdsmen are to treat the animals during the period of their illness and also take special care of calves and aged animals.

*Kauṭilya* prescribes various quantities of food for different types of cattle: 'For bullocks, with nose-string and capable of driving at the speed of a gentle horse, (the ration shall consist of) half a *bhāra* of green fodder, grass double that, a *tulā* of oil-cake from the press, (or) ten *ādhakas* of broken grains and bran, five *palas* of rock-salt, one *kuḍuba* of oil for the nose (and ) one *prastha* as drink, a *tulā* of meat and an *ādhaka* of curds, a *droṇa* of barley or of half cooked *māṣa*- beans; a *droṇa* of milk or half an *ādhaka* of liquor, a *prastha* of fat, ten *palas* of sugar and a *pala* of ginger (as) a strength-giving drink. (*K.A.*, II.29.43..169). One quarter less (is the ration) for mules, cows and donkeys, double for buffaloes and camels (*K.A.*,II.29.44.p.169). For bullocks used for work and for milch-cows suckling their calves, the giving of rations (shall be) according to the time of work and the yield (of milk respectively) (*K.A.*,II.29.45.p. 169)'.

*Kauṭilya* states that a cow or a buffalo may be milched twice a day during the rain, autumn and the post-autumn, but during the winter, spring and summer it should be milched only once. If anyone milks an animal a second time during the latter seasons, the thumb of the offender shall be cut off. The milching rule as prescribed in the text befits the high moisture content and nutrients in vegetation during the rainy, autumn and post-autumn seasons and a converse during the winter and drought seasons. This rule is undoubtedly based on scientific rationale for maintenance of good health of the cattle.

*Kauṭilya* continues, a herd of one hundred donkeys and horses should have five stallions: a heard of one hundred goats and sheep should contain ten males and a herd of hundred cows should have four bulls. The same principle is equally applicable to the herds of buffaloes and camels (*K.A.*, II.29.49.p. 170).

Depending on the oestrous frequency of each category of animals, the number of males recommended for a herd of hundred animals

appears to be adequate for successful insemination and for getting viable progeny.

The nutritional and therapeutic values of milk are described even in the earliest Vedic literature.

The *Suśruta Saṃhitā* gives a detailed account of similar values of milk of other animals and the products obtained from them. This and other passages scattered in *Āyurvedic* works refer to examination and care of milch cows. A treatise dealing exclusively with medical knowledge concerning bovine animals i.e. *Gavāyurveda* attributed to *Gotama* must have been current up to the middle ages, as quotations from it are found in the *Rājamārtanḍa*, but no authentic version is known at present<sup>22</sup>.

In the *Mahābhārata*, *Virāṭa Parva* (Chapter III), *Sahadeva*, the fifth *Pāṇḍava*, has described himself as wellversed in the science of management and treatment of cows. According to the famous indologist P.V. Vartak, the two *Pāṇḍavas*, *Nakula* and *Sahadeva* practised veterinary medicine. The information on ancient veterinary medicine and the treatment of disease are available largely in Sanskrit. Some information is also found in local vernacular languages of the Indian states, which indicate the incessant and relentless effort of the people from every part of the sub-continent for development of veterinary medicine. During the reign of Emperor, *Aśoka*, many well-equipped veterinary hospitals were built. Full care and protection was to be provided to the animals and in this regard the positive role of the state authority is declared in no uncertain terms. It is stated in the second major Rock Edict<sup>23</sup>:

Everywhere in the empire of the Beloved of the Gods, the King *Piyadassi* and even in the lands on its frontiers, those of the *Colas*, *Pāṇḍyas*, *Satyāputras*, *Keralaputras*, and as far as *Ceylon*, and of the Greek King named *Antiochus* and of those kings who are neighbours of that *Antiochus*, everywhere the two medical services of the Beloved of the Gods, the King *Piyadassi*, have been provided. These consist of the medical care of man and the care of animals. Medicinal herbs whether

useful to man or to beast, have been brought and planted wherever they did not grow; similarly, roots and fruits have been brought and planted wherever they did not grow. Along the roads, wells have been dug and trees planted for the use of men and beasts.

The edict makes it evident that many medical centres, for the animals were established at length side by side with the hospitals for men. Thus there is hardly any contradiction regarding the long heritage of studies on animals and plants in ancient India.

In the *Agnipurāna* there is a series of verses praising the greatness of cows and prescribing remedies against cattle disease<sup>24</sup>.

It is said —

A king should protect cows and *brahmins*. Cows are sacred and auspicious. The world is sustained by them. Such reverence for cows was generated from the high utility of the beast from the practical point of view.

*Dhanvantari*, the mythical physician describes the treatment of the diseases of the cows:

‘Oil mixed with rock salt and decoction of *śrīṅgavera*, *balā* and *māmsa*, together with honey should be used for the diseases affecting the horns of cows’ (*Agni.*, 292.23.p.800).

‘Oil prepared with *mañjiṣṭhā*, *asafoetida* and rock salt or garlic alone should be used in all kinds of pain in the ears’. (*Agni.*, p. 24).

‘Besmearing a paste of the roots of *bilva*, *apāmārga*, *dhātaki*, *pātākā* and *kuṭaja* at the base of the teeth would remove the pain therein’ (*Agni.*, p. 25).

‘.... Ghee heated with the ingredients used for removing toothache is known to remove the disease of mouth. Rock salt, (is used) for the disease of tongue’ (*Agni.*, p. 26).

‘*Śrīṅgavera*, the two varieties of turmeric and the three kinds of myrobalans (are useful to remedy) the stiffness of neck. The three myrobalans mixed with the ghee given as a drink to cows is commended

in heartache, stomachache, rheumatic complaints and pulmonary diseases. The two varieties of turmeric and *pāthā* may be given for dysentery'. (*Agni.*, pp. 27-28).

*Śrīgavera* and *bhārgi* may be given for the diseases of the digestive organs and the pulmonary capillaries, cough and asthma. (*Agni.*, p. 29).

'*Priyaṅgu* together with salt should be given for joining the broken (bones). Oil that removes wind, when heated with *madhuyaṣṭi* (would cure) biliousness'. (*Agni.*, p. 30).

'Mustard mixed with honey (would be the remedy) for (derranged) phlegm. (For the diseases) of the flesh, the same with the dust of *puṣṭaka* (Would be the remedy). One should apply oil, clarified butter and *haritāla* on wounds from which blood oozes out.' (*Ibid.* p. 31). 'Blackgram, sesamum, wheat, cow's milk and ghee made into a ball with salt gives nourishment to the calves. It would give strength to the young bulls. Fumigation would destroy the affliction due to evil planets. Fumigation with *devdāru*, *vacā*, *māṃsi*, *guggulu*, *asafoetida* and mustard is beneficial for cows against pain due to evil planets. After fumigation a bell should be tied to cows'. (*Agni.*, p. 32-34, p. 801).

'If a cow is fed with *aśvagandhā* and sesamum it would increase its strength and make it yield profuse milk. For a bull that is maintained in the house, oil cake (would be) the elixir'. (*Agni.*, p. 35).

From the prescribed medicines mentioned above for treatment of cattle diseases and health care, it comes to be clear that the *Āyurveda* meant for the cattle falls within the limits of *Tridoṣa* theory. *vāyu*, *pitta* and *kapha* are supposed to be present in all living creatures, diffused simultaneously in every minute portion of the organism to activate and govern the entire biological process between conception and death. Hence, diseases can be cured by administering *bheṣajas* which bear the potentiality of restitution, restoration or pacification in case of any irregularity.

Cattle were important resources for food and farm power. Verses 84-111 in the *Kṛṣi-Parāśara* emphasize that management of cattle must be done well. Cattle sanitation, health and nutrition are stressed in verses 84-98<sup>25</sup>.

Some of the verses are as follows: Carry on cultivation in such a manner as does not inflict pain on the draught animals. Grains obtained through the suffering of draught animals, are condemned in all the rites' (*Kr.Pa.,V.84*) 'Corns, obtained through oppression of draught animals, though grown fourfold, are quickly destroyed by their sighs' (*Kr.Pa.,V.85*).

By molasses fodder, smoke and other nourishments and also by grazing in the morning and evening draught animals never suffer' (*Kr.Pa.,V. 86*).

'The draught animals of one, whose cowshed is very strongly built, pure and free from cowdung, grow up even without nourishments' (*Kr.Pa.,V.87*).

'Where the bullocks are allowed to move out of the cowshed daily, smeared with cowdung and urine, nourishment can serve no purpose.' (*Kr.Pa.,V. 88*).

'A cow shed measuring five steps, is known to be conducive to the growth of cows. Made in *simhageha*, it surely causes destruction of cows. (The period of sun's stay in Leo i.e. July-August should be avoided)' (*Kr.Pa.,V.89*).

'Cows cry at the sight of that place, bereft of the Goddess of wealth, where a light is not put in the cowshed in the evening' (*Kr.Pa.,V. 95*).

'A plough is said to have eight bulls, six for ordinary use, four for the cruel and two for the cow killers' (*Kr.Pa.,V. 96*).

The verses stated above are important in the sense that good farm management is essentially related to the maintenance of healthy and strong draught animals like cows and bulls. But at the same time

*Parāśara*'s direction is that farm should be tilled causing no hardship to the bulls. Excessive exploitation of the animals is condemned in the text. Cleanliness and good condition of the cowshed have been considered as essential for wellbeing of the cattle and sometimes counted even more, than special nutrition. A cowpen where a lamp is not lighted in the evening is without the blessings *Laxmi*. The connotation is that cow-shed should not be left without lamp after the sun-set. This is natural that a cow may feel comfortable in lighted shed as the animal feels unsafe in darkness.

Verse 90, 91, 93, 94, etc. contain some superstitious beliefs.

Like *Kṛṣi-Parāśara*, *Gocaritra*' a script written in 1852 and considered to be of similar period as of *Kṛṣi-Parāśara* describes the importance of cattle, their selection and treatment<sup>26</sup>. It has been suggested to select a white cow having a large body, simple small horns, circular hooves, broad mouth and long tail, because such a cow will yield two times more milk. Preference was also given to such cows of various other colours such as grey, almond and red with patches on face, smooth skin, fine hair coat, large body, large abdomen and long neck and tail for selection.

Thus on the basis of observation and experience, people gathered adequate knowledge on different aspects of cattle science especially on health and hygiene. Though in the light of modern advances made in the field of veterinary science, the techniques adopted for the diagnosis of the diseases of an ailing animal and its treatment in the older days may appear to be crude, yet these are scientific and result oriented<sup>27</sup>.

The *Cālukya* kings encourages literary and academic compositions by poets and scholars in various field. While there is *Mānasollāsa*, the encyclopaedic treatise of the western *Cālukya* King *Someśvaradeva* in Sanskrit, there is also text like *Lokopakāra* by *Cāvundarāya* written in *Kannāḍa* (as already mentioned in earlier chapter), a regional language.

Chapter IX of *Lokopakāra* has documented in old *Kannāḍa*, knowledge pertaining to animals and animal diseases which were much

prevalent in the north Karnataka region in the beginning of the 11<sup>th</sup> century. Chapter X deals with the treatment on snakebite and Chapter XI deals with characteristics of animals. Out of 58 verses in Chapter IX, almost 30 verses have been spent for discussion on diseases and treatment of cattle.

The first 6 verses describe different remedial measures for treating barrenness of cow, easy release of the chorion of cow, buffalo, horse, goat and other domestic animals and also to rectify some behavioural irregularities of a mother-cow during the post-natal stage. Besides, treatment is prescribed for unnatural complications during the period of pregnancy. A verse may be cited here for our full understanding: If the calf appears to come out of the uterus of the cow well before the completion of the pregnancy period, it should be washed with sour gruel and later smeared with the juice of black night shade fruits or of prickly chaff flower plant root and should be pushed in with the fist. This will enable the calf to return to its proper place in the uterus of the cow<sup>28</sup>.

Verses 10 and 11 deal with the diseases in the mouth of cow and their treatments. Cough and its treatment have been discussed in V.12. Besides, a number of ailments like *albugo* (eye infliction), swellings, swollen belly, stomach pain, fever, nervous disorders, twisting diseases, kogile disease, waning disease, boils of gum and hoof, boils on the nerves, veins etc., worms in the horns, swelling of shoulders and their medicinal remedies have been discussed in the *Lokopakāra* so that the rural agrarian people may benefit from the instructions.

An excellent piece of sculpture depicted on a rock wall of Mahabalipuram bears an eloquent testimony to the practice of animal husbandry in the past. The cow is licking the calf with natural affection while being milched by a man. A single sculpture reveals at a moment the whole behaviour of the animals and cow-calf relationship and economic viability of cattle as well (Fig.7).

The *Mrigapakshi Shastra* by *Haṃsadeva* (C.13<sup>th</sup> century) contains information on cattle<sup>29</sup>. Different varieties of buffalos, bull, cow, sheep, goat have been described along with their behaviour (*MPS.*, V.502-655a).

*Harṁsadeva* has given age limit of all animals and birds, which information carry much importance from the zoological point of view. This book is regarded as an asset to zoological studies in ancient time.

**Horse:** That the Indians knew the use of horse in hoary antiquity is attested by the *R̥gveda*. 'Both at Harappa and Mohenjodaro the horse bones appeared in the upper levels and hence can not be assigned to the mature Indus phase'<sup>30</sup>. There are also occasional representations of the horse in terracotta art, still the exact situation may be delineated by quoting Sahu, 'piecing together the available evidence it can be inferred that the animal was known to people at least by the early 2<sup>nd</sup> millennium B.C. if not earlier. Nevertheless, the material remains do not indicate any significant use of the horse'<sup>31</sup>.

Obviously, the study on the horse is to be started from the days of the *R̥gveda* on the basis of information therein. A few verses may be quoted to evince the use of horse in the period. Mighty horse was used for many purposes by the *R̥gvedic* Aryans. It is said in the *R̥gveda* regarding the horse: 'Best strength-givers, ye stretch wide jaws, O Sacrificial Implements, Like two bay horses champng herbs'<sup>32</sup>. Vigorous horse along with kine has been regarded as source of prosperity.

In one verse it is explicitly expressed: 'Thou, Indu, as a vigorous horse, hast neighed together steeds and kine: Unbar for us the doors to wealth'<sup>33</sup>. A beautiful comparison has been made between a dark horse decorated with pearls and the sky studded with bright constellations. Like a dark steed adorned with pearl, The Fathers have decorated heaven with constellations. They set the light in day, in night the darkness. *Br̥haspati* cleft the rock and found the cattle'<sup>34</sup>.

The *Aśvamedha* sacrifice was a great event in the political life of India. The horse was used for many purposes, e.g. drawing the plough, carts and chariots, carrying mails and soldiers in battles. It was also used as a mount in hunting. Cavalry formed an important part of the military set-up. Caparisoned horses added to the grandeur of processions. The king when remained engaged in hunting in open grounds, some women

guards used to take position on chariots, some on horses and some even on elephants.<sup>35</sup>

Megasthenes gives the impression that ‘no private person permitted to keep a horse or elephant. The possession of either is a royal privilege, and there are men to take care of them’. The comment of Megasthenes is in sharp contradiction with that of Nearchus. But Trautmann finds out the reason of this apparent contradiction. He says that ‘Nearchus’ description is confined to the region which bore the brunt of Alexander’s invasion. But Megasthenes on the other hand describes the situation he found two or more decades later in the Mauryan Empire, probably at *Pāṭaliputra* in which he resided. The private ownership of elephants and also of horses, camels and asses, may be seen, prevailed then in that north-western sector of the Indian subcontinent which *Candragupta* Maurya was shortly to absorb within his empire. It is this empire which Megasthenes depicts for us, and its monopoly of the sinews of war, that must have been a factor of the first importance in achieving its success against the more loosely ordered states of the north-west<sup>36</sup>. So the studies on Horse and Elephant as both the animals constituted the limbs of ‘*Caturaṅga*’ army came to acquire much importance in running the state craft and the polity. In the *Arthaśāstra*, we find that the Superintendent of Horses is a notable dignitary in the royal service. *Kauṭilya* instructs a king to appoint a person, thoroughly conversant with the equestrian science as the *Aśvādhyakṣa*. *Kauṭilya* states that the *Aśvādhyakṣa* should maintain a register of horses containing the data about the breed, age, colour, marks, class and the place of collection. It is his duty to report on crippled or diseased horse<sup>37</sup> (*K.A.*, 2.30.2.p.170). *Kauṭilya* gives some guiding principles about the construction of a stable (*K.A.*, 2.30.4-7, p. 170). The stable should be spacious. The width of the stable should be double the length of a horse. It must have four doors on four sides and a rolling ground in the centre with an entrance-hall, provided with sitting arrangement. There should be number of monkeys, peacocks, spotted deer, ichneumons, *cakoras*, parrots and *śārikās*. *Kauṭilya* has not given any reason for keeping these animals and birds. But Sensarma explains

that the mongoose and peacock can save the horses from snakes, the birds can weed out the worms from the body including ears of the horses; and the monkey can make noise at the sight of strangers, even they can drive them away. Thus it may be held that *Kauṭilya* wants these animals and birds as natural guards and scavengers of the horses: But he is not sure of the role of the spotted deer<sup>38</sup>.

*Kauṭilya* further suggests that the stable should be constructed in such a way that each horse can be kept there facing either the east or the north. The floor should be built of smooth planks with a trough for fodder of each horse and also passages for removal of urine and dung. He continues that there should be separate chambers for *vaḍāva* (pregnant horse) *vṛṣa* i.e. stallions and *kiśora* i.e. foals (*K.A.*, 11.30.5,6,7). All these instructions practically are involved with the question of hygiene of the horses and clean and pollution free environment within the stable.

*Kauṭilya* states that quantity and quality of food for horses should be compatible with the age, type and work-load of the animal. The normal diet of the best type of horse should consist of two *droṇas* of half dried or half boiled *śāli* rice, *vṛīhi* rice, barley, *priyaṅgu* or same quantity of *mudga* or *māṣa* and a *prasthā* of fat, five *palas* of salt fifty *palas* of flesh, one *ādhaka* of *rasa* or two *āḍakas* of curd, five *palas* of *kṣāra*, one *prastha* of *surā* (alcohol) or two *prasthas* of milk (*K.A.*, II.30.18). The same quantity of drink shall be specially given to those horses which are tired of long journey or of carrying loads and one additional *prastha* of fat should be given. They should also be served with one *Kuḍuva* (of fat) for inhaling through nose, half a *bhāra* of green fodder, and twice as much of ordinary grass and hay stalk or grass shall be spread over an area of six *arantis* (*K.A.*, II.30.19) this is probably to form a bedding for the horse.

The horses of medium grade should be served with the same ration as that of the best horses but less by one quarter. Similarly horses of lower size shall receive the same quantity as a horse of medium size. Steeds and *pāraśamas* shall have one quarter less of rations.

*Kauṭilya* also discusses on the food to be served to a horse at post-natal period as also to the new born colt (*K.A.*,11.30.8,9). The horses which are incapacitated due to injury in battle, disease or old age should be given only that quantity of ration which fill their stomachs. The horses which are unfit for war (inspite of having good health) may be utilized for the purpose of crossing the mares in the interest of the country people and they may be given ration of mares (*K.A.*, 11.30,27,2).

The horses should be bathed twice a day and bedaubed with sandal powder.

Veterinary surgeons should look after the horses and should make change in the diet if and when it is needed. Any mistake or carelessness in the treatment of diseases of horses are considered as punishable offence.

It appears that, according to *Kauṭilya*, the able teachers should train the horses because regular training of a horse is nothing but preparation for war. Different types of movements, jumping and galloping are to be practised by the horse.

*Kauṭilya* makes a qualitative classification of horses:

Breed	Quality
<i>Kamboja</i>	Best
<i>Sindhu</i>	
<i>Aratta</i>	
<i>Vanāyu</i>	
<i>Bāhlika</i>	Middle
<i>Pāpeya</i>	
<i>Sauvira</i>	
<i>Taitala</i>	
<i>And the rest</i>	Ordinary.

*Kauṭilya* does not make any specific mention of diseases of horses, nor their remedies. Perhaps, it was exclusively the area of concern of the veterinary scientists. Texts exclusively dealing with the

different aspects of horse's life indicates that the equestrian science bears a long background since the ancient time.

The *Samhitā* of *Śālihotra*, an ancient and famous treatise dealing exclusively with horses may be regarded as the source book of all the later works on science of management and treatment of horses. The *Samhitā* of *Śālihotra* was, according to some redacted by *Kalhana* under the title *Śālihotrasārasamuccaya*<sup>39</sup>. A translation in Arabic was made under the Caliphs of Baghdad and came to be known as *Sālātor*. Besides, there are more editions or redactions of this work. These are *Aśvavaidyaka* by *Jayadattasurī* and *Aśvaśāstra* by *Nakula*.

Of all the sages who are renowned in connection with the teaching of the veterinary science, *Śālihotra* stands pre-eminent. He is said to have learned the science from *Brahmā*, the fountain head of all medical lore<sup>40</sup>. He described the subject of 'Horse and its treatment' which is also known to the world as *Hayāyurveda*, *Aśvāyurveda* or *Turaṅgama Śāstra*. Some chapters of this book are quoted in the *Agnipurāṇa*. *Hayāyurveda* is also described in *Matsyapurāṇa* and *Garuḍapurāṇa*. *Garga* was another ancient writer on horse. *Śukrācārya* in his *Nītisāra* treated the subject in detail, and he is largely quoted in the commentary on the *Aśva-vaidyaka*. King *Nala* had an epithet *Aśvavit*. *Nakula* and *Sahadeva*, the two *Pāṇḍavas* were taught by *Droṇācārya* in equestrian science and cattle science respectively.

To *Nakula* is ascribed the work called *Aśvaśāstram* which is still extant<sup>41</sup>. The manuscript on which the edition is based contains picture of twenty one horses of different types. (A few selected pictures are given in the Appendix at the end) (Figs. 8,9,10,11,12,13,14).

Reference is also made in *Aśvalakṣaṇa śāstra* to a big treatise on the subject by *Siṃhadatta*. Another important work is *Aśvavaidyaka* by *Jayadattasurī*. This book has 68 chapters dealing with many topics including separate chapters on different breed of horses; their characteristics according to age, sex and breed; the features to be desired in horses for riding, drawing carriage and for stud purposes, foaling, lactation, diet, various types of internal medicines and external

applications for equine diseases like cough, indigestion, diarrhoea, skin diseases, apoplexy, madness etc. and surgical operations for treatments of malformations, diseased conditions, castration, etc. The medical and surgical methods follow the classical precepts of *Āyurveda*<sup>42</sup>.

*Vātsya* is another sage versed in the veterinary science.

An Ayurvedic lexicon, also credited to *Nakula*, named *Cikitsā Saṃgraha* contains a glossary of terms and materia medica relating to this branch of knowledge.

*Jayadeva* also wrote on the treatment of horses. The work is known as '*Hayalīlāvatināmasaṃgraha*. *Mallinātha Sūri* has quoted verses from *Hayalīlāvati*. *Bhoja* was a writer on the same subject, but the text is not available. In *Yuktikalpataru*, draught and other animals are described.

There is another work *Aśva-vaidyā Śāstra* by *Dīpaṅkara*. In *Kavikalpatā*, there are some descriptions of horses. *Śāraṅadhara* is the author of *Turaṅga-parīkṣā* and *Vāji-cikitsā*.

In the *Lokopakāra*, horse diseases and their treatments have been described in chapter IX<sup>43</sup>. In the introductory verse (V. 31) the author deals with the theory of the diseases and treatment of horses. He states here that the disorders of horses are also due to the disorders of the *tridoṣas*. Thus it is expressly stated that the sciences like *aśvavaidyaka* and *govaidyaka* are based on the fundamental principles of *Āyurveda*. From the statement in this section on horses, it appears that the readers or listeners which the author envisaged were two different groups of people. One group (to whom the section on cattle appears to have been addressed) included the masses for whom for all practical purposes, the *śāstra* was more useful, while the other group (for whom the section was addressed) included the upper classes, kings, army officers, physicians qualified in *Āyurveda*, wealthy people, and trades men who were also interested in obtaining wisdom in the fundamentals of the science. We find in Indian sources like the *Mahābhārata*, high dignity of elephants and of horse-drawn chariots. These majestic animals were meant not only for warfare but these were signs of rank and dignity in a society in

which their ownership is broadly diffused. The same tradition predominated the social and political ideas even up to recent days<sup>44</sup>.

Next may be mentioned *Mṛgapakṣi Śāstra* (MPS) by *Haṃsadeva* (C.13<sup>th</sup> Century A.D.). As the title denotes, it is a science of animals and birds. The MPS describes seven variants of horses. In India the twirling markings on the skin are considered auspicious signs indicating a good horse. The season of *Vasanta* (March-April) incites mating. The gestation period is correctly recorded as 10-12 months. Maturity is attained at 4 to 6 years. Training has to be given from young age. The life span is again correctly indicated as 25 years. Thus it transpires that a thorough study was made on the horses regarding their behaviour, reproductive physiology, and life span. It is also suggested that the training of the horses should be imparted at early age and proper time when receptability of any training remains its peak.

Besides, even as late as 1812, King *Inclusena* wrote his *Sārasaṃgraha*, a short treatise on veterinary medicine, based on *Śālihotra*'s work. *Manapriyamataṃ* is a book on the characteristics of good and bad horses with hints for ascertaining their age etc<sup>45</sup>.

The extant treatises on horses are broadly of two classes. One class discusses the breed and the good and bad signs of horses. In the other class, various diseases of horses and their treatment have been dealt with.

The *Aśvaśāstra* of *Nakula* belongs to the former class. *Nakula*, the author of the text appears from the fourth and fifth verses to be identical with *Nakula*, one of the five *Pāṇḍava* brothers of the *Mahābhārata*. The contextual verses are<sup>46</sup>.

*Jayati sa pāṇḍavanāthaḥ Kṛṣṇo rājā Yudhiṣṭhiro Bhīmoḥ |*

*Pārtha Nakula Sahadevāstadanu Vājiśāstratattvajñāḥ || 4*

*Dr̥ṣṭvā samastaṃ Nakulaḥ śāstraṃ tacchālihotriyam |*

*Brute tattvārthamanadham śāstraṃ kṛtvā samāsataḥ || 5*

*Praṇipatya dhavalatanuṃ timiraharam gopatiṃ Śāsānikam ca |*

*Aśvāyurvedanidhiṃ Mahāmuniṃ Śālihotraṃ ca || 6*

*Ye Śālihotra Suśruta Gargādi maharṣibhiḥ purāgaditāḥ |  
Sve sve turaṅga śāstre yogāḥ śāntyai vikārānām || 7*

The meaning is — Lord *Kṛṣṇa* and the *Pāṇḍavas* are adepts in the science of horses.

*Nakula*, the fourth *Pāṇḍava*, compiled this work on horses with the help of all the texts of *Śālihotra*, the first and foremost exponent of this branch of knowledge among human beings. The exponents of this science are as follows: (1) *Sūrya* (Sun), (2) *Candra* (Moon) (3) Sage *Śālihotra*, (4) *Suśruta*, (5) *Garga* and others. This treatise on horses is the quintessence of the works of these great authorities.

The topics, dealt within the work are briefly as follows:

**In Praise of Horses:** In this chapter, horses are described as useful mainly in warfare. Physically and psychologically they are uniquely fitted for this purpose. Their fearlessness, accuracy, acute sensitiveness and extraordinary team spirit are highly appreciated. It is said that the horses are capable of enduring hunger and thirst. The horses are fit for all seasons. Extreme utility of horse for the army has got nice literary expression in the following verse:<sup>47</sup>

*Candrahīnā yathā rātriḥ patihīnā pativratā |  
Hayahīnā tathā senā vistīrṇāpi na śobhate || 32*

**In praise of *Raivata*:** In this chapter are given a few verses in praise of *Raivata*, the divine master of horses.

**Horses Lose their Wings:** It has been said that the horses were originally winged creatures. *Śālihotra* clipped their wings on request of *Indra* and they became useful to mankind.

**Anatomy of Horses:** This chapter enumerates and defines various parts of the body of horses.

**Characteristics of Horses:** In this chapter it is said that before selection of horses, their appearance, formation of body and signs are to be examined. Particularly condemned are those having inauspicious signs in the lips, face and nose etc. Good signs also are detected.

One should consider the following eight distinctive aspects in choosing a good flawless horse. They are in the order of importance: 1. Body, 2. Character, 3. Colour, 4. Steps, 5. Voice, 6. Smell, 7. Shade, 8. *Āvartas*. These aspects are separately dealt with in subsequent chapters in the text.

An ideal horse must be stout in chest, forehead and back, short in back, ears and *Kusthika*, soft in hair and mane, big in mouth, eyes and head, thin in lips, tongue and ends of mouth and long in neck, forelegs and face<sup>48</sup>.

In the *Agnipurāṇa* detailed information are available on diseases and management of the horses<sup>49</sup>. In Chapter 288, *Dhanvantari* said, 'I shall describe the essence of (science relating to) the management of horse and the treatment of their diseases. In order to achieve *dharma*, *artha* (virtue) and *kāma* (enjoyment and prosperity) (a king) should acquire (good) horses'. In this chapter, the author gives emphasis on the proper rule of riding and taming. The development of inherent natural qualities of horses depends on the management capability of a rider. In this context *Dhanvantari*'s instructions are: 'Generally the defects in the horses are produced in their bodies. The excellent riders should convert them into good qualities with much effort' (288,V.21).

'The good qualities that are due to the ability of the riders would appear as natural'. (288.v.22). Measures have been devised by the sage for protecting the horse from bites of flies and tiny insects (288, V. 57, 58). *Dhanvantari* has classified the horses into four classes, namely — *bhadra*, *manda*, *mṛga* and *sañkīṛṇa*.

In chapter 289, the speaker is *Śālihotra*. He defines bad symptoms of horses. Simultaneously he has given elaborate prescriptions in order to cure the horses from ailments with the help of herbal medicines, honey, sugar and saindhava (a kind of rock salt).

Like in all other scientific endeavours, equine science was not free from the beliefs and practices. It was entangled with speculation or more specifically with superstitions. *Śālihotra*, in chapter 290, obviously has

given instruction for propitiatory rites to be performed for curing the disease of horses.

That the horse was an indispensable part of state machineries is also attested by the composition of the authors like *Śukrācārya*. In course of description of the functions of the crown prince and other state officials, the author declares explicitly the qualifications to be possessed by the Superintendent of Horses of a kingdom.

*Śukra* says, 'the man who knows of the feeling of horses and can discover and distinguish their qualities by studying their species, colour and movements, who knows how to guide, train and treat them and is aware of their mettle, spirit and diseases, who knows what is good and what is bad nourishment for them, who knows of their weight, their capacity for bearing weights, their teeth and their age, who besides is valorous, adept in military parades and is wise, should be appointed to the superintendentship of horses<sup>50</sup>. (*Śuk.*, II, V. 260-263).

The primary sources already taken into consideration point to the fact that the behavioural science of animals i.e. Ethology had its origin in India in the remote past.

In a discourse on animal science, a text on horse lore of Assam deserves special mention. The text is known by the name *Ghorā Nidān*<sup>51</sup>. The author as well as the date of its composition is not definitely known. The original manuscript was handed over to T.C. Bhattacharjee by the Kamrupa Anusandhan Samiti through Pandit Hemchandra Goswamy. A meticulous examination of the style and vocabularies of the '*Puthi*' induce Bhattacharjee to decipher that in this treatise, there is no trace of influence of the *Vaisnavi* writers which is much dominant over the literature of Assam. 'Rather its style and diction are plain and homely and resemble more faithfully those of the *Buranjis* of Assam than other literary production. As such it can naturally be regarded as a piece of work compiled sometime during the administration of the *Ahoms*... '.

Horse obviously constitutes an important component of '*Caturāṅga Senā*' according to traditional rule. In the case of *Ahom* regime, naturally there was no exception, as is evident from the paintings

of the *Hastividyāṃava*. A beautiful illustration of the King on the elephant with the fourfold division of the army makes it clear that the *Ahom* rulers maintained horses with great care and they had under their command, *Caturaṅga Senā* (Fig.15).

Obviously, the horse was an important factor in the civil and military functions of the state and there was a special department under a *Ghora-Barua*.

*Bhattacharjee* after a careful examination of the related factors forms an opinion that it cannot be held that this treatise has any connection with the traditional Sanskrit treatises on horse of ancient India. The inherent naivety of the text proves that it should be a product of experience acquired independently in Assam with reference to the horses trained and domiciled in the land of Assam. It may be considered as a valuable supplement to those Sanskrit treatises recognized at all India level as source book of knowledge.

The original *puthi* contains 40 leaves and written in old Assamese script and it was discovered from Mangaldai Subdivision in the Western part of Assam which was the main centre of horse trade in the past. Though horse is not an endemic animal of Assam, yet Bhutan was known for its horses since the days of yore. Rulers of Assam most probably procured horses from Bhutan. It is learnt from Minhaj that a regular supply of horses used to reach Bengal from Tibet (Bhutan) via *Kāmrup* in the 13<sup>th</sup> century.

A. Guha has shown that unlike the trade with Bengal, *Ahom* trade with Tibet and Bhutan was favourable. The latter countries offered rock-salt, woolens, gold dust, horses, yak-tails, musk and Chinese silks in exchange for Lac, dried fish, cotton and silk fabrics and perhaps rice and iron<sup>52</sup>. The bulk of this caravan trade was between the *Ahom* Kingdom and Lhasa and was negotiated at a place in the foot hill. Thus the western part of Assam particularly Mangaldai and Kamrup became the main centre of horse trade. Therefore, in the opinion of Baishya, there developed traditional veterinary practices for looking after and treating

the horses and as such scientific traditional veterinary lores are extant in a number of manuscripts in the locality<sup>53</sup>.

Bhattacharjee refers to two more *Puthis* on horse lore namely *Ghorar Lokshana* and *Ghotoka Ratna* in the custody of Goswami of Kulbil Satra. Besides he came across several copies of *Ghora Nidān*, which differ a great deal so far as their style and composition are concerned.

The method, style and treatment of the subject make it distinct from other Sanskrit treatises. A viable logic for designating the text as Assam's native production is that the treatise has no mention in it of either spices or herbs which are rare in Assam<sup>54</sup>.

The *puthi* may be divided broadly into two sections, one dealing with the classes, colour and characteristics of ponies and the other with diseases, their symptoms and curative measures.

**Section I** contains:

- (1) The horse, kinds and characteristics
- (2) Colours and characters according to colours.
- (3) The parts of body, and what they indicate, natural marks and their inductions.
- (4) Vices and their cure.
- (5) A few instructions to the riders.

**Section II** contains:

- (1) Diseases, their general symptoms and treatments. In this section, as much as 109 names of diseases and their antidotes are given.

There is hardly any doubt that this hand-book on horse lore of course reflects an individual and distinctive local character and can not be equated with other ancient Sanskrit treatises on equestrian science.

The text, as is evident from the contents, thoroughly deals with the *Tatuk* (Bhutan pony) and the *Turuki* (Turki pony). They have each three varieties. The male is called *Tangon* and a mare is known as *Taji*. By *Achowari* (a local term) means an expert rider who knows about the

strength, intelligence and gait of the pony. Typically indigenous terms and words are used in the *Ghora Nidān* e.g. *Ablakh pakhara*, *Bagh darya*, *Baghnola*, *Bagh pakhora*, *Bamuna pakhora*, *Chilimi*, *Chai-Chilimi*, *Chabua Chilimi*, *Chakar*, *Dabla or Dapona*, *Deocharai*, *Fulam pakhora* and such other likely words which attribute much native flavour to the text and gives it a distinct entity. Still by collating the essence of the Sanskrit treatises as well as of the Assamese text it is felt that obviously there may be rules variable from those given in the Sanskrit treatises with regard to selection of good horse, colour prejudice, natural marks and their indications i.e. whorl, riding etc. due to ecological factors, but thematically, the text is not totally dissociated from the principles founded on the experience of the past. From the *Hastividyārṇava* it becomes apparent that the Assam people were fully concerned with the developmental process that was going on outside their orbit. But the people, of course had that capacity to distinguish themselves by adding fundamental knowledge to golden treasury of knowledge of the country as a whole, accumulated through the ages.

### Elephant Science

The word *Hastiśāstra* may be translated into English as ‘Elephantology. The science deals with topics like genealogical, physical, mental and intellectual characteristics of elephants, techniques of tracing and capturing elephants from forests, nourishment for healthy growth and general upkeep, taming and training them for war and work and diagnosis and treatment of their diseases. It was seriously studied in India since very ancient times in great details and has a continuous written and oral tradition<sup>55</sup>.

There are two species of elephant viz. African and Asian, their scientific names are *Loxodonta africana* and *Elephas maximus* respectively<sup>56</sup>. It is obvious that the elephantologists of India in the ancient past must have studied and recorded their observations on the details of the Asian type.

The study of animal behaviour has started by the western scholars only recently. But it may be concluded with confidence that this sort of science has its roots in India from the yore. Even if we go by the recent definition of ethology, we think the conclusion regarding India's achievement in this field would remain unaltered.

The noted European ethologist Niko Tinbergen has provided a useful and widely accepted framework which is much similar in approach to the study of animal behaviour in ancient India. Tinbergen pointed out that the first tasks of the study of behaviour are observation and description<sup>57</sup>.

The animal remains excavated from the Indus site fall under three categories: domestic, semi-domestic and wild beasts. Among the animals, the most popular animals regularly reproduced on seals are various types of bulls. The next popular one on the seal is elephant figure.

We get several references to elephant in ancient literature. The powerful and huge animal has got nice expression in the hymns of the *Rgveda*. One of such hymns is as follows:

‘Mighty, with wondrous power and marvellously bright, self strong like mountains, ye glide swiftly on your way. Like the wild elephants, ye eat the forests up when ye assume your strength among the bright red flames’ (*RV.*, 1.64.7.p.43).

The ancient Indian kings maintained huge armies in which foot soldiers and warriors riding in chariots, on horse backs and on elephants formed the four division, combinedly known as *Caturaṅga sena*. Breeding, maintaining and training of elephants as well as of horses and studying and treating their ailments, therefore, occupied a place of vital importance in the defence of the state.

Consequently, the ruling class used to pay much attention to the development of knowledge in this branch of study and engaged scholars and experts who investigated the veterinary science, right from the early days. Their knowledge was naturally based on observation and

experience. But simultaneously, it should be remembered that the information culled from those down to earth people who in fact used to take main part in the entire process of taming the wild animals and making it possible to ride on, practically made the foundation of branch of study on the animal through direct association with the wild life.

The detailed description given by Megasthenes on catching and taming of wild elephants suggests that the government had to maintain people, experts in such works.

The whole process of chasing and taming is described in the following quoted lines from Megasthenes:

‘They dig a deep ditch round a tree-less tract about four or five stadia in circuit and bridge the entrance with a very narrow bridge; and then, letting loose into the enclosure three or four of their tamest females, they themselves lie in wait under cover in hidden huts. Now the wild elephants do not approach by day, but they make the entrance one by one at night; and when they have entered, the men close the entrance secretly; and then, leading the most courageous of their tame combatants into the enclosure, they fight it out with the wild elephants, at the same time wearing them down also by starvation; and once the animals are worn out, the boldest of the riders secretly dismount and each creeps under the belly his own riding-elephant, and then, starting from here, creeps under the wild elephant and binds his feet together; and when this is done, they command the tamed elephants to beat those whose feet have been bound until they fall to the ground... Of the elephants captured, they reject those that are too old or too young for service and lead the rest to the stall; and then, having tied their feet ... they subdue them by hunger; and then they restore them with green cane and grass. After this the elephants are taught to obey commands.... Those that are hard to tame are rare; for by nature the elephant is of a mild and gentle disposition, so that it is close to a rational animal; and some elephants have taken up their riders who had fallen ... safely out of the battle. And if in anger they have killed one of their feeders or masters, they yearn after him so strongly that through

grief they abstain from food and sometimes even starve themselves to death'<sup>58</sup>.

The description of the entire course of the operation with minute details makes it clear that the whole matter of elephant catching and taming is related to the behavioural study of this gigantic animal.

Richly decorated elephants always constituted the attractive and glamorous part of royal processions<sup>59</sup>. The sculptural piece of *Dhauri elephant* in Orissa is indeed a loud expression of 'His Imperial Majesty King *Aśoka*' presenting himself with quiet dignity before the people of *Kaliṅga*. The artist chose this giant animal in a dignified motion perhaps to exhibit the majesty and dignity of the Mauryan imperial glory<sup>60</sup>. N.R. Ray's comment in this context may be recalled, 'Indeed, such plastic presentation of bulky volume, such feeling for living flesh rendered with remarkable realism, such knowledge of the physiognomical form of the subject treated and such sense of dignified movement and linear rhythm have no parallel in Mauryan animal sculptures'<sup>61</sup>.

In the state building process, the importance of elephants and horses can never be missed. Formation of a state and its consequent defense measures could never be imagined without utilizing the inherent strength, power and qualities of the animals like horses and elephants. How imperial dream was intricately connected with the vigour of the giant animal i.e. elephant, is revealed in the writing of *Quintus Curtius*, giving a glowing picture of the King Puru in the battle. 'In the centre of the line of elephants, on the tallest elephant in the field could be seen the towering figure of *Poros* nearly seven feet in height'<sup>62</sup>.

The picture of vigorous *Poros* here indeed is blended with the valour of the mighty elephant. Setting it aside, we notice that this huge creature finds its mention repeatedly in the Buddhist literature symbolizing the Budha himself. The magnitude of the animal in its physical and behavioural expression certainly led the authors to select it to indicate the height of the Great Master.

Thus it is no wonder that this species could draw the curious attention of the royal personage and became the subject matter of empirical study and observation parse. Among the seven constituent elements of the state, as enumerated by *Kauṭilya, Daṇḍa* i.e. coercive power mainly in the form of army is mentioned as the sixth element (*K.A.*, VI.1.1.p. 314). Elephant army constituted one of the vital components of the *Caturaṅgaṇi* Senā<sup>63</sup>. The other three wings are infantry, cavalry and chariots. Thus the process of study on different aspects of elephant's life found expression in the composition as well as compilation of a number of texts from a very early period. In the *Arthaśāstra* it is explicitly mentioned - 'The victory of kings (in battles) depends mainly upon elephants, for elephants being of large bodily frame, are capable not only to destroy the arrayed army of an enemy, his fortifications and encampments, but also to undertake, works that are dangerous to life'<sup>64</sup>.

By the time of *Kauṭilya*, study and investigation on different types of elephants available in the sub-continent reached a considerable maturity. According to *Kauṭilya*, elephants bred in countries, such as *Kaliṅga, Aṅga, Karūśa* and the East are the best; those of the *Daśāṛṇa* and western countries are of middle quality; and those of *Saurāṣṭra* and *Pañcajanya* countries are of low quality. The might and energy of all can, however, be improved by suitable training<sup>65</sup>.

There is slight difference in the translation of Kangle. According to Kangle's translation - 'elephants from the *Kaliṅgas* and the *Aṅgaras* are best; those from the east, those from *Cedi* and *Karūśa* and those from the *Daśāṛṇas* and the *Aparāntas* are considered as of medium quality among the elephants. Those from the *Saurāṣṭras* and *Pañcanadas* are declared to be of the low of the lowest quality among them. Of all these, valour, speed and spirit increase by training' (*K.A.*, 11.2.15, Kang., pp. 60-61).

In spite of differences between the two sets of translations, both the authors infer from the text that proper training may develop the inner qualities of the elephants, wherever from they hail. True to say, this

assertion is a peculiarly scientific expression. Besides, the comparative comment of *Kauṭilya* on the qualities of the elephants from different regions of India makes us believe that without a thorough data-base on behaviour of elephants hailing from different parts of the sub-continent, it would not have been possible for him to draw such conclusion.

An analysis of the Mauryan sources brings out that the Mauryan state was keenly interested in pushing the frontiers of cultivated tracts further and further back, for instance by colonizing *Kaliṅga*. The continuation of such expansion under the Mauryan state was not possible without taking the help of the elephants. The domesticated elephants probably played a significant role in the invasion of the tracts<sup>66</sup>.

It has already been noticed that by the time of the Mauryas, the elephant was established as an important component of the war-machine and *Kauṭilya's Arthaśātra* discusses in some detail all essential information regarding elephants.

Under the circumstances, it appears that fragments of knowledge acquired scatteredly by the ancient people steadily developed into an integrated knowledge system leading to the composition of a number of texts on elephantology.

*Kauṭilya* states that a king should appoint one *Hastyādhyakṣa* i.e. the Superintendent of elephants who should take proper steps to protect elephant forests and supervise the operations with regard to the standing or lying in stables of elephants, male, female, or young, when they are tired after training, and examine the proportional quantity of rations and grass, the extent of training given to them, their accoutrements and ornaments, as well as the work of elephant doctors, of trainers of elephants in warlike feats, and of grooms, such as drivers, binders, and others.<sup>67</sup>

*Kauṭilya* specifies the measurement of the elephant stall. Hence his instruction is: He (Superintendent) should cause a stable to be constructed double an elephant's length in height, breadth and length with additional stalls for female elephants, with an entrance hall, with

posts and with its door facing either the east or the north (*K.A.*, 11.31.2. Kang., p. 175).

To ensure proper disposal of urine and dung of the elephants, the square space in the front of the smooth posts to which elephants are tied should be covered with smooth wooden planks. The front ends of the planks should be slightly elevated, and there should be holes in the planks. The lying place of an elephant should also be commodious enough, and should be provided with a platform, one end of which is raised to half the height of an elephant.

The stalls for the elephants serviceable in war and / or fit for mounting and load carrying should be arranged within a fort, but the same for the elephants which are under taming process or are of bad temper should be kept outside a fort.

Daily routine to be maintained for proper health care of the elephants is also chalked out in the text.

(a) If a day is divided into eight equal parts, then the first and seventh divisions should be considered as appropriate for bath of elephants. Refentially, it may be remembered that taking of bath is very enjoyable for elephants and splashing of water with the trunk is nice to look at by any spectator.

(b) Then elephants should be served with food after each bath. (c) Forenoon is the time for exercise and training while afternoon is the time for invigorating drink. (d) Two-thirds of the night are the time for sleep and the remaining one-third should be passed in wakeful rest.

*Kautilya* suggests different scales of balanced diet for elephants of varying heights and measurements. Besides, oil in a definite quantity is to be applied to limbs and head for massaging. The purpose of the same may logically be imagined that the aim was to take care of skin of the pachyderm.

The newly born cub should be fed with milk and green crops only. The prescribed season for capturing elephants is summer and a twenty-year old elephant should be caught.

*Kauṭilya* imposes prohibition on capturing cub, an elephant with small tusk, one without tusk, one diseased, a female elephant with young and a suckling female elephant.

As it is evident from the *Arthaśāstra*, the Mauryan government had to run a huge establishment with officials looking after different matters relating to elephant. The entire set of officials under the superintendent of Elephants is said to have been constituted with the following persons: the physician, the trainer, the rider, the driver, the guard, the decorator, the cook, the fodder-giver, the foot-chainer, the stall guard, the night attendant and so on form the group of attendants (*K.A.*, 11.32.16. p.178). Physicians are instructed in the text, to treat (elephants) afflicted by long journey, illness, work, rut or old age.

Any case of not maintaining cleanliness, non-receipt of fodder, making elephants sleep on bare ground, striking them at vulnerable point of body etc. all are dealt with punishment. Because, all these issues seriously concern the healthy life of elephants. According to *Kauṭilya* length of the tusks, possibly for convenience or for other reasons, is to be reduced and the actual instruction is — ‘Leaving (a length) double the circumference at the root of the tusks, he should cut (these, every two years and a half in the case of those from river-banks, every five years in the case of those from mountainous regions. Time and space specific variation as noted in the instructions (*K.A.*, 11.2. 32.22. p.179) is significant, Whether there is any difference between the growth rate of tusks of the elephants residing in riparian countries and those in mountainous region is not specifically mentioned by the author.

*Varāhamihira* mentions four kinds of elephants<sup>68</sup>. In the *Hastilakṣanādhyāya* of the *Bṛhatsamhitā* the following four types of elephants have been described: (1) an elephant with tusks coloured like honey, a well-proportioned body, uniform limbs, a backbone shaped like a bow and hips like those of a boar and which is neither too stout nor lean and is fit for work is called *Bhadra*, it is 7, 9, and 10 cubits in height, length and girth respectively; colour of *Bhadra* and its ichor is green; (2) *Manda* has a loose breast and folds on the waist, long belly,

thick skin and neck, long abdomen and the root of the tail, and the look of a lion; it is 6, 8 and 9 cubits in height, length and girth; colour of *Manda* and its ichor are yellow; (3) *Mrga* is characterized by short lips, tail and sex-organ, slender feet, neck, teeth, length and periphery measure 5, 6 and 8 cubits; colour of *Mrga* and its ichor are black; (4) an elephant with mixed characteristics is termed *Sankīma*. The four categories are also named by *Kauṭilya* and *Someśvara*. *Varāhamihira* also refers to four other kinds forbidden for domestication viz. *Kubja*, *Vāmanaka*, *Matkuṇa*, *Sandha*, *Varāhamihira* like *Kauṭilya*, refers to elephants hailing from swampy as well as from mountainous regions.

*Hastyāyurveda* an ancient work of unrecorded date by sage *Pālakapya* is an important text on the subject preserved till date, a copy of which is available in the Raja Serfoji Saraswathi Mahal Library of Thanjavur in South India. We are informed that *Pālakapya* narrated the science exhaustively to *Romapāda*, the King of *Aṅga*, at the latter's request. The date of the work is not known. The author of *Trikāṇḍaśeṣa* identifies *Pālakapya* with *Dhanvantari*, the founder of the surgical school in India. *Suśruta* is said to have learned major surgery from *Dhanvantari*; but from other accounts it is learnt that *Suśruta* also learned the veterinary science from *Dhanvantari*.

Though the identification of *Pālakapya* with *Dhanvantari* does not seem to be impossible, but without the support of concrete evidence, no conclusive comment is possible<sup>69</sup>.

The *Hastyāyurveda* of *Pālakapya* rivalling the *Carakasamhitā* in bulk is written in the form of questions and answers between the sage and his disciple *Romapāda*. This branch of medical knowledge is also based on the *tridoṣa* theory of origins, symptoms and treatments of diseases. The *Pālakapyasamhitā* is divided into four sections each of which is called *sthāna*<sup>70</sup>. These are *Mahārogaṣṭhāna*, *Kṣudrarogaṣṭhāna*, *Śalyaṣṭhāna* and *Uttaraṣṭhāna*. Each *sthāna* is sub-divided into several *adhyāyas*.

In the first section, there is a discussion on the fatal diseases of elephants and their remedies. In the *adhyāya* called *Roga-vibhakti*, the

diseases are divided into two classes, viz. *Ādhyātmika* and *Āgantuka*. Of these diseases, 76 are *vātajā* (caused by wind) 27, *pittajā* (caused by bile) and 32 *śleṣmajā* (caused by phlegm).

In the second section, many ordinary diseases and their treatment have been dealt with.

Elephant surgery has been treated of in the third section. Surgery is the most illustrious aspect of ancient Indian medicine. Since olden days, the Indian doctors were renowned for their surgical operations. In the section of *Śalyasthāna*, the following instruments have been mentioned: *vṛddhipatra*, *kūṭāpatra*, *maṇḍalāgra*, *vrihi-mukha*, *kuthārākṛti*, *vatsa-danta*, *utpalapatra*, *śalākā*, *sūci* and *rampaka*.

The topics, dealt within the last section, are food and drink of elephants, flow of ichor, elephant-stall, description of various kinds of elephants, *nirājanā* of elephants, etc. In the thirtieth chapter of this section called *Pāmsūdāna*, elephants have been divided into four classes - *āraṇya* (wild), *damyamāna* (being tamed and under training), *dānta* (trained) and *purāṇa* (old).

The *Mātāṅga-līlā* is written in 263 verses divided into twelve chapters called *Paṭālas*. The contents of the chapters are briefly as follows:

1. A legend on the origin of elephants.
2. Good and bad signs.
3. Evil signs.
4. Signs helping the ascertainment of longevity.
5. Signs indicating age and different stages of life.
6. Measurement of the elephant's body
7. Valuation of elephants.
8. Different types of the nature of elephants and their external signs.
9. Flow of ichor due to excess of joy or excitement.
10. Five methods of capturing wild elephants.
11. Maintenance and food of elephants.

## 12. Qualifications and disqualifications of the rider.

The authorship of some more works like *Gajaparikṣā*, *Gajadarpaṇa* and *Gajacikitsā* is also ascribed to the sage *Pālakapya*. Another book on the Treatment of Elephant is referred by *Al-beruni*.

The study of elephantology formed an essential part of the formal training of the princes.

In the *Arthaśāstra*, there is clear mention that a king should superintend elephants, horses, chariots and infantry, besides, with a view to acquiring efficiency in the skill of shooting arrows at moving objects, a king should go to a forest, which is free from dangers specified in the texts.

*Kāmaṇḍaka* is in agreement with the efficacy of hunting to be practised by a king while he designated it as *Vyasana* at the same time. It is mentioned, ‘physical exercise (in hunting expeditions) produces power of endurance (or strains) and immunity from indigestion, heaviness (due to growth of fat) and susceptibility to catching cold, whereas hunting develops excellence in successfully hitting stationary or moving targets with darts’<sup>71</sup>. (*Kām.*, XV.25.p.312).

*Kāmaṇḍaka* in this context reminds the king of the great utility of elephants for kingdom and king’s responsibility in taking personal initiative for their proper care in the army division.

He states: ‘The great rutting elephants (from whose temples flow fragrant ichor) capable of rendering rocks with their tusks, with bodies effulgent like the blue clouds, constitute a stable support for the kingdom.’ (*Kām.*, XVI, 10. p. 328).

‘Arranged in battle formation and well trained, each elephant mounted by an expert driver, is capable of destroying, (killing) a cavalry of six hundred horses.’ (*Kām.*, XVI. II. p. 328).

‘An army supported by elephant forces is sure of success in battles whether in a water-logged field or an high lands, in a forested defile or plains or in a rough (uneven) region, whether there is (passable)

road or not, and also in breaking through ramparts or mansions' (*Kām.*, XVI.12.p.328). Hence *Kāmaṇḍaka*'s definite instruction is —

‘The king should personally inspect the exercise (*caryām*) or parade of the contingents of elephants, chariots, cavalry and infantry in group formation (*sāmūhikam*) as well as severally (unit by unit). He should also inspect twice a day (*dvirahna*, in the morning and evening) the arrangement of distribution of prescribed food and drink to the elephants and horses (of the army) (*Kām.*, XVI. 48. p. 345).

The verses quoted, indicate the behaviour, power, fitness as well as its all-round utility for the security of a kingdom. The animal by virtue of its utility deserves royal care. Prescribed food and drink were to be afforded in order to maintain their health and hygiene.

*Śukrācārya* also is in accord with the rules prescribed in the *Nītisāra*. He states that hunting is essential for developing agility, fearlessness and striking the target. So a king should promote the strength of valour and prowess by means of hunting excursions.

*Śukrācārya*, gives some behavioural and physical features by which a good elephant may be distinguished from a harmful one.

He is also in accord with the conventional categorization of the animal in the ancient texts i.e. *Bhadra*, *Maṇḍa*, *Mṛga* and *Misra*. Details regarding limbs tusks, throat, ears, trunk, eyes, genital organ, skin, strength stature as well as auspicious marks have been discussed. According to Sarkar, ‘the science about elephants is highly specialized in India. Hindu drivers and veterinary doctors are well up in the rules of elephant life. There are several marks known to them by which they can interpret the internal character of these animals and forebode good or evil of the owner’<sup>72</sup>.

As we have already mentioned that *Pālakapya* was the propagator of the elephant lore known as *Hastyāyurveda*; he described it to king *Romapāda*.

We find in the *Agnipurāṇa* the extract from the speech of *Pālakapya*<sup>73</sup>. *Pālakapya* says: O *Romapāda*! I shall describe to you the

characteristics of the elephants and the treatment (of their diseases). Verses 1 — 33 constitute the whole discourse on different aspects of elephant life. The discourse has two distinct components (1) behaviour and physical features; (2) diseases and their treatments. Decoction prepared with different herbals and salts, juice of flesh, milk etc. have been prescribed for curing different types of ailments of the animal.

The main meal for them should be composed of varieties of rice like *ṣaṣṭika*, *vrihi* and *śāli*. The meals consisting of barley and wheat are considered as mediocre. The other kinds of food are deemed as inferior.

Some treatments have been advised in case of injury suffered by an elephant in a war.

In the *Agnipurāṇa*, we find that the propitiatory rites for curing the ailments of elephants have been described by *Śālihotra*, who was an expert in Equin science. Thus it may be assumed that the veterinary science in general was their area of investigation and they were all great experts in this field but they produced texts on a particular animal which shows a proneness to acquire specialized knowledge dealing with the behaviour, characteristics and diseases of that animal, during the period.

In a quest for getting an argument for explaining the co-existence of science in a positive sense and speculative rituals in the texts pertaining to the Hindu system of scientific study, we are to believe that the practitioner of sciences in ancient India could not shake off the all pervading influence of the brahmanical society. Naturally, here in ancient science and society superstitious, practices and beliefs are found intermingled. D.P. Chattopadhyaya of course, due to such inner contradictions in Indian scientific texts comments, ‘The form in which the source-books of Indian medicine reach us is, to say the least, most peculiar. It is the form of a strange amalgam of science and its opposite — or, to be more specific, of natural science and regimented religion’<sup>74</sup>.

This is perhaps true for other sciences also, as is evident from Alberuni. Among the ‘Hindu’ sciences, Alberuni devotes special attention to that of astronomy partly because it was ‘the most famous among

them' and partly because of his own interest in the subject. While admiring their proficiency in this branch of knowledge he stresses the sharp distinction between 'the two theories, the vulgar and the scientific'.

He states. '..... even the so-called scientific theorems of the Hindus are in a state of utter confusion, devoid of any logical order, and in the last instance always mixed up with the silly notions of the crowd ... I can only compare their mathematical and astronomical literature, as far as I know it, to a mixture of pearl shells and sour dates, or of pearls and dung or of costly crystals and common pebbles'<sup>75</sup>.

In this context, it may be stated that conflicting ideologies are always functional in social dynamics. To isolate real science from speculation is a rational attempt and may be imagined in an ideal situation, but people at different level of cultural attainment can not do without psychological reliance on their long practised rituals and beliefs in the efficacy of religion.

Elephant lores with new interpretations and additions, modifications and abridgements, elaborations of certain selected topics etc. were composed continually till as late as the 19<sup>th</sup> century. In 1820 King Serfoji Bhonsle, the Maratha ruler composed *Gajaśāstrabhaṣā Prabandha*. This work, also in the custody of Saraswathī Mahal Library, is unique and immensely valuable in as much as the king included in it coloured illustrations<sup>76</sup>. This text is different in the sense that each illustration in the book is flanked by the relevant Sanskrit verse on the top and its translation at the bottom.

Now we may turn to *Mānasollāsa*, an encyclopaedic work of *Someśvara* III, a later *Cālukya* king who ruled from c. 1126-1138 A.D. Since the closing part of the 10<sup>th</sup> century, a number of *Cālukya* families ruled in the Deccan as vassals of the *Rāṣṭrakūṭas*. *Someśvara* III belonged to the western branch of the *Cālukyas* and was son of *Vikramāditya* VI whose court was graced by the presence of the Kashmirian poet *Bilhana*, the author of *Vikramāṅkadeva Carita* and *Vijnāneśvara*, the author of *Mitākṣarā*<sup>77</sup>.

A verse of the *Mānasollāsa* in the introductory portion clearly states that, *Someśvaradeva*, the well-known king of the *Cālukyas* composed this valuable work containing a treasure of information. The internal evidence confirms his authorship of the work. But Shrigondekar thinks on the basis of another verse, that some scholars in his court composed the work and dedicated the authorship to his patron king. Considering the encyclopaedic nature of the work, Shrigondekar's opinion can not be ruled out. These works generally represent the knowledge base prevailing at that time on the subjects dealing with.

*Mānasollāsa*, also known by the name *Abhilāṣitārtha Cintāmani*, contains about 10,000 verses and is divided into five sections called *vimśati*, each containing twenty chapters.

Verse 171-331 in *Vimśati* 2, Chapter 3 contains information on characteristics, habitat and methods of capturing and training elephants. The verses have been discussed by Sadhale and Nene, the article was published in the journal, *Asian Agri History* (Vol. 8, No. 1, 2004, pp. 5-25).

The diseases and treatment of elephants have been dealt with in *Mānasollāsa* Section 2, Chapter 6. From the verses, it appears that knowledge of *Āyurveda* was extensively used to treat various ailments of elephants. Sadhale and Nene made another publication on the diseases and treatment of elephants on the basis of the text (*A.A.H.*, Vol. 8, No. 2, 2004, pp. 115-127).

They have given a long list of the herbs prescribed in the text for treatment of elephant diseases with their Latin nomenclature and the numbers of the corresponding verses. In the *Mānasollāsa*, the author exhibits his concerns not only for physical ailments but also deals with the mind of the captivated elephants. A verse quoted below would reveal the mental involvement of the author for the benefit of the animal concerned. The exact verse is as follows:

‘Captivity, lashing ailments, memories of the happiness of freedom enjoyed in the forest, staying in the captivity only physically with heart else where, incompatible food, indigestion, exertion, and lack

of sleep are the basic causes of the diseases of elephants. Those should be properly treated by medicines procured from forests or purchased from shops' (*Man.*, II. 6.628,629).

Verses 630 to 677 in the same section and the same chapter deal with the common ailments of domestic elephants. There is hardly any doubt that treatments of such ailments must have been worked out through a process of trial and error. A close look at the recommended herbals will convince anyone that the knowledge of treating human diseases under the *āyurvedic* system had been extended to animals. An indication of the quantities of required medicines to be calculated on the basis of animals' length, (similar to the modern concept of medicinal doses should be in proportion to the body-weight of the diseases), is noticeable in the lines of the verses no. 630 and 631. The ailments here again included disorders caused by the imbalance of *vāta*, *pitta* and *kapha*.

The classification of Indian elephants in the *Mānasollāsa* is different from the qualitative classification of the *Arthaśāstra*. This change in the view between the two texts of two different time periods points to the ongoing cultural and research practices on elephants. Reclassification of elephants in the *Mānasollāsa* might have been the result of continuous observation and investigation of the experts. D.C. Sircar expresses some doubt and comments 'it is difficult to say whether the reclassification copied in the *Mānasollāsa* was a deliberate attempt to improve upon the earlier authorities on the basis of investigation and personal experience'<sup>78</sup>.

In this context, problems cropping up from psychological pressure of the elephants in captivity as dealt with by the author in the text should be remembered. This is of course a distinct development in case of medical treatment of the animal. Earlier much emphasis was not given on the issue of frustrated mind of the beast. So improvement in knowledge is a fact which may be regarded as true in case of reclassification of the elephants also.

The *Viṣṇudharmottara* mentions the names of the *Dig-gajas* in the following order- 1. *Airāvāna*, 2. *Padma* (i.e. *Puṇḍarīka*), 3. *Puṣpadanta*, 4. *Vāmana*, 5. *Supratīka*, 6. *Añjana*, 7. *Sārvabhauma* and 8. *Kumuda*. The same work also speaks of four classes of the elephants born in the clan of each one of the eight, viz. 1. *Bhadra*, the best, 2. *Manda*, the medium, 3. *Mṛga*, the worst and 4. *Saṅkīrṇa* or the mixed breed. Thus the classification of elephants in *Viṣṇudharmottara* is done in conventional line. Qualitative assessment and categorization of elephants practically became a compulsory practice for the imperial rulers of each period of history.

Before dealing with the text on elephant lore the *Hastividyārṇava* of Assam, it should be mentioned that the forests in eastern India were infested with elephants. H.P. Sastri mentioned that *Hastyāyurveda* or the science of elephant medicine developed in *Gaṇḍu-vāṅga*. A number of verses on the behaviour of elephant in the *Aryāsaptaśati* of *Govardhanācārya* strengthen Sastri's view.

***Hastividyārṇava*:** Now we may turn to a text of an entirely different category, a treasure house of knowledge on elephants, hailing from Assam. This book *Hastividyārṇava* composed in Śaka era 1656 i.e. 1734 A.D. is a unique creation of the North-East people. Though composed in 1734 A.D. under the instruction of munificent Ahom King Śiva Sinha and his queen *Ambikādevī*, the *Hastividyārṇava* deserves a special mention in a discourse on elephantology in India irrespective of period specification. The content of the text reveals that the scholarship in Assam was fully conscious of the knowledge prevalent in the subcontinent from the hoary antiquity and the composition reflects the combination of knowledge both pan Indian and local, transcending the barrier of time.

The illustrated manuscript copy of the *Hastividyārṇava* was in the custody of late Mohidhar Burhagohain, the grandson of Purnananda Burhagohain, the legendary Prime Minister of Assam (A.D. 1783-1817). The late pundit H.C. Goswami recovered this manuscript as early as 1912 and the copy of the manuscript was handed over to the Department

of Historical and Antiquarian Studies of Assam<sup>79</sup>. The original manuscript had 193 folios out of which 135 still remain. The folios up to 163 deal with the types of elephants and from 164 to the end with their ailments and treatments. The date of its composition as is mentioned in the colophon is 1656 Śaka era (1734 A.D.). Under the inspiration of the Ahom King, Śiva Sinha and queen Ambikā Devi, Sukumar Barkath composed the *Hastividyāṇava*<sup>80</sup>. Dilbar and Dosai the two painters painted the pictures therein under the order of the King and the Queen<sup>81</sup>. The total number of paintings is 170.

In the Introduction to the text, P.C. Choudhury states that probably the treatise compiled originally in Tai-Ahom language might have been without the pictures of the elephants and later the treatise was recomposed by Sukumar Barkath under the orders of the King and the Queen with materials taken from the old text *Gajendracintāmaṇi*.

*Prācyavana* has been described as the natural habitat of elephants in the traditional texts. According to *Kauṭilya* elephants bred in countries, such as *Kaliṅga*, *Aṅga*, *Karūśa* and the East are the best<sup>82</sup>.

The *Mānasollāsa* describes the extent of the *Prācyā* forest in the following stanza:

*Gaṅgāsāgara-Himādri-prayāgāṇam ca madhyataḥ !*

*Vanam prācyam = its proktaṃ Lohitābdhiśca paścime ||*

(*Mān.*, V. 173-174).

It means that the *Prācyavana* extended from *Gaṅgāsāgara* in the south to the *Himādri* in the north and from *Prayāga* in the west to the *Lohitya* (lower course of the Brahmaputra) in the east.

*Hastividyāṇava* which constitutes the main text of this discussion in this part was composed mainly on the basis of investigation and observation on the elephants of the forests of Assam i.e. a considerable portion of the aforesaid area of *Prācyavana*. The text also tells that the author was quite apprised of the knowledge about elephants, preserved in the earlier books composed in other parts of India.

The Ahom rulers paid much attention to the welfare of the elephants as one of the constituents of the four-fold divisions of the army during the long period of Ahom history from early 13<sup>th</sup> to the early 19<sup>th</sup> century.

It is known from *Shihābuddin Tālish* that the kings of Assam maintained vast bodies of fighting men and mountain like ferocious looking elephants<sup>84</sup>.

In the Khalimpur copper plate, we get a beautiful description of elephants having the colour of cloud<sup>85</sup>. The elephants mentioned in the copper plate, of course, had their habitat in the *Prācyavana* if geographical proximity of the *Prācyavana* is taken into consideration. The elephants have been compared with dark cloud shading the sunlight of the day- '*niratīśaya-ghana-ghanāghana-ghaṭā-śyāmāyamāna-bāsaralakṣmī-samārabdha-santata-jaladasamaya-sandehāt*'.

Thus as lord of the elephant producing forests, the Ahom ruler Pratap Sinha (A.D. 1603-1641) wanted to assume the epithet *Gajapati* by being the owner of one thousand elephants. But his desire was not fulfilled. Elephant catching was a very old practice in Assam and it was not merely a pleasure making but was intended for enhancing the prosperity and strength of the rulers. Obviously the scholars versed in the science of elephant behaviour enjoyed considerable indulgence from the kings. This sort of congenial environment was the breeding ground for the composition of the *Hastividyāṇava*, a comprehensive manual.

Studies on different aspects of behaviour as well as of the types of elephants constitute the main contents of the *Hastividyāṇava*. There are chapters like:

1. Types of elephants.
2. The tuskers: mode of training.
3. Female elephants: mode of training.
4. Description of the elephant stable, measurement of ropes for tying elephants, measurement of doors of stables.
5. Functions of elephants according to *Nītsāra* of *Kāmaṇḍaka*.

6. Varieties of elephants as described by *Vyas*.
7. Characteristics of different varieties.
8. Characteristics of the bad types.
9. The kind of elephants found in different regions with their characteristics.
10. Mode of training of the newly caught elephants and calves.
11. Measurement of elephants according to age.
12. Treatment to be made to the elephants captured in aged stage.
13. Instructions for treatment of the elephants newly caught.
14. Medicines for treatment of ailing elephants.
15. Medicines for making elephants rutted and strong.

Most of the medicines mentioned were prepared from the herbal and faunal ingredients. Near about five hundred herbal and faunal antidotes have been prescribed in the text.

In the concluding portion of the treatise (from p. 204-256) the author has dealt with different ailments and their remedies by the application of indigenous medicine prepared from locally available herbal and faunal ingredients. In the origin and the development of the *Āyurveda* or the indigenous system of herbal medicines, Assam has developed a long tradition and it is no wonder that the rulers of Assam paid much 'attention to the indigenous system of medicines, called *Kāmarūpī Pharmacopia*'.

We know that medicinal science in ancient India was intricately associated with plant science. *Caraka*'s remark in this respect may be remembered here: 'it is only the man well acquainted with the names and external features of plants and his ability to use them properly according to their properties is to be called an expert physician'<sup>86</sup>.

'The physicians does well to master *Bheṣaja vidyā* by acquainting himself with the various names of plants in Sanskrit and Prakrit consulting all classes of men by personal observations by a careful handling as well as by a careful consideration of its specific characters and sexuality' (quoted from *Dhanvantari Nighaṇṭu*)<sup>87</sup>. The word *bheṣaja*,

from which *bhīṣak* denoting physician is derived, etymologically means vegetable drugs<sup>88</sup>.

In the quotations mentioned above, we find the use of a technical term *Bheṣaja vidyā* signifying a distinct study of the plants and plant life with special emphasis on their medicinal properties and use. Thus it is logical to assume that the indigenous system of *āyurvedic* medicine that developed in Assam was in no way distracted from the traditional Indian system developed by *Caraka*, *Suśruta* and *Vāgbhaṭa*.

The huge store-house of knowledge in herbal medicines for the elephants as preserved in the *Hastividyārṇava* reveals, as Kamrup or Assam constitute the natural habitat of elephants, behavioural study of elephants, had become principal area of interest of the people. Without the initiative on the part of the rulers accompanied by the involvement of the people, such study and observation on the animal would have been in practical sense, impossible. It required the total involvement of the kings, the pundits, the plant scientists, the physicians and above all the common folk and the riders, familiar with the nature of elephants and also the forest area, the natural habitat of the elephants<sup>89</sup>.

From the content it appears that the author Sukumar Barkath was fully conversant with the features and characteristics of different types of elephants coming from different corners of the Indian sub-continent. Their whole behaviour and method of taming and training have been documented with corresponding paintings, in the text. The author did not forget to mention the instruction given by the mighty Ahom ruler *Suhungmung Dihingīā Raja* to his riders for imparting the best type of training to his elephants.

Medicines have been prescribed for curing serious ailments and it is said that ‘the text has not left out a single serious ailment from which the animal is likely to suffer...’<sup>90</sup>.

At the same time, it should be noted that the people of Assam has belief in the efficacy of mantras, the reflection of which we find in the depiction of *Mandala* i.e. a sacrificial circle in the text (Fig.16). Ritual, beliefs and practices are mingled with empirical knowledge in this book.

The paintings in the text show a blending of realism, idealism, ritual beliefs and legends of the region. The warning given to the riders as well as to the rulers against the use of elephants without comprehending their nature is also indicative of a thorough knowledge of the author on the subject.

The Kingdom of Coochbehar in present North Bengal, once forming an integral part of old Kingdom of *Kāmarūpa* was visited by Ralph Fitch during the rule of *Naranārāyaṇa* in the 16<sup>th</sup> century. This English traveller writes that they have hospitals for sheep, goats, dogs, cats, birds and for all living creatures and when they (animals) be old and lame they (authority) look after them until they die.<sup>91</sup> This was in the opinion of Choudhury 'more true for the Ahom Kingdom'. 'In short', he says, 'a scientific method of veterinary āyurvedic treatment with the help of medicinal plants and herbs, was evolved, a fact which is best borne out by the present treatise'<sup>92</sup>.

The paintings of the text done by *Dilwar and Dosai* distinguish the work from the traditional writings of ancient India. We have already made mention of the illustrated *Gajaśāstrabhāṣāprobandha* of the King Serfoji Bhonsle, which was composed in 1820 A.D. But the *Hastividyāṇava* was composed in 1734 A.D. So this is a historical fact that the production of Assam is a pioneering work in this discipline with painted illustrations depicting, types, categories, colours, physique, mood, temper and taming, training, application of medicine and such other related issues of the tuskers along with the people associated in day to day works for the elephants (Figs. 17,18,19,20,21). The illustrated manuscript of the *Hastividyāṇava* is an out come of fundamental thinking of the King and the Queen concerned. The terse content of the subject has been given a lucid touch by the coloured paintings. In this sense it is an innovative attempt on the part of the Ahom royalty. The paintings cover almost everything about elephants. The painters have not forgotten to illustrate the picture of the author and even of their own, not to speak of the patron King, the most enlightened one *Śiva Sinha* and his equally enlightened Queen *Ambikā Devi* along with the nobles, pundits, courtiers, and male and female attendants. *Caturanga sena*, royal

processions and recreation performances, by the musicians and dancers in different garbs are depicted. We get the whole canvas of the court of the Assamese King. The paintings are important from the socio-cultural as much as from the scientific point of view (Figs. 22, 23, 24).

The tradition of veterinary treatment for all practical purposes never ceased to exist in ancient India. The practice is coming down through the ages. We get a definite inscriptional corroboration of the presence of veterinary doctor in the Gayā Stone Inscription of *Nayapāla* of the *Pāla* dynasty<sup>93</sup>. The composer of the stone inscription is one *Sahadeva*, a veterinary surgeon. The composer's identity is given in the following verse:

*Vājivaidya-Sahadevaḥ niruktiḥ tat praśastiriyamastu nitāntam |  
Prema-sauhrda-sukhaikadharitrī sajjanasya hṛdaye ramañīva ||*

*Nakula* and *Sahadeva*, according to the famous indologist, P.V. Vartak, practised veterinary medicine<sup>94</sup>. So the name of *Sahadeva* is traditionally associated with animal diseases and their treatment.

This *Sahadeva* as mentioned in the inscription either is a veterinary doctor having that particular name or may be a doctor bearing the epithet after the name of the legendary veterinary practioner of the *Mahābhārata*.

In any case, for the present purpose, the inscription is useful which bears a clear proof to the prevalence of practice of veterinary medicine by some professional people for giving relief from ailments and diseases.

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