

BHADURI

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**A CONCISE  
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in Sweden under Linnaeus. Koenig was an enthusiastic collector of natural science products. He not only made a serious study of the flora of Madras coast but also sent dry plants to Sir Joseph Banks and his teacher Linnaeus. The latter gave special place to these plants in his herbarium.

It must be pointed out here that Koenig was the first botanist who introduced Linnaean system of classification of plants in India. Before this the classification was mainly based on uses of plants without giving serious consideration to how flowers and other parts were arranged in a plant.

Missionaries gathered round Koenig's 'United Brotherhood', a society established for the promotion of botanical studies in India. Members of the Brotherhood included many missionaries of Tranquebar such as Heyne, Klein, Rottler, William Roxburgh, William Jones and Buchanan Hamilton.

Koenig, after 10 years with the Mission, transferred his services to the Nawab of Arcot and then to the East India Company. He was sent to Siam and the Malay Peninsula to ascertain if Siamese cardamom could be grown in south India. He became ill and retired in 1785.

Systematic botanical investigations were continued later by several European naturalists in different parts of India. Of them, special mention may be made of William Roxburgh, William Carey, Nathaniel Wallich and George King. The Royal Botanic Garden came into being as early as 1787 through the efforts of Robert Kyd. The part played by this garden, botanical investigations in the nineteenth century, the formation of the Botanical Survey of India and related matters are discussed in chapter 10.

## 8

## ZOOLOGY

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ANCIENT Indians, like their contemporaries in the West, had collected considerable information about the living world, although their efforts in this field have generally passed unnoticed in books on the history of biology by such modern authors as Nordenskiöld, Locy, Bodenheimer and several others. One of such modern historians of biology remarks: '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>a</sup> We believe that remarks and opinions of this kind, due probably to the lack of knowledge of Sanskrit and other classical languages of India on the part of Western historians of biology, now require revision. We have abundant evidence, albeit scattered in archaeological and literary records, of the interest and curiosity of ancient Indians in the living world around them leading to a large mass of facts and ideas comparing favourably with similar efforts made contemporaneously by peoples of other culture areas of the world.

### PREHISTORIC PERIOD

#### *Neolithic Haematite Drawings of Animals*

The earliest concrete evidence of interest in animal life is furnished by the 'ruddle' or 'haematite drawings' in caves or sheltered rocks, made by the neolithic men in India (Fig. 8.1). That these neolithic dwellers of the subcontinent, out of sheer necessity for existence, must have acquired familiarity with animals and plants is self-evident. Keen naturalists as they were, they must have memorized shapes and forms of animals hunted

<sup>a</sup> Nordenskiöld, p. 7.

for food or dreaded. This familiarity finds artistic expression in these drawings—heralding the beginning of the science of morphology. In India, the neolithic haematite drawings are found delineated on the rocky



FIG. 8.1. Neolithic haematite drawings showing stag, boar and hunters (after Mookerji, 1963).

walls of the Vindhya Hills, Mirzapur district, Uttar Pradesh, representing hunters with barbed spears attacking rhinoceros, now extinct in that area; in the caves of Hoshangabad district, Madhya Pradesh, representing a giraffe (?); in the Kaimur Hills, showing stag-hunts; and at Singanpur, showing representations of an animal resembling a kangaroo, and also of horse and deer, which are very like the Spanish drawings of the same age.<sup>a</sup> The presence of rhinoceros in the illustrations cited above is of great zoological interest, as this animal figured almost constantly in later history, and was more widely distributed in India than at present.

#### *Animals of the Indus Valley Civilization*

The animal remains excavated from prehistoric sites in north-west India as well as animal representations on pottery, seals, figurines and toys amply demonstrate the familiarity of prehistoric man in India with his living world. Recently, Nath, in an excellent review of the prehistoric and ancient animal remains from India, has given an exhaustive list of

species of animals associated with the lives of prehistoric peoples. The total number of species identified is 92. Mammals represented by 41 species top the list. Next in order are molluscs represented by 31 species, including some marine and land forms and reptiles by 12 species, while fishes and birds, of which only five and two species respectively have so far come to light, are scantily represented. Barring molluscs, the only other invertebrate occurring at Mohenjo-daro (but not reported from other places) is coral, *Favia fabus* (Forskål). For a full list of species, Nath's work may be consulted.<sup>a</sup> We shall, however, restrict our remarks to a brief discussion of the faunal characteristics.

The rich yield of animal remains comes from Mohenjo-daro and Harappa. Sewell and Guha<sup>b</sup> have listed 37 species from Mohenjo-daro, while Prashad<sup>c</sup> has identified 30 species from the remains obtained from Harappa, among which many are common to both sites.

The identified mammals from prehistoric animal remains fall under three major categories, viz. domestic, semi-domestic or the wild forms habitually associated with vicinities of human dwellings, and wild beasts.

The domestic animals are the humped cattle, buffalo, horse, domestic ass, sheep, goat, elephant, camel, pig, dog and cat. Of birds, remains of only two species are known with certainty; the fowl was definitely domesticated and the black partridge might have been so. The presence of so many domestic species in prehistoric India is not surprising. It is now universally accepted that the domestication of animals either preceded or went side by side with the transition of man from a nomadic hunting and root-gathering stage to a farming one. The people had already taken to agriculture and had domesticated the species mentioned above. The commonest domestic animals whose remains have turned up at several prehistoric sites in India were the humped cattle, buffalo, sheep, goat and pig. The elephant seems to have been tamed fairly early as its remains have been found at both Harappa and Mohenjo-daro. The ass was a common domestic animal but not everywhere. The horse appears to have come into the picture later as its remains are not found in the earlier stratifications. This animal was very popular among the later Aryans who used it for drawing chariots, for riding and as a sacrificial animal. The dog and the cat are not plentifully represented, though they might have been popular. There are archaeological indications that the people of Harappa were familiar with at least two kinds of dogs, one of which, a mastiff, had been a locally restricted breed (Fig. 8.2).

Of the remains of other animals so far found, which were not truly domesticated in the economic sense but moved freely among human settlements or at their outskirts in prehistoric times, mention may be made of the rat, the mongoose and the shrew. The jackal and the wolf had been the prowlers in forests or scrubs skirting the inhabited areas.

<sup>a</sup> Nath, pp. 1-63.

<sup>b</sup> Sewell and Guha, pp. 649-73.

<sup>c</sup> Prashad (1), pp. 1-62.

<sup>a</sup> Mookerji, pp. 10-11.

The wild life apparently familiar to these people consisted of the elephant, rhinoceros, wolf, jackal, nilgai, gaur (Indian bison), buffalo and a few species of deer like the hangul or Kashmir stag (whose horns

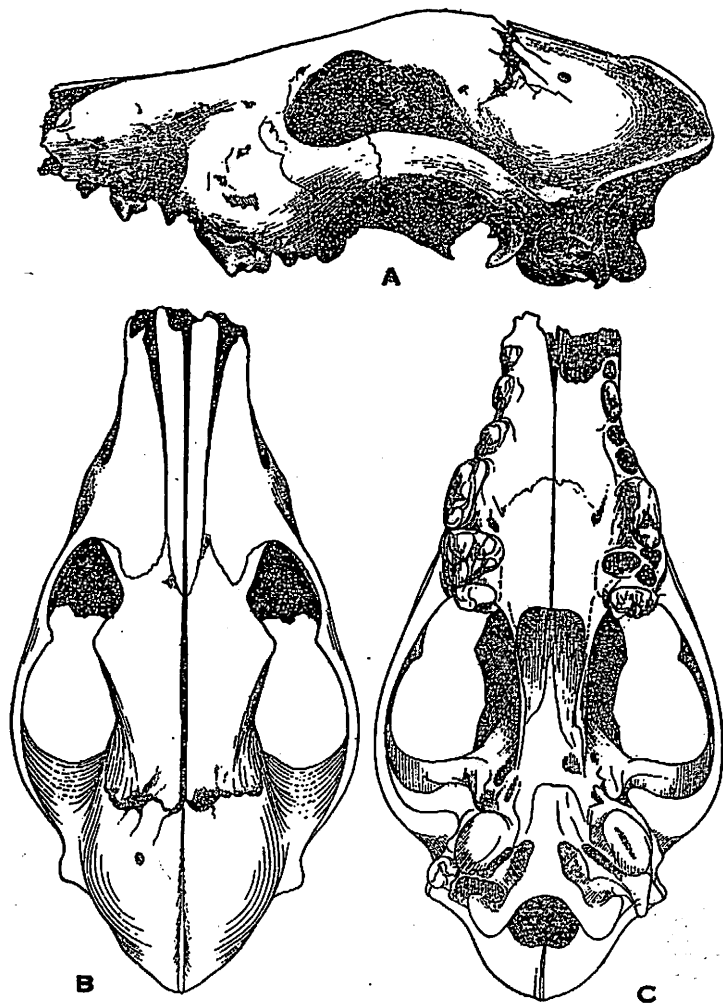


FIG. 8.2. Skull of the Harappan dog, *Canis tenggeranus harappensis* Prashad. A, lateral; B, dorsal; C, ventral views.

were perhaps imported by the people of Harappa along with those of the sambhar and chital for medicinal purposes),<sup>a</sup> chital, sambhar, barasingha, four-horned antelope, blackbuck and hog deer. The sambhar, barasingha

<sup>a</sup> Sewell and Guha, p. 671.

and chital, specially the last, were fairly widespread as their remains had been found in several prehistoric and historic sites from different parts of India.

The abundant molluscs which included many marine forms like *Xancus* (Chank shell) and *Arca* (Arc shell), etc., were apparently used for food (along with the domestic animals) as well as for ornamental purposes. The remains of bangles and their fragments at Harappa and Mohenjo-daro, and cores of shells from which these had been sawn off, point to the existence of a well-developed bangle industry at those sites. Possibly several species of turtles recovered at many sites might also have served ornamental purposes in addition to fulfilling the dietary requirements.

Among the 12 species of reptiles, eight belong to tortoises and turtles in seven genera, while the remaining ones are the crocodile, gharial and two species of monitor lizards.

Fishes are scantily represented and their remains do not furnish their identity with certainty. There are carp and other 'teleostean' remains, *Rita rita* and *Wallago* sp., both freshwater forms, and *Arius* sp., an estuarine fish. The scantiness of fish remains, however, may not indicate paucity or lack of interest in fish. There is definite evidence, furnished by the unearthing of several fish-hooks from these sites, which indicate that angling was a common pastime, as also the netting of fishes.<sup>a</sup>

Strangely enough, no remains of the tiger and lion are found though the former was by no means uncommon to the Harappans as we shall see later. The occurrence of rhinoceros remains at Harappa and Mohenjo-daro is interesting indeed. It has also been discovered at Lothal in Gujarat and formed the subject of neolithic haematite drawings in Mirzapur. The distribution of this dweller of marshy forest lands is now severely restricted, though only in historic times it was hunted by the Mughal Emperor Babur at Peshawar in the former North-West Frontier Province of undivided India. Judged from the archaeological finds and from references in the Vedic and the Puranic texts, it is apparent that rhinoceros was a fairly common animal in certain parts of India until recent historic times.

The animal remains dug up from the prehistoric sites give concrete evidence of the association of the people with the animal world and of the extent to which these were harnessed in the service of man. Some idea as to the impact of animal life on the prehistoric Indian culture and on the thought processes of these people can also be gathered from the glyptic art represented on seals, paintings on pottery and animal figurines and toys.

Large numbers of steatite seals excavated from Harappa and Mohenjo-daro bear engravings of animals in profile with inscriptions in a pictographic script still remaining undeciphered. Some of the animals depicted—the unicorns and chimaeras—are apparently mythical, but others are immediately recognizable as beasts obviously familiar to the artists of those times. The dexterity and sureness of touch with which many engravings have

<sup>a</sup> Sarkar (H.), pp. 133-34.

been executed are indeed commendable, specially the humped bull, in which even the wrinkles on shoulders and dewlaps have been faithfully reproduced.

The recognizable animals on seals from Mohenjo-daro, according to Mackay, are the short-horned bull (a smaller humpless breed), zebu or

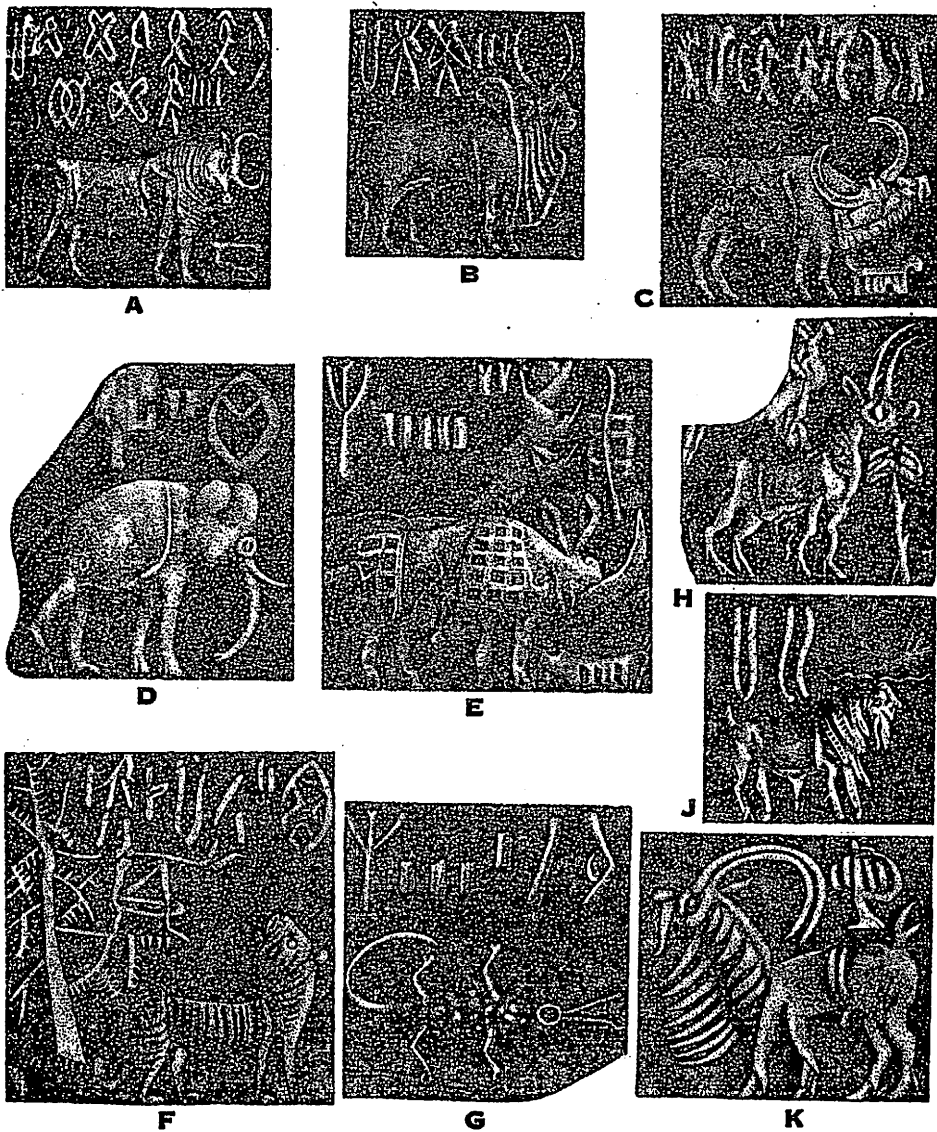


FIG. 8.3. Representation of animals on seals of Mohenjo-daro. A, short-horned bull; B, Indian humped bull; C, buffalo; D, elephant; E, rhinoceros; F, tiger; G, gharial; H, chinkara; J, domestic goat; K, wild goat (after Mackay, 1931, 1938).

Indian humped bull or brahminy bull (*Bos indicus*), buffalo (*Bubalus bubalis*), elephant (*Elephas maximus*), Indian one-horned rhinoceros (*Rhinoceros unicornis*), tiger (*Panthera tigris*), gharial (*Gavialis gangeticus*) and antelope (blackbuck ?). Further excavations from the same site have also unearthed a few seals with engravings of a frog (?), the chinkara or Indian gazelle (*Gazella gazella bennetti*) and the goat (*Capra hircus aegragus*)<sup>a</sup> (Fig. 8.3).

Majority of the seals excavated from Harappa<sup>b</sup> bear engravings identical with those from Mohenjo-daro, but on some are carved animal forms not represented at the former site. These are the gaur or Indian bison (*Bos gaurus*), eagle (?), (Fig. 8.4) and a hare (?). In addition, miniature seals representing the gharial, fish and tortoise are also available from Harappa.



FIG. 8.4. Representation of animals on seals of Harappa. A, gaur; B, eagle (? (after Vats, 1940).

Judging from the frequency of reproduction on seals, it seems that among the recognizable animals the most popular (next to unicorn) are the bulls which are represented both by a smaller, short-horned, humpless variety (only found in the seals at Mohenjo-daro) and by the brahminy bull or the Indian humped cattle. The short-horned bull is invariably carved in a characteristic stance, the head lowered and slightly twisted to one side, as if in an angry mood and just about to charge.<sup>c</sup> In most cases the heavy wrinkles on shoulders, and sometimes the dewlaps, are also reproduced with great fidelity. The sureness of touch with which these are executed leaves no doubt as to the identity of the zebu. The elephant, next to the bull in order of popularity, was certainly tamed by the Indus

<sup>a</sup> Mackay (1), pp. 385-92; Mackay (2), I, pp. 326-35.

<sup>b</sup> Vats, I, pp. 300-309; vide also pp. 451-58.

<sup>c</sup> Mackay (1), p. 385.

Examples of decorated pottery with naturalistic representations are available from other prehistoric sites adjoining Harappa-Mohenjo-daro culture in Baluchistan.

The Kulli wares from Kolwa in south Baluchistan contain natural representations of animals and plants on a frieze between zones of non-representational motifs. 'The frieze represents a standard scene, in which two animals, usually humped cattle but sometimes felines, dominate in grotesquely elongated form, a landscape with formalized trees and sometimes ancillary rows of diminutive, very stylized goats.'<sup>a</sup>

Some very interesting pottery remains with fish paintings executed in polychrome have been excavated from Nāl (Jhalawan Division of Kalāt State, Baluchistan). Hora<sup>b</sup> has attempted to identify the fishes represented on the 4,000-year-old Nāl ware, which he assigns to seven genera, namely *Garra*, *Crossochilus*, *Cyprinon*, *Tor*, *Nemachilus*, *Botia* and *Glyptothorax* (Fig. 8.9). The attempted identification is indeed a tribute to the Nāl artists for realistic accuracy. If Hora's identifications are correct,

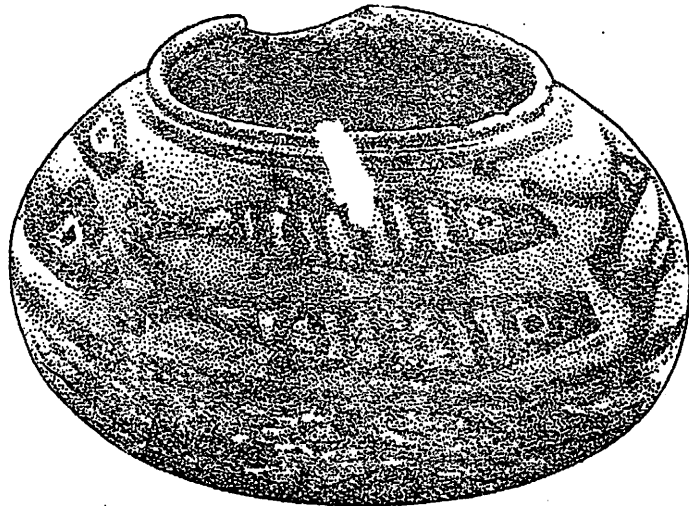


FIG. 8.9. Polychrome painting on Nāl ware showing *Nemachilus*-like fish (after Hora, 1957).

and they appear to be so, the pottery fish designs may throw some light on the climatic conditions then prevailing in Baluchistan. Hora rightly concludes that Baluchistan, now an arid area, might have had more rainfall and voluminous perennial streams during those times, since at least three of the fish motifs on the pottery represent genera which live in such streams.

<sup>a</sup> Figgott (2), p. 100.

<sup>b</sup> Hora (6), pp. 78-84.

No account of animals that caught the attention of prehistoric Indians can be complete without a reference to the mythical forms, specially the 'unicorn', depicted on seals from Harappa and Mohenjo-daro (Fig. 8.10A). The fact that 312 seals out of 387 excavated from Mohenjo-daro in the

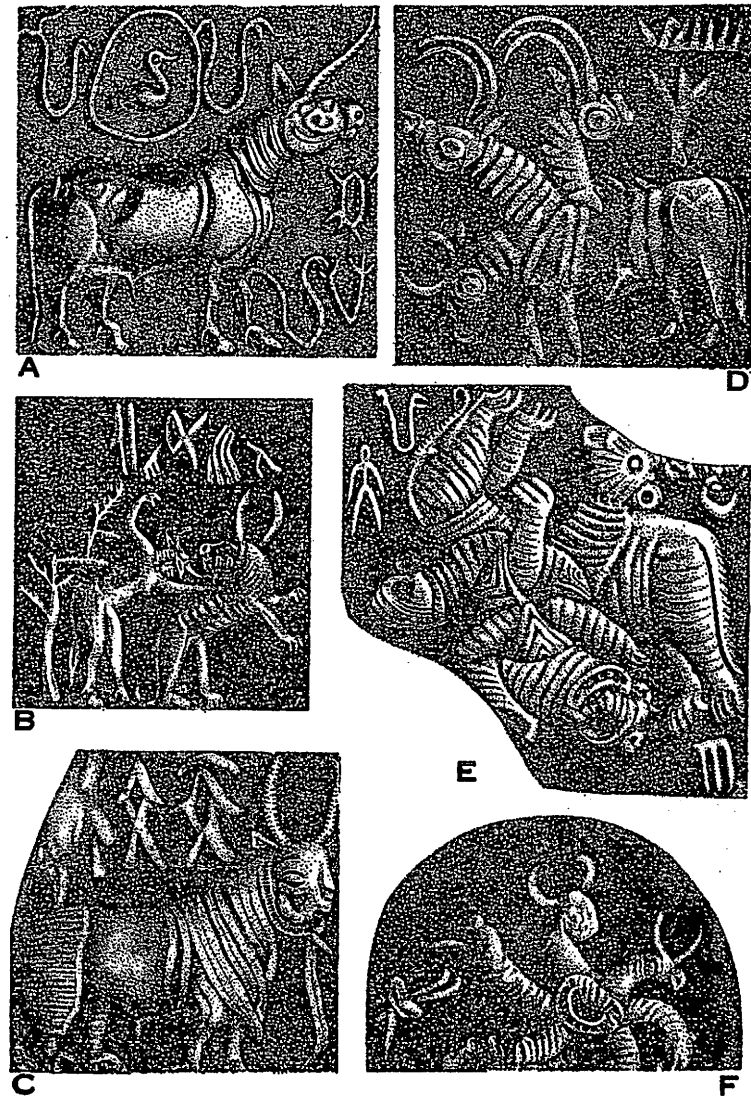


FIG. 8.10. Mythical animals depicted on seals of Mohenjo-daro. A, unicorn; B, human figure with hooves, horns and tail; C, ram+bull+man+elephant+tiger; D, three-headed beast; E, 'triskillon'; F, heads and necks of six animals radiating from a common ring (after Mackay, 1931).

in the *Sukraniti*. The assessment of the external characters of these animals was chiefly done from the practical point of view, to distinguish between the different qualities of animals in relation to their usefulness, and various breeds were enumerated taking into consideration the external characters of practical importance.

#### The Muslim Period

The Muslim rulers of India, in their own way, were sportsman-naturalists. They were keen hunters and had big menagerie of horses, dogs, cheetahs, falcons, etc., which were primarily helpful in hunting. Few, however, have left records which could throw light on the fauna of the country or its natural history. The only exceptions are the Moghul kings whose memoirs and biographies bring to light interesting information about the fauna and flora of the period. Ali in a series of articles has given a lucid account of the love of nature of the six great Moghul kings, Babur to Aurangzeb. Apart from their keen interest in animals and nature, the Moghul rulers were particular about truthfulness and accuracy in their memoirs.

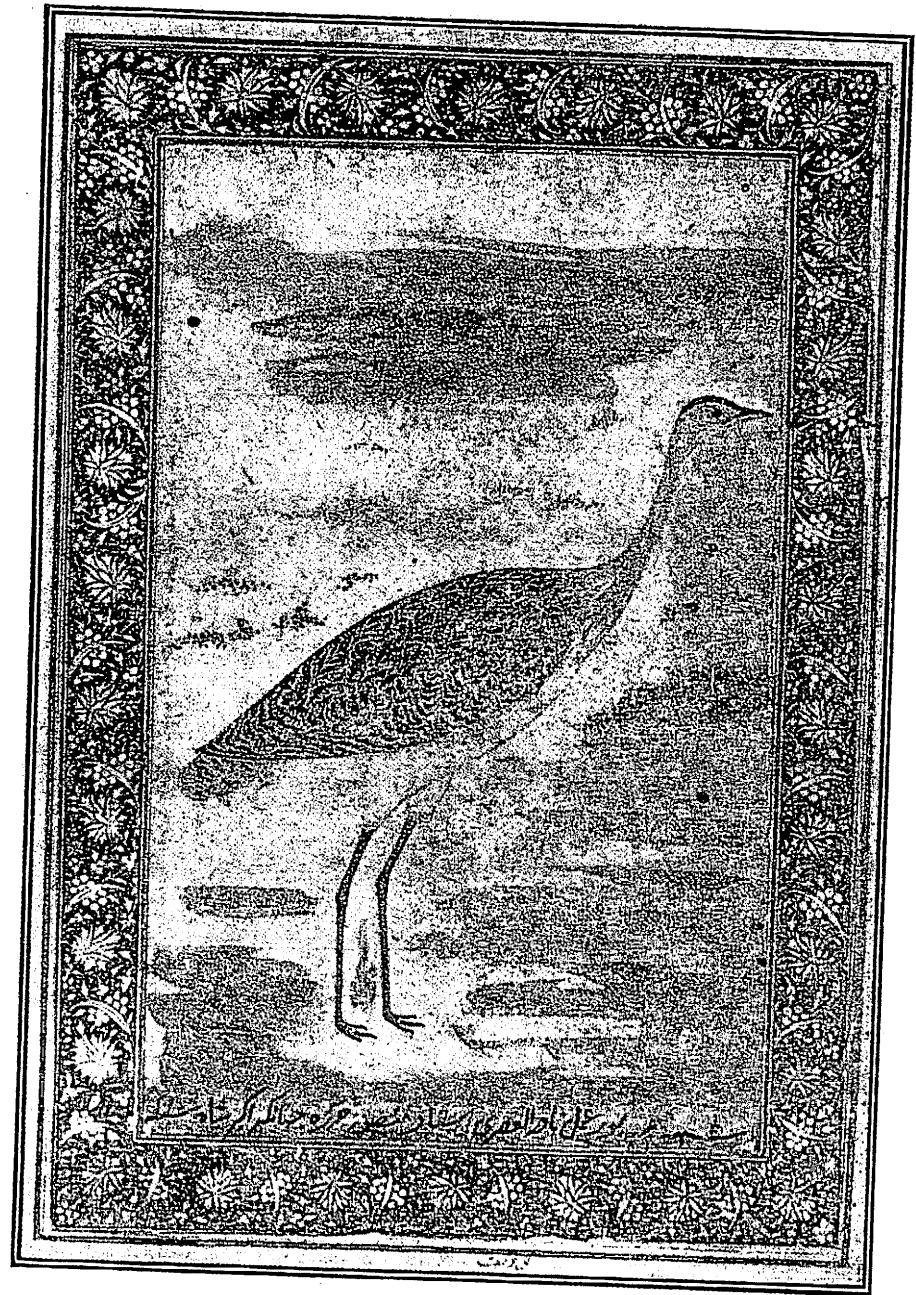
Babur, after his victory at Panipat in A.D. 1526, proceeded to compile a comprehensive gazetteer of Hindustan, to describe at length the customs of peoples, animals, fruits and flowers of the land he had conquered. In recording his observations he had taken special care for their authenticity and accuracy. Even when engaged in affairs of the State, or marching against a foe, Babur was always awake to the objects around him, and anything new that he saw was carefully noted mentally and reduced to writing in his memoirs at the earliest opportunity. Of the larger mammals, he was very fond of hunting the rhinoceros, an animal he had not seen in his native land. He frequently hunted the rhinos in the jungles of Peshawar and Hashnagar.

Humayun (1530-1540, 1555-1556), in his chequered career, had but little time to indulge in hunting animals. Yet his deep love of animals and nature is reflected in little passages of *Tazkerech*.

Akbar (1556-1605) was passionately enamoured of animals of all kinds from Persia, Turkestan and Kashmir. The inmates of his menagerie, which were every day led past under the royal window for the monarch's observation, included horses, elephants, antelopes, nilgais, rhinoceroses, large buffaloes with prodigious horns, lions, tigers, some of the finest sporting dogs of every kind from Uzbek, and species of birds of prey used in field sports for catching partridges, cranes, hares, and even for hunting antelopes on which they pounced with violence.

Moreover, he was a great breeder of domestic animals—elephants, camels, cows and horses—and the breeds of horses produced in his stables were as fine as those of Arabia.

His mode of hunting most frequently employed was *quamargah* or 'ringing in' method. He employed his armies (which kept them trim in



Bengal florican, painted by Mansur, court-artist of Emperor Jahangir, in c. A.D. 1624.  
(Courtesy, Indian Museum, Calcutta.) See page 441

Jahangir maintained a big aviary and menagerie where he carried on his observations, tests and experiments. His curiosity and passion for verifying hearsay often led him to dissect objects of his hunt and to examine the internals. He was specially interested in the position of the gall-bladder and never failed to verify whether this organ was situated inside the liver or outside. It may be of interest to note that what was just a natural curiosity for Jahangir assumed great importance some 300 years later. From the functional and evolutionary points of view, the presence or absence, size and position of gall-bladders in various animals formed topics of extensive investigations during the third and fourth decades of the present century. He was also keen to study the reproductive behaviour of animals in captivity and recorded some interesting observations on the breeding of the cheetah and of the tiger in captivity. Equally interesting are his observations on the diet of the Indian python (*Python molurus*) 'which can swallow up to a hog-deer' and of the king-cobra (*Ophiophagus hannah*) which was seen swallowing another cobra.

Jahangir's repute as a hunter was no less than his passion for nature, and his records reveal astronomical figures, 3,203 mammals and 13,954 birds. The nilgai (889), and deer, antelopes, mountain goat, etc. (1,670), among mammals, and pigeons (10,348) and crows (3,276) appeared to be his special targets.

The two last eminent Mughal kings, Shah Jahan and Aurangzeb, did inherit the qualities of their ancestors, but not to the same extent as Jahangir's or Akbar's.

The animals mentioned in the memoirs of the Moghul kings have been listed by Ali, along with notes recorded by them. Jahangir's animals have also been dealt with by Alvi and Rahman. Of special interest in this connection is the find of a miniature portrait of the dodo (a bird from Madagascar now extinct) in the collection of the Institute of Orientalists of the USSR, Academy of Sciences. This remarkable miniature (Pl. IX), apparently drawn from a live specimen, though unsigned and undated, bears the unmistakable Mansur style and was probably drawn from a collection of three birds in the possession of the East India Company's Factory at Surat where it was observed and described by Mundy in 1628.

#### ANIMALS IN SAṄGAM LITERATURE OF THE TAMIL COUNTRY

The Tamil country of the south is also rich in literature on animals and their natural history. Rao<sup>a</sup> has dealt with the animals mentioned in the ancient Tamil *Saṅgam* literature. This literature was certainly spread over a long period, which according to estimates lasted from 3000 B.C. to A.D. 1915. Nilakaṅṭha Śāstrī (*vide* Rao), however, is of the view that this literature was spread over four centuries commencing with the fourth century A.D.



Miniature of the dodo and a few other birds, painted during the reign of Emperor Jahangir. (First published in *Journal für Ornithologie*, 1958, Vol. 99; blocks received through the courtesy of Prof. Dr. Erwin Stresemann, Berlin). See p. 441

<sup>a</sup> Rao (H. S.), pp. 251-80.