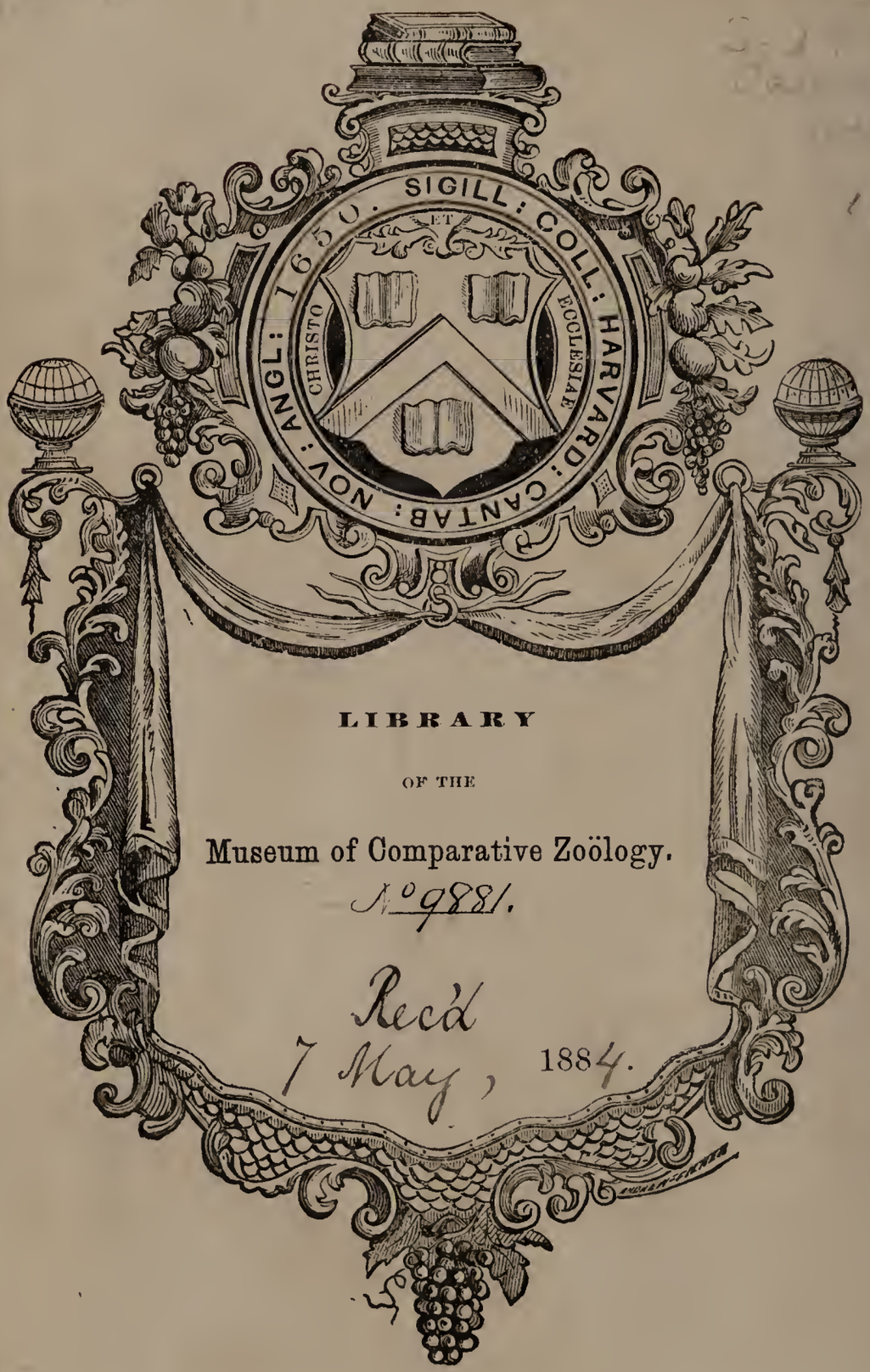

GUIDE

TO THE

CALCUTTA

ZOOLOGICAL GARDENS

BY

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PREFACE.

The Zoological Gardens of Calcutta having now been in existence for nearly eight years, and some definite arrangement of the Menagerie having thus become possible, it was thought that a Guide might be prepared which would render a visit to the Gardens more interesting and instructive than if the visitor were merely to walk round as hitherto, without any indication of what animals were represented and where they were placed.

The Plan which accompanies the Guide gives the position of the various Houses and Enclosures.

Changes are of course inevitable; but the arrangement adopted in this Guide will be adhered to, as far as possible, for some years to come.

8th December 1883.

KEY TO THE PLAN OF THE GARDENS.

On the Opposite Page.

1. Entrance Lodge
2. Aquatic Bird Pond
3. Dumrāon House.
4. Rodent House
5. Python Cage
6. Equine Enclosure
7. Porcupine House
8. Monkey Cage
9. Sonebursa House
10. Anoa Enclosure
11. Small Bears
12. Bear Houses
13. Hospital
14. Paddocks of Ruminantia

14*a*. Sheep & Goats
14*b*. Indian Gazelle
14*c*. Grant's Gazelle
14*d*. Indian Antelope
14*e*. Four-horned Antelope
14*f*. Beisa Antelope
14*g*. Nilghai
14*h*. Eland Antelope
14*i*. Gyal
14*j*. Gaur
14*k*. Wapiti Deer
14*l*. Bantings
14*m*. Formosan Deer
14*n*. Molucca Deer
14*o*. Spotted Deer
14*p*. Equine Deer
14*q*. Samber Deer
14*r*. Swamp Deer
14*s*. Hog Deer
14*t*. Barking Deer

15 & 16. Monkey Cages
17. Thatched Cottage
18. Dove Aviary
19. Peafowl Aviary
20. Rhinoceros Enclosure
21. Ostrich Enclosure
a. b. c. Emus, Cassowaries
22. Agouti Cage
23. Squirrel Cage
24. Mullick House
25. Thatched Pavilion
26. Superintendent's House
27. Parakeet Aviary
28. Schwendler Memorial
29. Andul House
30. Band Stand
31. Great Lake
32. Cages at Tamarind Tree
33. Bee Hives
34. Private Entrance
35. Dog Kennel
36. Anoda Pershad Roy House
37. Otter Enclosure
38. Buckland House
39. Kuch Bihar House
40. Burdwan House
41. Wolf and Hyæna House
42. Orang-Outang House
43 Abdool Gunny House
44. Armadillo Cage
45. Hyæna Cage
46. Surnomoyee House
47. Water-lizard Cage
48. Ezra House
49. Hamadryas Baboon Cage
50. Jheend House
51. Boat House
52. Elephant Picket
53. Gubbay House
54 & 55. Ratel Cages
56. Mongoose Cage
57. Schwendler House
58. Paradoxurus Cage
59. Durbhanga House
60. Small Cages
61. Restaurant
62. Malbrouck Cage
63. The Rink

PLAN OF THE ZOOLOGICAL GARDENS ALIPORE.

Lithographed at the Survey of India Offices, Calcutta, September 1883

ERRATA.

p. 19, line 16, *for* permited, *read* permitted.
p. 25, line 21, *for* Artomys, *read* Arctomys.
p. 31, line 8, for duplicidentali, *read* duplicidentati.
p. 41, line 12, *for* the, *read* this.
p. 56, line 31, *for* jet, *read* nearly.
p. 82, line 10, *for* on, *read* an.
p. 97, line 17, *for* egg, *read* eggs.
p. 119, line 19, *omit* that.
p. 151, line 9, for *gingianus*, read *ginginianus*.

GUIDE

TO THE

ZOOLOGICAL GARDENS,

CALCUTTA.

In the *Calcutta Journal of Natural History*, 1842, an article appeared from the pen of Dr. MacClelland advocating the establishment of a Zoological Garden in Calcutta; but this praiseworthy proposal did not meet with any response at that time.

In 1866, however, in an article in the *Calcutta Review* on "The Indian Museum and the Asiatic Society of Bengal," the writer urged the founding of a Zoological Garden, pointing out its utility as a means of affording instruction and recreation, and of providing facilities for the study of the habits and instincts of animals, and opportunities for testing their capabilities for acclimatization. He further urged the claims that such an institution had upon the consideration of Government.

In the beginning of the following year, Sir Joseph Fayrer, then President of the Asiatic Society of Bengal, proposed a scheme for the establishment of such an

institution, and although money was then subscribed by the late Maharajahs of Burdwan and Vizianagram, and by Rajah Rajendra Mullick, Bahadur, to the amount of Rs. 39,000, the project had to be abandoned, as no suitable site could then be procured. The subject, the importance of which had become fully recognized from that period, was only held in abeyance, never again being lost sight of.

Mr. Carl Louis Schwendler, in 1873, addressed the Council of the Asiatic Society on the same subject, and his suggestions were carefully discussed by a Sub-Committee of the Asiatic Society and of the Agri-Horticultural Society, but the scheme was once more deferred for want of a proper site.

At last, however, during the Viceroyalty of Earl Northbrook and the Lieutenant-Governorship of Sir Richard Temple, the Zoological Gardens became an accomplished fact through the energy of Mr. Schwendler; the Institution being established towards the close of 1875 by the Government of Bengal in conjunction with the public; the Government granting a suitable piece of land and securing the maintenance and the management of the Gardens, the public liberally contributing the capital required for the laying out of the grounds and for the erection of buildings; and Mr. Schwendler making over his private collection of animals to the new Institution.

The public, chiefly the native section of the community, contributed the sum of Rs. 2,40,000, and the subcriptions so liberally promised in 1867 were at once paid and even increased.

Advantage was taken of the presence in Calcutta of the Prince of Wales to have the Gardens inaugurated

by His Royal Highness on the 1st of January 1876, and they were opened to the public on the 1st of May of the same year.

The land granted by Government for the use of the Gardens comprised two sections, lying on either side of the road leading from the Zeerut Bridge to the entrance to Belvedere, the residence of the Lieutenant-Governor of Bengal. The section to the west was covered by a dense mass of native huts, more or less grouped around a large sheet of water, now converted into an ornamental serpentine lake with islands; whilst the other section to the east, which was a very waste piece of ground, much cut up by small tanks requiring to be filled up, yet remains only partially reclaimed, but there is an immediate prospect of its being utilized for the rearing of stock and for a dairy farm.

The Menagerie is at present solely confined to the western section, which has been transformed into one of the most beautiful pleasure-grounds in India.

The Gardens are situated about one mile and a half to the south of the city, on the south-eastern bank of Tollah's Nullah, probably one of the original channels of the sacred Ganges, and on the opposite bank of which, about a mile to the south-east, is the famous Temple of Kali from which Calcutta is supposed by some to derive its name.

The Zeerut is the bridge by which the Gardens are usually approached from the Calcutta side, and towards it converge roads from the east and west of the Maidan; but there is also the Alipore Bridge to the east, and over this it is proposed to carry an extension of the Calcutta systems of tramway, the terminal station to be within five minutes walk of the Garden Gate.

The Public Entrance to the Gardens is close to the main approach to Belvedere, and the Gardens are open to the public daily from sunrise to sunset at a merely nominal entrance fee.*

Passing through the Turnstile, as all have to do who are not Members or who enter in carriages, and across the verandah of the small picturesque Lodge, the visitor finds the main road before him, dividing into three great branches, one to the right, one in the centre, and the third to the left. If either the first or the last be followed, a carriage can be driven round the greater part of the circumference of the Gardens, and by this means the visitor can at once obtain a comprehensive idea of their general plan and extent.

The visitor, who would systematically go round the Menagerie, had better take the road leading to the left, because in the annexed plan he will find that the houses, cages and paddocks are numbered in accordance with this route, and the description of the animals will follow the same direction.

First of all, however, the visitor will pause close by the Lodge, near to a tall Borassus Palm, and observe

The Aquatic Bird Pond,

an oval sheet of water enclosed by a neat iron railing. The grassy border of this tank is planted out with a variety of beautiful shrubs and a few cocoanut palms, the former affording the birds admirable shade from the scorching sun of mid-day. In the tank are usually to be seen the following birds:—the flamingo, stork, pelican, common

* For special rules regarding the admission of the public, *see* Appendix.

swan, black-necked swan, black swan; the grey goose, bar-headed goose and black-backed goose; the ruddy sheldrake, the spotted-bill duck and the pink-headed duck, besides some specimens of the typical bird of Calcutta, the adjutant.

The Flamingoes, which constitute one of the families of the Order of birds known as Grallæ, a term derived from the Latin and meaning 'stilts,' in allusion to their generally long legs, are common to the Old and New Worlds; four species occurring in each of these great sections of our globe. Their structure is remarkable on account of the great elongation of the neck and limbs, and the peculiar formation of the beak.

In all the Mammalia, that Order of animals which suckle their young, the bones which form the neck, however long and flexible it may be, are always seven in number, with only one or two exceptions, for example, the three-toed Sloths of South America, in which the *cervical vertebræ* are nine in number; but in birds no such uniformity prevails, and the neck-bones (cervical vertebræ) may vary from eight to twenty-three, being never fewer than eight. In the flamingoes they number seventeen.

The peculiarity of the bill of the flamingo is the remarkable way in which it is downwardly bent at its middle. Like the bill of a duck its margins are provided with a series of lamellæ, which enables the bird to sift the food from the mud as through a strainer. In the early morning one may observe the flamingo with its head immersed in the tank, treading the bottom with its feet to loosen the mud, and sifting it backwards owing to the downward direction of the bill; and it can keep its head in this position for a considerable time. In the great

majority of birds the tongue is but little fleshy ; in the flamingo, however, it is so plump, that it was a *bonne bouche* with Roman epicures. The three anterior toes are united by membrane as in the ducks. It is still a matter of uncertainty to what groups of birds the flamingoes are most nearly allied, but they seem nearly to approach the storks in some of their characters, and the geese in others.

The Storks are here represented by the white stork *Ciconia alba ;* the white-necked stork, *Ciconia (Dissura) episcopus ;* the adjutant, *Leptoptilus argala,* and the black-necked stork, *Mycteria australis.*

The White Stork is altogether white with the exception of the greater wing coverts, the scapulars and the quills which are black, and the bill and legs which are red. It is an inhabitant alike of Europe, Africa and Asia, but it only visits India during the cold weather, arriving about October and leaving by the end of March. It occurs chiefly in Central and Western India, and only rarely finds its way to Southern India. This bird is generally found in large flocks on open grassy plains, and it feeds on insects and also on reptiles.

The White-necked Stork can easily be recognized by its body being a glossy purplish-back with a white neck and tail. It is known to the natives of India as *Manik-jor,* which means the companion of a saint ; hence it is not eaten by Mussalmans, as a rule, but on the other hand, Europeans have no such scruple, and as the flesh is considered palatable as a beefsteak, the bird is called by them *the beefsteak bird.* India, with the countries to the eastward, is the home of this stork, and it frequents the margins of rivers, jheels and lakes, and its food would

appear to be very varied, as it apparently eats everything invertebrate, also fish, frogs and snakes. It has been often observed killing snakes, and even killing and eating small cobras, although it has a dread of the full-grown reptile. The snakes it generally attacks and eats, are of the dimensions of the grass-snake, *Tropidonotus stolatus*, and the tree whip-snakes, *Passerita mycterizans*, and *Dendrophis picta*. The manner in which it proceeds to kill a snake is interesting. After having given the snake repeated sharp nips by its powerful bill, which prevents it wriggling away for any distance, it at last invariably, as far as these observations go, takes the snake to the water into which it drops it, but watching it carefully all the while, and if it becomes lively and looks as if meaning to escape, the bird seizes it again and squeezes it with its bill, and then returns it to the water, and this is repeated until the snake is nearly dead, when the bird begins to swallow it head foremost. Sometimes considerable difficulty attends this process, as the reptile occasionally resents this treatment and makes a violent effort to escape, the tail wriggling about at the angles of the bird's mouth, and even twining round its thin neck, but this awkward dilemma is overcome by the bird regurgitating the reptile, giving it another squeeze and a final swallow. This habit of destroying snakes renders this stork valuable, and it ought, therefore, to be carefully protected.

In this pond, the Adjutant, another form of stork, and which is a very characteristic feature in the fauna of Eastern India, is generally to be found in captivity. It is one of the largest of Indian birds and is well known, as it frequents Calcutta and its neighbourhood during the rains,

arriving about June and departing to its breeding haunts about the middle of October. It is a curious-looking bird, owing to its huge bill, nearly bald head, bare neck, grey stony eyes, and long pendular pouch. Its body is of a nearly uniform grey colour, and it has long stilt-like legs. Its most remarkable structural peculiarity is its pouch, which has no connection whatever with its digestive system, but is only a receptacle for air which it receives from two crescentic, valvular orifices that occur in the nasal passage a little behind the opening of the nostrils. These communicate with a large chamber in which the orbit is situated, there being a great cavity immediately below the eye of the bird, which is suspended in it, and another large cavity occurs farther back in which all the muscles are seen free as in the anterior cavity; and a single orifice below the mesial line of the base of the skull communicates with the neck or gular pouch. The pouch in reality consists of two, but the one on the right side, like the asymmetry that prevails in the generative organs of birds, is nearly suppressed, the left pouch being the one that is so largely developed. The right pouch is indicated by a small flaccid cavity separated from that of the left side by a longitudinal septum of delicate consistence. The pouch does not communicate with the lungs, but the whole of its inner surface is highly vascular and its walls are endowed with remarkable contractility. Long after death the pouch may be distended to a great degree, and when the tension is taken off it, at once contracts into numerous folds. This pouch has doubtless some relation to the mechanism of flight and to the aeration of the blood, both of which functions are intimately related to each other in birds as is well known, and it

must, therefore, be regarded merely as an adjunct to the usual air-sacs found in birds, and which contribute to increase the temperature of the blood, and make the skeleton pneumatic.

Mycteria australis, or the Black-necked Stork, sometimes known as the Indian Jabiru, is a bird of great size, and has a wide distribution over India and the Malayan region, extending even into Australia. In its habits and food it much resembles the adjutant.

The Pelicans belong to a somewhat grotesque group of birds characterized by their large bodies, powerful wings, short limbs, webbed feet, and the large loose bag or pouch beneath the lower jaw ; the tongue being quite rudimentary and reduced to a mere tubercle. The pelicans are universally distributed, occurring in both the Old and the New Worlds, but confined to temperate and tropical regions. Nine species are known. The bill is strongly hooked at its tip, and its under half forms a flexible framework to which the pouch is attached, and it is in this receptacle that the fish which the bird catches are stored, to be afterwards swallowed at leisure, or to be disgorged for its young. In order to empty its pouch the bird presses its crimson-tipped beak against its breast, and it is this habit doubtless that gave rise to the fable, that the pelican pierces its breast in order to draw blood wherewith to feed its young. Although there is no truth in this fable, the pelican does not appear to be without compassion for its own kind when helpless and suffering, for it is related that the inhabitants of Mexico being aware of this trait in its character, catch a pelican, break its wing and tie it to a tree. Its cries of distress attract other pelicans, which are said to bring fishes in their pouches and disgorge them for the food of the

captive bird ; the wily Mexican, however, drives off the birds and appropriates the fishes for his own use. Besides being so thoroughly aquatic in their habits, that they progress with difficulty on land and with an ungainly waddle, they are nevertheless possessed of great powers of flight due to the great size of their wings and to the buoyancy of their bodies. This latter feature of their organization is effected by the air which they breathe finding access not only to their bones but into the tissue which underlies their skin. It is only, however, in the last mentioned particular that they differ from other birds in the provision for flight, because it is a peculiarity of the feathered tribe that their lungs open internally into large air-sacs. These are generally nine in number, two in the abdomen, four in the chest, two in the neck, and one between the branches of the merry-thought or collar-bone. These air-sacs communicate with the air-cells in the bones of the bodies of the birds ; the bones of the head only receiving the air which they contain from the ear and the cavities of the nose.

The Swans, Ducks, and Geese belong to the family *Anatidæ*. There are usually several representatives of the common White Swan, *Cygnus olor*, also known as the mute-swan. It is generally distributed over Europe and occurs in the western portion of Asia and has been killed in Sindh. The other white swans are the Hooper swan, Bewick's swan, and the Trumpeter swan.

The Black-necked Swan, *Cygnus nigricollis*, is peculiar to the Antarctic regions of South America, whilst the Black Swan, *Cygnus atratus*, of which there are some specimens in this pond, is found only in Australia.

The chief characteristics of Swans are their greatly

elongated necks and their short legs. There are, in all, ten species of swans, and in their distribution, with the exception mentioned above, they are confined to the temperate regions of the Northern and Southern Hemispheres.

Ducks and geese, like swans, have four toes, three of which are turned forwards and webbed, while the fourth toe is directed backwards. The true ducks, such as the pintail, widgeon and teal are distinguished from those ducks which chiefly frequent the sea, such as the golden-eye, pochard, canvas-back, &c., by their first toe being provided with only a narrow membranous lobe, whereas in the Scoters, Eiders and Mergansers this structure is very broad. The bill of ducks and geese is more or less spatulate and is a highly sensitive structure, as it is covered with skin richly supplied with nerves; and in this respect it resembles the bill of the flamingo, and also in that the sides of the bill are provided with a series of horny plates which act as a strainer.

The well-known Indian duck, the Spotted-bill, *Anas pœcilorhyncha*, is represented here. This duck is peculiar to India, Ceylon and Burmah, being a permanent resident and not like the majority of ducks that occur in this country, merely visitors during the cold weather months and leaving on the approach of the hot weather for the temperate regions to the north, crossing the Himalaya for their breeding grounds in Central Asia.

Another non-migratory species generally to be seen in this tank, and essentially a bird of this country, is the Pink-headed duck, *A. caryophyllacea*, the males of which have the whole of the head and neck of a beautiful rosy pink, the rest of the body being dark-brown with a white spot appearing on the closed wing, the under surface of which has a pinkish tint which becomes very observable

during flight. This bird is found in Bengal (Rajmehal and Purneah), Northern India, and as far south as Madras. It breeds amongst long grass in marshy places. It is occasionally sold in the Calcutta market.

The Ruddy Sheldrake, *Casarca rutila*, is also generally present. This duck, which is very widely distributed in India and Burma in the cold weather, is spread in profusion over the greater part of Asia, and occurs also in Northern Africa and Central Europe, extending to Britain. It has been observed breeding by Hooker in Sikkim and Ladakh. It is commonly known as the Brahmani duck.

The Grey Goose or Lag, *Anser cinereus*, is generally to be found in this pond. It annually visits India during the winter, and is frequently seen in large flocks. It breeds in Northern Europe and Asia, and is the stock from which all the domesticated varieties of geese appear to have been derived.

This pond also presents some examples of the Bar-headed or Indian Goose, *Anser indicus*, which appears during the cold weather in vast flocks, and which returns in spring to its breeding quarters north of the Himalayan range.

The Canadian Goose is also represented. The marked feature of this bird is its black head and neck, with a broad patch of white spreading from the neck over the cheeks on each side. It occurs in the United States of America and in Canada, and its "migrations extend from the lowest latitude of the United States, to the highest parallels that have been visited in the Northern regions of America." It has been introduced into England where it has thriven well, and the bird in this tank has readily accustomed itself to the climate of this country.

Taking now the broad path to the left, a narrow road

soon diverges to the right, leading to a prominent building known as

The Dumrāon House.

It may be as well to explain here in passing, that all the more important houses have had special names bestowed on them in recognition of the munificence of the individuals whose names they bear. There is only one exception to this, in the case of the enclosure which has had associated with it the name of Buckland, as a tribute to the services rendered by Mr. Charles E. Buckland, C. S., at the beginning of the Gardens, and by his father afterwards during his tenure of the office of President of the Honorary Committee of Management.

The house before which we now stand is named in honor of His Highness the Maharajah Sir Radha Prasad Sing, K. C. S. I., of Dumrāon, who contributed Rs. 10,000. It is a large structure, and is devoted to the illustration of the Indian and Malayan species of monkeys. The house consists of eight compartments, in which will be found examples, as far as possible, of the following species, *viz* :—The Langur or Hunamān monkey, *Semnopithecus entellus*, and the Assam Langur, *Semnopithecus pileatus ;* also the Bandar or common monkey, *Macacus rhesus ;* the crab-eating monkey, *Macacus cynomolgus ;* the pig-tailed Macaque, *Macacus nemestrinus ;* the Ashy monkey, *Macacus ocreatus ;* and the Satyr monkey, sometimes called the *Wanderoo*, *Macacus silenus.*

They belong to the great section of monkeys known as the *Catarrhine*, from the fact that their nostrils are directed downwards and are separated from each other, merely by a narrow septum ; whereas in the second division, the *Platyrrhine*, the nostrils are far apart. All the

Catarrhine monkeys are inhabitants of the Old World, whereas the Platyrrhines are found only in the New World. There are other and important characters, however, in which they differ from one another; for example, very many of the Old World monkeys have cheek-pouches in which they store their food, but the New World monkeys have none. While no monkey of the Old World uses its tail as an organ of prehension, in many of the Platyrrhine monkeys of the New World, the tail is very muscular and flexible, and the under surface near its tip is in many quite bare and extremely sensitive, so much so that the animal is able to use it as a fifth hand. These latter monkeys are also distinguished by the circumstance that their hips have no hardened bare patches; in the majority of them, their teeth are more numerous than in the Catarrhine or Old World monkeys in which the teeth are 32 in number as in man; whereas only the Marmoset among the Platyrrhine monkeys has this number. Besides these, there are other distinguishing characters which it is unnecessary to dwell upon here.

The Catarrhine monkeys are divisible into two great groups, first those which present a general resemblance to man and assume a semi-erect or erect position in walking and have no trace of a tail, and are known as the Anthropoid Apes which are illustrated by the Gorilla. Chimpanzee, Orang and Gibbon; and second, those which more resemble ordinary Mammals in walking on all fours and in being provided with a tail, or a rudimentary tail, or the presence of caudal muscles if the tail is absent externally. Of course, these are only the most general of their external differences, there being many important anatomical features in which they differ. The

Anthropoids are kept in another part of the Gardens and will be described afterwards, while the second group is represented in this and also in the Jheend House and in some small cages distributed throughout the Gardens. Of this latter group there are two well-marked genera exhibited in this house, the genus *Semnopithecus* without cheek-pouches, and the genus *Macacus* which has these sacs, all having tails generally well developed, but differing from each other in dentition, the form of the skull, and the structure of the stomach,—this last anatomical feature being one of considerable importance. In the genus *Macacus* the stomach is a simple sac as in man ; whereas in *Semnopithecus* it is, as far as we know, throughout the genus, a much sacculated organ. These last monkeys feed largely upon the leaves of trees, and it is interesting to observe the manner in which, by one sweep of their hand, they strip the leaflets from off a pinnate leaf ; whereas the food of the Macaques is much more varied.

The Langur or Hunamān monkey, *S. entellus*, is a large powerful animal, generally distributed over the greater part of India, and is represented in the Himalaya by even a more powerful monkey, *viz.*, the Hill-Langur which some have supposed to be a distinct species, although perhaps it would be more accurate to regard it as only a mountain race which ascends to considerable altitudes. The Langur and the other Semnopitheci, are essentially gregarious, and the experience gained in these Gardens has been, that the only way to keep any alive is to have a considerable number of one species together, otherwise they pine and die.

It is well known to sportsmen that the Langurs from their heights among the trees, are very observant of

tigers, and whenever one is seen, they make a peculiar noise which, after once being heard, can always afterwards be recognized as announcing the near proximity of *Stripes*.

The female langur exhibits great affection for her young which, as in the case of the monkeys generally, holds on to the under surface of the mother, this position being assumed in order to admit of its having free access to the nipples, which in all monkeys are situated on the chest as in woman. As an example of the affection manifested by these animals for their young, an instance that occurred in this house may be cited: A baby langur which was still being reared at the breast died, but the disconsolate mother, who exhibited the greatest tenderness for her lost one, refused to allow it to be removed from the cage, snatching away the decaying body when any attempt was made to remove it.

Forbes mentions that having once shot a female out of a number of langurs herding together, a large male followed him and the dead monkey to his tent and remained there manifesting the greatest distress, and was only pacified by getting possession of the dead body of his comrade which he bore quickly away in his arms.

The Assam Langur or Semnote, *S. pileatus*, differs in appearance from the Indian Langur. It is considerably smaller, and does not carry its tail curved forwards over the back like *S. entellus*, *S. schistaceus*, *S. priamus*, and *S. leucogaster*; but its tail, which is very long and tufted, hangs down. The face is purplish-black, and the whiskers are rather long and reddish-yellow. In adult males, the coat is a rather rich yellowish colour, washed with ashy-grey on the upper surface, and more especially on the top of the head, giving rise to a capped or pileated appearance,

hence its specific name, *pileatus*. Its under surface is sometimes bright orange, and owing to this circumstance the term *chrysogaster* has also been applied it. It is generally of a mild disposition.

Its call is very peculiar, and when I first heard it in this Garden, about sundown, and at a little distance off, I thought it was the voice of one of the large tree-geckoes of Arakan and Burma known as the *Tuck-tu* or *Gecko verus*, a lizard which of late years has been introduced into the neighbourhood of Calcutta by the boat traffic from Chittagong.

The other Semnotes closely allied to these Langurs of India and Assam, are *S. priamus* found in Southern India and Ceylon; and *S. leucogaster* also peculiar to Southern India.

The Macaques, or common monkeys of Asia, differ greatly in disposition from the generality of the Semnotes, as they are much more lively, imitative and aggressive. Some of them, especially the large pig-tailed monkeys, so called from their short up-turned tails, are very formidable, as they attain a considerable size, are extremely muscular, and their jaws are armed with canines equalling those of a leopard in size.

Of this group the following species occur in India, *viz.*, the common monkey or *bandar*, *Macacus rhesus*; an allied species in Assam, *M. assamensis*, probably the same as *M. rheso-similis*; and *Macacus sinicus*; whilst in Ceylon there is a species, *M. pileatus*, resembling the latter in certain of its features, but quite distinct from it, and peculiar to that island. A monkey, markedly distinct from any of the foregoing is also found in Southern India, *viz.*, the so-called Satyr Monkey, *Macacus silenus*. In Assam, the fauna of

which is essentially Indo-Chinese and not Indian, partaking also of Indo-Malayan characters, we find the Stump-tailed Macaque, *M. arctoides*, the most westerly representative of a short-tailed group or sub-section of the genus found in Eastern Asia, the islands of the Indo-Malayan Archipelago, and the Austro-Malayan section of the great Australian region where, by *Macacus maurus*, it is linked to the other subgeneric form, *Cynopithecus niger*, which in its turn manifests affinities to some of the African Apes.

Macacus rhesus, the common monkey of India, is always to be found in this house, and also in other parts of the Gardens. It is very generally distributed over India, ascending the Himalaya to 7,000 feet, and it invariably dwells in communities, for monkeys generally manifest the social instinct as well as man. It is to the ignoring of this feature of their native disposition, that a great deal of the want of success that frequently attends the attempts to keep certain species alive in Zoological Gardens is to be attributed. This trait in their character is more highly marked in some than in others, and amongst the Langurs it is very pronounced, and this Garden always failed to keep the Indian species alive until it was represented by a troop. As a rule it has been found, in the management of this Garden, that when monkeys are kept singly, they droop in spirits and neglect their toilets; whereas if two or more are together, they mutually attend to personal cleanliness in the way which is so characteristic of their race, and of which habit we find the equivalent, if not the survival, among uncultivated races of men.

Macacus rhesus among the Asiatic monkeys, and a nearly allied species found in the Island of Formosa, *M. cyclopis*, and probably also *M. lasiotis* of China,

are distinguished by the periodical recurrence of great tumor-like swellings, which make their appearance on the hinder quarters, more especially of the females at certain periods, associated with a remarkable activity of the capillary circulation in these parts and in the blood-vessels of the face, producing a bright crimson hue. This species has bred in the Gardens and has also crossed with the common *Macacus cynomolgus*, the young possessing more the characters of the female parent *(M. rhesus)* than of the male, and, when females, exhibiting similar sexual swellings and flushings.

This monkey is generally found near human habitations, as is frequently the case with the langur, doubtless from the circumstance that it finds an ample supply of food ready at hand in the fields, gardens and bazaars, and which it is permited to pilfer with comparative impunity. Similar considerations lead it to attach itself also to temples, as for example, to the so-called Monkey Temple at Benares and numerous other shrines. This monkey manifests considerable intelligence, and is easily taught to mimic some of the ways of its superiors, and hence it is the species generally seen with the *Nāts*, being led about with a goat, on which it is taught to bestride itself and go through certain manœuvres, or it may be in the company of a bear, black or brown.

M. cynomolgus, is distributed over the Malayan Peninsula and the adjoining islands; it occurs also in the delta of the Irawady, and ranges as far to the east as the island of Timor, under various slight modifications of external aspect. It is frequently seen in large troops on the mudflats all along the Burmese and Malayan coasts hunting for crabs. These mudflats of the estuaries are the abode

of burrowing crustacea, which occur in immense numbers, and at low tide the monkeys may be observed wandering about searching for the crabs and inserting their arms into the burrows even up to the shoulders.

Macacus silenus is markedly distinct from any of the foregoing examples of the genus, as it is jet-black, with long grey whiskers and beard, giving rise to the two names which are sometimes applied to it of Satyr or Lion monkey. Its tail is moderately long and somewhat tufted. It is peculiar to the forests of Southern India.

The Rodent House.

In close proximity to the Dumrāon House, and a little to the south of it, is the house devoted to the gnawing animals, or *Rodentia*, a class of animals illustrated by the rabbit, rat, and squirrel, and which is distinguished by the presence of two front cutting-teeth or incisors in both jaws, which unlike the teeth of the majority of Mammals, are persistent growers, that is, they are always growing outwards as their tips are being worn away; and as the thick enamel which covers the front of the tooth is not worn away by attrition so rapidly as the part behind it, their incisor teeth have cutting edges like a chisel, and it is the hard character of the enamel which enables some rodents to eat their way even through wire-cages. Unlike other animals, they have no eye-teeth or canines, and the incisor teeth which are generally four in number in other Mammals, become in all the Rodentia, reduced to two in number, with the exception of the family that includes the hares and rabbits, in which another pair of incisors exists in the upper jaw.

The other teeth of these animals (rodents) present con-

N. B.—to face p. 20.

The complete arrangement of the Rodent House has been necessarily deferred until a house shall have been built for the reception of the poultry now exhibited in one half of it.

siderable diversity of structure, as in some they have roots, while in others they are always growing. Milk teeth, which occur in the majority of other animals, have not been detected in a large number of rodents, and when they do exist, as in the Guinea-pig, they are shed before the animal is born.

Some of these animals, like the Old World Monkeys, have huge sacs at the angles of the lower jaw called buccal pouches, and, in the Hamster, they can be drawn back by special muscles, which are attached to processes of the back-bone in the loins of the animal. Many of them are burrowers and nocturnal in their habits. A few of their structural modifications are exhibited in this house; and a little to the south-east, the animals known as porcupines, have a special house devoted to themselves.

In this Rodent House, the forms exhibited are, the Paca or Spotted Cavy, the Agouti, the Viscacha, the Coypu, the Guinea Pig, the Hare, the Hispid Hare, the Bamboo Rat the Indian Field Rat, the Marmot, and Squirrel, the last being illustrated by a number of species, some being accommodated in other parts of the Garden.

The Spotted Cavy is an inhabitant of South America, and along with the Agoutis, constitutes a Family of Rodents. Its greatest peculiarity is the very remarkable cavity that occurs in the cheek and lies under a great expansion of what is called the zygomatic arch, that is, the eminence corresponding to the line that runs from the ear of man to the bony prominence of his cheek. A dilatation of this character is not found in any other animal. The sac that lines this great bony cavity, is an inward prolongation of the skin of the cheek, devoid of hair, and the opening being placed behind the mouth might at first sight be

mistaken for the mouth of the animal. The use of this curious provision is yet unknown. This feature in the anatomy of the Cavy gives its name to the genus, *Cælogenys*, which means hollow-cheeked. It will also be observed that the tail is only indicated by a very slight prominence. In its habits it is strictly nocturnal, and it is, therefore, usually found in its box during the day. It is also a burrower, constructing superficial chambers, each of which, it is said, has three openings, and the localities which it selects are, as a rule, in forests, close to water in which it swims and dives with facility. Its food is entirely vegetable, and it is very fond of sugar-cane, but it does not refuse animal food when in confinement. It is distributed all over the Eastern portion of South America, and formerly occurred in some of the islands of the West Indies. Its flesh is highly esteemed.

The Viscacha, also a South American rodent, will be found in the adjoining compartment. It has somewhat the general characters of a hare, but with a heavier head and body, and a much longer, and tufted tail. It is known as *Lagostomus trichodactylus*. It is restricted to the Eastern slopes of the Andes, and Darwin gives the following account of its habits: he says that in the evening they come out of their holes in great numbers, and then sit quietly on their haunches. They are at such times very tame, and a man on horseback passing by, seems only to present an object for their grave contemplation. They do not wander far from their burrows. They run very awkwardly, and when hurrying out of danger, from their elevated tails and short front legs, much resemble great rats. Their flesh when cooked is very white and good, but it is seldom used. The Viscacha has one very singular

habit; namely, dragging every hard object to the mouth of its burrow; around each group of holes many bones of cattle, stones, thistle stalks, hard lumps of earth, dry dung, &c., are collected into a heap, which frequently amounts to as much as a wheelbarrow would contain. Darwin goes on to remark 'I was credibly informed. that a gentleman, when riding in a dark night, dropped his watch; he returned in the morning, and by searching in the neighbourhood of every viscacha hole on the line of road, as he expected, he soon found it. This habit of picking up whatever may be lying on the ground anywhere near its habitation, must cost much trouble. For what purpose it is done, I am unable to form the most remote conjecture; it cannot be for defence, because the rubbish is chiefly above the mouth of the burrow, which enters the ground at a very small inclination.' The Viscacha is herbivorous in its habits. It belongs to the Family which includes the Chinchilla which yields the valuable fur.

The Coypu, that large rat-like rodent, is exhibited in the next compartment. It is also South American, occurring in the rivers on both sides of the Andes, and is found also frequenting the sea among the islands of the Chonos Archipelago. It is exclusively a vegetable feeder. It is closely allied to *Plagiodon ædium*, the house rat of the island of St. Dominique, The Coypu resembles a beaver in appearance, but has a round scaly tail. Its hindfeet are broadly palmated, so that it is an agile swimmer. It inhabits the banks of streams and creeks, on which it constructs its burrows, and it also frequents the sea shore, and it is said to eat shell fish. It is nocturnal in its habits, and it is hunted with dogs for the sake of its fur which is valuable, as it has an under-fur resembling that of the Otter

and Beaver. As many as three millions of skins are annually exported, great numbers being required to make up into an ordinarily sized cloak.

The Bamboo rats belong to the genus *Rhizomys* which is closely allied to that group of burrowing rodents, found in temperate regions and known as Mole-rats. They are essentially burrowing rats, living exclusively on vegetable substances, and more particularly on the shoots of bamboos, hence they are known to Europeans as Bamboo rats. Their heads are large and round and furnished with bright orange-coloured powerful incisors, but their eyes are very small, and also their external ears. Their tails are always very much shorter than their bodies, and naked. They occur in the Eastern Himalaya, Assam, Arakan, Burma, and the Malayan Peninsula and islands. The largest species appears to be the *R. sumatrensis*, which attains to the size of a rabbit. It is a greyish yellow, with generally a white spot on the forehead, a mark which sometimes shows itself on the chestnut-coloured species, *R. badius*, which inhabits the Himalaya and extends southwards to Mergui. If irritated, they occasionally become very fierce; and a female of *R. pruinosus*, a race which inhabits the Assam region and Upper Burma, and is closely allied to a Chinese form, *R. chinensis*, and attains to nearly as great a size as *R. sumatrensis*, has been seen to kill off its own young in quick succession, apparently merely from fright or anger. The other species, *R. erythrogenys*, also a Malayan form is, however, very gentle in its habits, and the first example of the species, an adult female, could be handled with perfect safety. Two other and younger individuals were equally docile and used to play

with one another, and never fell asleep until they had cried themselves to sleep, emitting a noise like the whine of a very young child, and one generally lay on the back of the other, having the ear of its mate in its mouth, a habit often observed in young bears. This plaintive whining noise was also made by the adult when handled.

The common Guinea-pig is supposed to be derived from the species *Cavia aperea*, or the Restless Cavy, a common South American rodent, inhabiting the grassy districts at the edges of woods. It lives exclusively on vegetable substances, and in feeding generally sits up on its hind feet and carries the food to its mouth in its paws. It is very prolific, and begins to breed at ten months, and generally produces a brood of six or eight. This species has often suffered martyrdom in the interests of physiological research.

Examples of the genus *Arctomys*, or the Marmots, are generally exhibited in this house, either the Himalayan, Alpine, or American species. They belong to a Family divided into two sections, those without buccal pouches or the true marmots, *Artomys*, and those with buccal pouches, *Spermophilus*, smaller animals than the former and linking the marmots with the squirrels. They are all more or less gregarious, and live in burrows in elevated regions. They lay up a store of provisions for winter in the chamber in which they live, and in which they hibernate during the whole of winter, having first shut themselves in from all annoyance by closing the door of their house with grass and earth. A number of other animals also manifest this remarkable phenomenon, and they are known as hibernating animals, and chief among them are the Dormouse, most of the

hedgehogs and some bats. These singular animals, whenever the approach of winter is felt, at first fall into a prolonged ordinary sleep, waking, however from time to time to take food. At last, their sleep is succeeded by a state in which they become benumbed and their vital movements feeble, followed by increasingly retarded beatings of the heart, and more and more slow circulation of the blood, till at length the limbs are motionless, the body cold, and the benumbing so profound, that the most energetic disturbance of the animal only produces the faintest manifestation of life. However, this is not death, and under the influence of gentle heat, the lethargic condition gradually passes away, and the animal resumes its ordinary habits.

The Gerbilles.—As opportunity offers these beautiful little animals are represented in this house. One species is common over the greater part of India, but not extending much to the west, where its place is taken by another of its kind. It is gregarious and lives in burrows of considerable depth, and in some parts of the country, especially where the soil is light and dry, the ground is riddled by its holes. It is extremely active, and like a great number of burrowing rodents, it ventures out of its holes chiefly at early morning and after sunset. The leading peculiarity of the group, is the great development of the hind as compared with the fore leg, the specially intensified portion of the limb being the foot which is greatly elongated, and thus has great power which enables the animal to effect wonderful leaps. In some forms the under surface of the sole is covered with hair as in the Gerboa, which frequents the burning sands of the Egyptian desert, but in the common Indian Gerbille, *G. indicus*, the soles of the feet are bare.

The ears and also the eyes are very large, and these animals are therefore very wary. The tail is generally long and more or less tufted. They are vegetable feeders, and are eaten in many countries.

The Bandicoots, &c.—This group is generally illustrated by a common field-rat of a type slightly differing from the ordinary rats and mice. This is the sub-genus *Nesokia*, two species of which occur in Bengal, and the largest of which is known as the Bandicoot rat, *Mus bandicota*; the smaller and more common form being *Nesokia bengalensis*, the burrows of which are unfortunately too often to be seen in this Garden, on the lawns and along the sides of the paths, and more especially near the feeding troughs of the ruminants and other grain-eating animals. Their burrows are frequently regarded by Europeans as the work of moles, but these almost blind burrowing creatures are not found in India proper, being confined to the Himalaya, and the hilly regions of Assam, Cachar and Tenasserim. *N. bengalensis*, or the burrowing field-rat of Bengal, differs from the common house rat, *Mus decumanus*, in its teeth and in the form of its skull; the skull being shorter and more rounded than that of the latter, and the incisor teeth being much broader; but in other respects, as in the colour of the fur and general aspect, to the untrained eye, they would appear hardly distinguishable, the one from the other. This species is fond of water, and its burrows occur not unfrequently on the margins of nullahs and tanks. It is known to dive and to be able to swim well for considerable distances. The burrows are usually about nine inches or more under ground, and consist of a number of runs passing from a main burrow which ends in a

small chamber in which grain (paddy) is occasionally stored in considerable quantities. They are very wary, and leave their burrows with the greatest circumspection, when these are in exposed situations. The mouth of the burrow is indicated by a heap of earth, and if a fresh heap is quietly watched, the head of the animal may be seen appearing through it, pushing and tossing out the newly excavated earth with its nose. They live not only on grain but on various roots, and when they appear in great numbers in a district, they are very destructive. They do not seem to remain always in one place, but rather to change their burrows at the different seasons. Their movements are probably influenced by the amount of water they meet with in the soil, and observations would lead to the conclusion, that they betake themselves to the highest and driest areas during the rains. In some years, the Zoological Gardens are tolerably free of them, but in others they so swarm, that special means have to be taken for their destruction. The large species, *M. bandicota*, attains to the size of a rabbit or nearly so. These animals do not confine their raids to fields, but at night enter houses in quest of food.

Two other kinds of rats occur in the Gardens in a wild state; 1st, the common tree-rat, a beautiful creature with a fawn-coloured coat, and a rich yellowish-white under surface; this is *Mus alexandrinus*, var. *rufescens*, and which has been considered to be only a variety of the common white-bellied rat of Egypt, *Mus alexandrinus*; and second, the common grey rat of Europe, *Mus decumanus*, to which *Nesokia bengalensis* has such a strong external resemblance.

In the Gardens there are always to be found a number

of species of those interesting animals, the Squirrels, besides the common dorsal-striped or palm squirrel, which occurs here wild, in great profusion, and is wonderfully tame.

The Indian and Malayan species generally represented are the following :—*S. bicolor*, *S. giganteus*, *S. indicus*, *S. maximus*, *S. macrourus*, *S. erythræus*, *S. palmarum*, *S. plantani*, *S. prevostii*, and occasionally the English squirrel which differs from all the Southern Asiatic squirrels, except *S. indicus*, *S. maximus* and *S. macrourus*, in its beautifully tufted or penicillated ears. Besides these squirrels there is a very extensive series, the members of which have been described as distinct species ; many of them, however, as our knowledge extends, are found to have been based on examples, either immature, or exhibiting seasonal changes of pelage. The changes which the individuals sometimes undergo in one and the same locality are so great, that unless the transitional phases are ascertained, the naturalist has no course, but to regard the extreme or even the intermediate stages as indicating specific rank. There is in Upper Burmah a squirrel which at one period of the year is uniform greyish olive with a yellowish belly, which at another period has a chestnut-coloured head and feet, with a brownish olive fur, which at a more advanced stage would appear to become chestnut all over. Separate species seem to have been founded on these stages. There is evidence also tending to show that it sometimes becomes black in other localities to the east.

The squirrels are resolvable into two groups, the true squirrels illustrated by the foregoing species and which are essentially arboreal in their habits, but at the same time occasionally descending to the ground ; and those small

squirrels which are terrestrial in their habits. This last group constitutes the genus *Tamias* which is not found in Southern Asia to the east of the Indus. The little palm squirrel was once regarded as a *Tamias*, but its organization and habits prove it to be a true squirrel, and resembling it, there are some allied forms in Burma and Tenasserim. It, however, would appear to frequent the ground more than the generality of the common species of squirrels in this region, which seldom descend to the ground; their lives being spent in leaping from branch to branch and round and up the trunks of forest trees in which they construct their nests and breed. The time to observe them is in the early morning and after the sun is well down in the heavens.

There is a remarkable modification of the squirrel type of structure in those animals which are provided with a loose membrane that extends along the sides from the fore to the hind limbs, constituting a kind of parachute, which enables the animals to effect enormous leaps as if flying from tree to tree, down the steep mountain sides on which they are generally found. They constitute the genus *Pteromys*, or flying squirrels. The species are numerous and are chiefly confined to Southern Asia, and the neighbouring islands. Their food consists of wild fruits, and they live in the hollows of high trees, sleeping during the day and appearing to feed about sunset. Those which occur in cold regions hibernate. Two species have been exhibited in this Garden, but the only specimen now alive is an example from Darjeeling of *Pteromys albiventer*. As the compartments of this house are not sufficiently high for the proper accommodation of this leaping animal, it is provided with a special cage placed in the Surnomoyee House.

The flying squirrels are represented in Africa by another group, constituting a special Family, the Anomaluridæ, so called from the existence of a remarkable series of large hard scales at the base of their long tails, and they are distinguished by these and some other structural features from the ordinary flying squirrels.

The Hares and Rabbits belong to the least specialized section of the Rodentia, viz. the *Glires duplicidentali*, comprising those rodents which differ from all other rodents in having a small pair of incisors immediately behind the front pair in the upper jaw, thus giving rise to the appearance of double teeth, hence the name given to the group. It includes, besides the hares and rabbits, the genus *Lagomys*, which contains a number of small short-tailed rodents, only found in temperate regions.

No wild rabbits occur in India proper, the genus being represented by two species of hares—the common hare *Lepus ruficaudatus*, and the black-naped hare, *L. nigricollis*, but besides these two, there is another hare which presents certain anatomical characters which separate it from the genus *Lepus*, and the animal is known as the Hispid Hare, *Cārpolagus hispidus* of Blyth, and sometimes is erroneously called, as in the Dacca district, the black rabbit. Its chief distribution is along the base of the Himalaya, in the Terai, from Gorakhpur to Assam, and southwards to Dacca, occurring also apparently in the Rajmahal hills. The hispid hare is distinguished by its short ears, its coarse hispid fur, which is of the colour of an ordinary hare but darker, the upper surface in adults being more or less washed with black ; and it is its dark colour when seen in the jungle that has obtained for it the name of black rabbit. Very little is known about the habits of this

animal, and the species is worthy of careful observation.

The Agoutis, which form the genus *Dasyprocta*, resemble in figure the smallest of all the deer kind, known as mouse-deer, but their teeth and the other details of their structure, clearly indicate their true position as gnawing animals. They live on vegetable substances, such as roots and fruits, and having a voracious appetite, they sometimes prove very destructive to cultivated crops, such as potatoes, yams and sugarcane. Like squirrels, they use their fore-limbs to carry the food to the mouth. They live among stones or rocks, or in the hollows of fallen trees in the forests where they bring forth their young on a bed of leaves, and as many as three at one time, and usually two broods in the year. In confinement they manifest but little intelligence; and on several occasions, they have killed and partially eaten their own young, which seems to be due to irritability induced by a life of captivity. It is even said that when they are greatly irritated their hair falls out, as in similar circumstances the quills of a porcupine or hedgehog are said to do.

Two species are represented in the Garden, *viz. Dasyprocta isthmica* and *Dasyprocta prymnolopha*, the former from Central America, and the latter from Guiana.

The visitor will now, leaving this house at its southern end, follow the path leading to the left, passing to the right, an octagonal cage, under a Rain-tree, *Pithecolobium saman*, containing Pythons, and proceed to

The Equine Enclosure

on the opposite side of the carriage drive, and in this enclosure, which consists of seven divisions, will be found representatives of the *Equidæ* and the *Camelidæ*.

The Equidæ, or Family of Horses, belong to the ungulate or hoofed division of Mammalia, and to that section known as the *Perissodactyla*, or those possessing an odd number of toes on the hind foot, in contradistinction to the *Artiodactyla*, which have an even number.

The Perissodactyle mammals are the Horses, including the Asses, the Rhinoceroses, and the Tapirs. The foot of the horse and ass corresponds to the terminal bone of the middle finger or toe of man, on which the nail is placed, the nail becoming the hoof in the horse, hence horses and asses walk on the tips of the nails of their third or middle finger and toe, the other fingers or toes not being developed except as mere rudiments of the second and fourth, known as splint-bones. The so-called knee of the horse is thus its wrist in the foreleg, and the hock is the equivalent of the heel. The little round or oval horny plate found on the inner surface of the forearm and hind-leg of the horse is known as the chestnut, whilst the little corneous mass growing on the fetlock is known as the ergot. The chestnuts and ergots are always less developed in the finer breeds of horses. Chestnuts are absent from the hind limbs of asses.

In connection with the teeth of horses and asses, the incisors or front teeth give only an approximate indication of age. These teeth have a deep valley of irregular outline, which becomes filled up with masticated matter, and this gives rise to what is called the dark mark. As the tooth wears away, the form of the valley changes and it becomes more shallow, and ultimately, by friction, the whole of the valley disappears. The degree to which this change has proceeded gives the indication of age.

Horses, unlike the majority of animals, are unable to

vomit owing to a peculiar arrangement of muscular fibres around the opening into the stomach, which closes the orifice in any upward peristaltic movement of the digestive sac. Ruminants, also from the construction of their stomachs, do not vomit.

In one of the divisions, the Wild Ass of South-Western Asia, *Equus onager*, is generally represented by two or more individuals. It occurs in Cutch, through Sindh to Persia ; another species, the Hemippa, *Equus hemippus*, taking its place in Syria, and yet another, the Kiang, *Equus hemionus*, in Tibet. The specimens in the Gardens are from Cutch. Every effort has been made to tame them and make them useful, but in vain. Two of them, a mare and a stallion, have the usual pale uniform grey coat with the dorsal line ; but in an adult gelding, the sides of the body and the shoulders even to the elbows, are covered with fine reticulations of faint brown lines.

The common Ass of the Soudan, Eastern Africa, *Equus asinus*, is illustrated by a very good example of the breed, its colour being very much the same as the preceding, but it has the characteristic transverse mark on the shoulder.

The *Camelidæ* are only represented now by the Llamas. The Camel used formerly to be exhibited here, but the climate proved so detrimental to it, that it was resolved not to persevere in giving it a place in the collections.

Closely allied to the Camel is the Llama of South America. The *Lama peruana* might be called the Camel of South America, as it fulfils almost the same uses to the inhabitants of that country as the camel does to the Arab. It is used for riding and as a beast of burden ; its milk is drunk ; its flesh is eaten, and the skin and hair

furnish leather and clothing, the hair being manufactured into cloth. It is the long wooly coat of the Alpaca, one of the Llamas, which is so largely imported into Europe and converted into fabrics of various kinds. It differs, however, from the Camel in not inhabiting sandy deserts, but the mountainous regions of South America. It was from the circumstance of its being a hill animal and used as a beast of burden, that during the viceroyalty of Lord Mayo, these very animals were brought to India and sent to the North-West Provinces with the object of introducing them into the Himalaya to take the place of sheep, which are there used to carry goods over the high passes. The sad calamity which terminated Lord Mayo's career, unfortunately put an end to this experiment, which is still well worthy of being tried. One of these Llamas has the disagreeble habit of spitting at visitors when offended, or even when merely looked at attentively, but this is not singular to this animal, as the majority of them manifest it in confinement.

Like the Camels they are modified ruminants, but differ from them in having no hump on the back, and in having the toes separate, with distinct pads and long curved nails. They have also no horns.

Leaving the Equine Enclosure, the visitor will find at its western end

The Porcupine House.

In this house three or four species of Porcupine are usually exhibited, *viz.*, the large or long-quilled porcupine, *Hystrix cristata* ; the short-quilled porcupine, *H. bengalensis*, and the brush-tailed porcupine which belongs to a distinct genus, *Atherura*, and which is represented by

two species, *A. fasciculata* from the Malayan Peninsula and adjoining islands, and *A. africana* from West Africa.

The large form of Indian porcupine does not appear to be specifically distinct from the porcupine of Southern Europe and Northern Africa. In the Garden an opportunity once occurred of comparing an individual from the Zanzibar coast with specimens from the South and other parts of India, and the differences were so very slight, that it was difficult to say which was the African and which were the Indian after they had been some time together. *H. cristata* seems to extend from Europe into Asia, as far east and south as Ceylon, but it is confined apparently to the western and southern portions of India. *H. bengalensis*, the lesser form, appears to be distributed all over India, as specimens have been received from Karachi in no ways separable from individuals obtained in Bengal; and it would also seem to range through Assam, Arakan, Burmah and the Malayan Peninsula.

These animals are excessively pugnacious, and sometimes kill each other. On one occasion, two males of *H. cristata* had such a deadly fight, that one was transfixed right through by the quills of the victorious combatant which also received very serious wounds, and it is seldom that they are not more or less defaced by wounds inflicted on one another; nevertheless, the short-quilled porcupine breeds freely in the Gardens, but it frequently devours its young.

The distinguishing features of the genus *Atherura*, or Brush-tailed porcupines, are the smaller and more pointed head, the long rat-like tail, terminated by a tuft of fine bristly spines, dilated at intervals into three or more spindle-shaped cavities, which make a peculiar rattle

when shaken against each other; also the body is covered with flattened and grooved spines which are recumbent like hairs, but capable of being erected.

On the opposite side of the road is

A Cage

containing one or more fine examples of the Pig-tailed monkey, *M. nemestrinus;* the largest species of the group and extremely powerful. The males are possessed of enormous canines, and when excited or irritated, they exhibit movements which appear to be peculiar to them. An attitude frequently repeated under excitement, is the following: the monkey depresses its fore-quarters, bringing its chin nearly to the ground as if it were preparing to leap, and associated with this, the hair on the back part of the head, is raised as a kind of crest. If this determined attitude does not disturb the spectator, the monkey generally jumps on his platform, sits down and yawns showing his formidable canines, thus warning the visitor of the possessor's power so far as his dental armature is concerned. The yawn, it will be observed, is got up for the occasion, as the mouth is first partially opened once or twice before it is developed. Another attitude for many of these monkeys to assume is, to stand erect on their hind legs and to grasp the sides of their hips with their hands, grimacing at the same time and advancing.

This cage is immediately adjoining

The Sonebursa House.

This house is named after one of the original Life Governors and Donors, the Rajah Bahadur Hurbullub Narain Sing of Sonebursa, and has railed enclosures on three of its sides communicating directly with the house; while

in addition to these, there is on the north side an enclosed plot of grass into which any of the animals on that side can be let out. This side of the house is entirely devoted to Marsupials.

The great class of Mammalia is divisible into three sections; the *Ornithodelphia*, *Didelphia*, and *Monodelphia;* and typical of the first group is the Ornithorynchus or Duck-bill Platypus of Australia; typical of the second is the Kangaroo; and included in the third are all the ordinary Mammals from man downwards.

The *Ornithodelphia* present certain characters by which they are connected both with birds and reptiles. It includes only two genera, viz., *Ornithorynchus* and *Echidna*, both being restricted to Australia, Tasmania and New Guinea.

The *Didelphia*, or Marsupials are so called because the majority of them possess a pouch on the belly of the animal, in which the imperfectly developed young are received, being apparently transferred thither by the mother, although the act has never been witnessed, and there is no passage between the womb and the pouch. Each becomes attached to a long nipple within the pouch, and which exactly fills the mouth of the young creature, down whose throat the milk is squirted by the cremaster muscle of the mother. Suffocation is prevented by a special modification of the larynx of the young, which, as in the case of dolphins, porpoises and whales is prolonged upwards into the posterior opening of the nose at the back of the mouth, so that respiration takes place entirely through the nostrils, and thus also the milk is prevented finding its way into the wind-pipe. The young remains attached to the nipple until it attains

that stage of development at which other animals are born into the world; but even then it does not leave the pouch for some time, as it may be seen with its head out grazing from it, and if, when more mature, it should leave the pouch, it immediately betakes itself to it when any danger threatens. The tendons of two of the belly muscles become converted into bone, but it is asserted by some observers that these bones have nothing to do with the support of the pouch. There are many other structural features of this group which are well worthy of study.

Generally three or four species are represented, and the Common Wallaby, *Halmaturus ualabatus*, has bred in the Gardens.

In one of the other houses of the Gardens where small cages are kept, there are frequently to be seen examples of the Dasyures, usually *Dasyurus geoffroyi*, which are essentially carnivorous and are viverrine in appearance.

Another familiar example of Marsupials is the Opossum, which differs from the rest of the group in occurring out of the Australian province, being found both in North and South America, whilst all the other Marsupials are restricted to the Australian region.

The southern side of this house is set apart for the illustration of the *Suidæ*, or Hog Family.

In one of the divisions of this side, the common Wild Pig of India is generally to be found, and alongside of it the Pigmy Hog of the Terai, also that remarkable porcine animal, the Babirusa of Celebes. These animals belong to the Artiodactyle section of the hoofed Mammalia, and to that division of it which is known as the Non-ruminantia in contradistinction to the other section the Ruminantia. The Artiodactyla are those hoofed

quadrupeds in which there are an equal number of toes to each foot, two or four in number ; and a striking example of the non-ruminant section, besides the animals mentioned above, is the Hippopotamus or river-horse of Africa ; while the ruminant section embraces the oxen, sheep, goats, antelopes, giraffes, deer, camels, llamas, &c. One of the characteristic features of the hogs, or *Suidæ* is the elongated head, terminated by a long snout flattened at the extremity which is perforated by the nostrils, and is used for turning up the roots, &c., on which they live. This special modification of the nose is strengthened and adapted for its work by the existence of a pre-nasal bone, which results from the ossification of the cartilaginous septum which separates the nostrils and their backward passages. Another peculiar feature in them is the way in which the eye-teeth or canines of each jaw are directed upwards and outwards in both jaws, and these structures in the males become formidable weapons of offence and defence. The stomach of the pig presents certain structural characters in which the complicated stomach of the ruminant is foreshadowed.

The wild Pig of India, *Sus indicus*, is so nearly related to the wild boar of Europe, that it may be regarded only as a race of that species. It occurs all over India, ascending the Himalaya and the hill-ranges of Southern and Central India to considerable altitudes, and extends into the Assam region, Arakan, Burmah and Tenasserim, and into the islands of the Malayan Archipelago where it occurs in great abundance. A dwarf race is also found in the Andamans.

The rather elegant little pig, *Porcula salvania*, is very difficult to procure, but, at the same time, it is not un-

common. It is generally found in small herds of five or six, in low jungle. Its food consists of bulbs and roots. The Mechis of the Terai say that the female goes with young from five to six months, the litter generally being three or four in number. It is very shy, and the Mechis trap it with nets and hunt it with dogs. A village will catch as many as four or five in a season which extends from January to April, and when caught very young, it becomes easily domesticated and is found tame about the villages. The general colour of the animal is brownish. The legs are very graceful, and suggest that the little pig must be a good test of the running powers of the dogs of the Mechis. This species was first discovered by that distinguished man, Mr. Brian Hodgson, C. S., who was Resident for many years at Katmandu.

The Babirusa, *Baba Rusa*, or Pig Deer, *Porcus babirusa*, is found only in two islands, *viz.*, Celebes and Bouro in the Austro-Malayan Zoological region. The body of the Babirusa is somewhat barrel-shaped, and the dark sooty brown skin is almost devoid of hairs or bristles. Its greatest peculiarity is the remarkable way in which the canines or tusks of the upper jaw are turned directly upwards, so that these teeth, which attain a great length in the male, pierce through the upper lips and rise up like horns over the side of the mouth, and arch backwards, near their ends, over the eyes ; the lower tusks standing up outside. The function performed by these extraordinary teeth is unknown. The back of the throat or pharynx is provided with remarkable air-sacs, and the stomach consists of three chambers.

In the adjoining compartment is an example of the

South American hogs, or Peccaries, which differ from the hogs of the Old World, in having their hind feet with only three toes seen externally, and besides, the middle metacarpal and metatarsal bones unite to form a cannon-bone like that of oxen and deer. The other peculiarity is that the canines do not appear externally as in the true pigs; there is no tail; and there is a peculiar gland on the back that exudes an offensive odour. The Peccaries are gregarious in their habits, and, like the Indian pig, their food consists chiefly of roots, bulbs, &c. They constitute the genus *Dicotyles*, and two species are known, *viz.*, the larger Peccary, *D. labiatus*, and the smaller species, *D. torquatus*.

Pigs manifest considerable intelligence, much more than the horse or ox, and as is well known, some have become such proficients in tricks that have been taught them, as to merit the term "learned." Romanes, in his interesting book on "Animal Intelligence" mentions "that they manifest the same kind of sagacious co-operation in facing an enemy as that manifested by the bison and buffalo, but in a more organised manner," and he gives the following quotation from "Thompson's Passions of Animals":—

"Wild swine associate in herds and defend themselves in common. Green relates that in the wilds of Vermont a person fell in with a large herd in a state of extraordinary restlessness; they had formed a circle with their heads outwards, and the young ones placed in the middle. A wolf was using every artifice to snap one, and on his return he found the herd scattered, but the wolf was dead and completely ripped up. Schmarda recounts an almost similar encounter between a herd of tame

swine and a wolf, which he witnessed on the military positions of Croatia. He says that the swine, seeing two wolves, formed themselves into a wedge, and approached the wolves slowly, grunting and erecting their bristles. One wolf fled, but the other leaped on to the trunk of a tree. As soon as the swine reached it, they surrounded it with one accord, when, suddenly and instantaneously, as the wolf attempted to leap over them, they got him down and destroyed him in a moment."

From this house, the path leading in the direction of "The Hermitage," a private residence outside the Gardens, should be followed, and on the left of the path, under a shed, is to be found that peculiar ruminant, *Anoa depressicornis*; the small wild buffalo of the forests of Celebes.

But before visiting the Ruminants to which the Anoa belongs, the visitor should first notice the small cage on the right hand side of the path leading southwards, which generally contains young bears; and beyond it, still further to the right, are three

Bear Houses

radiating from a common centre, inhabited by three species of bears, *viz.*, the common or Honey-bear of India, *Melursus labiatus;* the common Black bear of the Himalaya, *Ursus tibetanus;* and the smaller or Malay Sun-bear, *Helarctos malayanus.*

The Bears, or *Ursidæ*, constitute one of the divisions of the Carnivora or flesh-eating animals, that is, having teeth specially adapted to this kind of diet. However, the bears, with one or two exceptions, are frugivorous, and it is remarkable that the teeth of these vegetable feeders do not present such differences from

those of the flesh-eaters as would suggest such an important difference in their diet; but the teeth of bears, generally, do not exhibit the typical carnivorous dentition, as the sectorial molar tooth has not a cutting edge, but a tubercular crown. All the bears in these Gardens are frugivorous, and thrive in confinement with the exception of the Honey-bear, which has never yet been kept successfully. This species extends from the Ganges to Ceylon and is not found elsewhere.

The Black Bear of the Himalaya has a very wide range, as it extends westwards across the Indus, and apparently through Afghanistan southwards to Balūchistān and the hilly regions of Western Sindh, where it is known by its Baluch name of Mamh or Mum, and it has been found near Gwādar, not very far from the coast of the Indian Ocean, and whence it has been described as *Ursus gedrosianus*. Its eastward distribution is along the Himalayan range, Assam, and through the northern portion of the Irawadi valley in Burma, and along the eastern ranges defining that valley, and as far south as Mergui, in the province of Tenasserim, from the hills to the east of which two specimens were lately sent to the Gardens. It was found in China by M. L'Abbé Armand David. The specimens of this bear which were obtained near Gwādar, have exhibited a considerable amount of browning in the hair, and it is interesting to note, that one of the young bears from the neighbourhood of the old town of Tenasserim is nearly brown all over, for although the bases of the hairs are black, the animal is so decidedly brown, as almost to resemble a brown bear. Its companion has the brown confined almost to the head, a character which has also been observed in young bears from Assam.

The Sun Bear of the Malayan peninsula extends as far north as the valley of the Brahmaputra, and it has been found in the Garo hills associated with the previous species. It has also been obtained in the Chittagong hill tracts.

In addition to these species, the Brown Bear of the higher regions of the Himalaya, *Ursus isabellinus*, is occasionally exhibited in these Gardens, but as it comes from a very cold region, it has been found difficult to keep it in health during the hot weather. It is closely allied to the brown bear of Europe, *Ursus arctos*.

The honey-bear and the black Himalayan bear have a curious habit of sucking their paws, or it may be one bear will suck the ear of another, whilst the latter is sucking its own paw, both emitting a peculiar continuous humming sound like a hive of bees. What induces the bears to do this is unknown, but it is a popular belief among the natives of India, that when a bear is so engaged, it has fever. Of course this interpretation is quite erroneous, as animals in perfect health may be seen and heard making this noise and no fever following.

The long house, with a series of pens or enclosures on its northern aspect, is

The Hospital

for the treatment of sick and temporarily delicate ruminants.

Paddocks of Ruminantia.

At this corner of the Gardens these paddocks begin, and extend as far as the Rhinoceros enclosure to the north-west. Each paddock is of considerable extent, affording grazing ground, and also shelter from the sun and rain, as a house exists in each, and generally trees or palms. A

continuous handsome iron railing runs along the side of the foot-path, and railings of a similar pattern divide the paddocks from one another.

The series begins with the hollow-horned ruminants, *viz.*, the sheep, goats, oxen and antelopes, and ends with the solid-horned ruminants, the various species of deer. All the important ruminants in the Gardens are exhibited in these paddocks with the exception of the Giraffe, which has a special house and enclosure to itself in another part of the Gardens, and the little Anoa noticed before. As has already been said, the Artiodactyle section of the *Ungulata* or hoofed mammals, is divided into two great sections, the Non-ruminantia, and the Ruminantia.

The distinguishing structural character of the true ruminants is the existence of four compartments in the stomach, a few having three, but none less. The stomach of a typical ruminant consists of four chambers, the one most to the left being a very large sac called the *rumen* or *paunch*, which communicates by a wide opening with the much smaller chamber on its right called the *reticulum* or *honeycomb* from the folds of the mucous membrane which line the cavity crossing each other at right angles and producing a multitude of six-sided cells. An orifice in the right wall of the *honeycomb* stomach leads into another chamber, the mucous membrane of which is thrown into an immense number of deep longitudinal folds, lying over one another like the leaves of a book, and hence called the *many-plies* or *psalterium*. This stomach, by an aperture on its right, leads into an elongated sac having a few longitudinal folds, and known as the *rennet-stomach* or *abomasum*.

It is well known that in grazing, cattle feed rapidly

cutting the herbage with the front teeth (incisors) of the lower jaw, against the toothless pad of the front of the upper jaw, and hastily swallowing the mouthfuls. After grazing they lie down and quietly rest, but when the feeling of hunger comes on, masses of food are brought back in boluses to the mouth for mastication, where they are triturated into an exceedingly fine pulp, mixed with a plentiful secretion of saliva, then again swallowed, but not returned to the cavity from whence the food came. In the first act of swallowing, it went directly to the *paunch* and to the *reticulum*, but in the second act it passed directly to the *psalterium* or *many-plies*, and from it finally to the *abomasum* or *rennet* stomach, in which it is subjected to the action of the gastric juice. The food is made to return to the mouth by the action of the diaphragm, that is the transverse muscle that separates the chest cavity from the belly cavity, and by the contractions of the *paunch* and *reticulum*, the food is pressed up against the opening of the œsophagus or throat-tube between the *paunch* and *reticulum*. The œsophagus opens to receive a portion of the food, and having received it, closes its orifice, and then by contracting from behind, pushes the bolus to the mouth, and this latter action can easily be observed in any animal ruminating. The food in returning is directed straight to the *psalterium* by a groove that proceeds from the œsophagus to the *reticulum*, and is shut off by a valve from the two first sacs of the stomach, whilst when the valve is open, the food passes directly into these two sacs. The action of the animal's jaw while engaged in masticating the boluses, is peculiar, as after the first stroke, say from left to right, all the succeeding movements are from right to left.

As incidentally mentioned above, the ruminants are divided into two sections according as their horns are hollow or solid. The former horns are developed as one pair with the exception of the four-horned antelope of India, *Tetraceros quadricornis*, and they consist of a solid core prolonged outwards from the frontal bone and covered with a sheath of horn. These horns are simple, unbranched structures, except in the Pronghorn Antelope, *Antilocapra americana*, a North American ruminant in which each horn has a short branch, and it is this animal alone, among the hollow-horned ruminants, that sheds its horns at intervals, as in all the others, these structures persist throughout life. These horns have the power of repairing injuries ; and in the first species in the series of these ruminants, there is a female wild sheep, *Ovis cycloceros*, one horn of which not only lost its sheath, but also had the core injured, and yet the injury to the core was repaired, and the sheath in time was completely restored ; horn being simply a thickening of the outer skin or epidermis. Horns of this kind may either be straight, curved, spirally twisted, or ringed.

Very different from these persistent epidermal horns, are the long horns of the deer which are bony antlers not covered by horn, and which are shed every year. These structures are developed from processes of the frontal bone covered with skin and hair. After the animals have attained a certain age these processes begin to grow, and whilst so doing they are full of blood-vessels and from the active flow of blood to them, their temperature is much higher than that of the rest of the external surface of the body. As growth advances, the part from which the horns sprang and which is called the *pedicel*, becomes marked off from the horns by a circular thickening called the *burr*,

the rest of the horns being known as the *beam*. When the beams or antlers have attained their full size, the circulation in them becomes gradually sluggish, and ultimately the blood-vessels dry up in and over the antlers, and only the dead dry substance remains, the skin also shrivelling up and being rubbed off by the deer constantly using its horns against trees and rocks and in digging up the ground. The animal is now in the full pride of the breeding season, when deadly conflicts take place between the males for possession of the females. After the rutting season is over, absorption begins to take place between the burr and the pedicel, and the dead bony antler at last drops off leaving the pedicel intact, but its apex bleeding. This heals, becomes covered with skin and hair, and shortly begins to sprout up into another horn; this process annually recurring throughout the life of the animal; the perfect form of antler characteristic of the species not being attained for seven or eight years. Horns of this character are generally absent in the females, but are present in both sexes in the Reindeer. There are also no horns at all in the Mouse-deer or *Tragulidæ*, and none in the Muskdeer.

The horns of the Giraffe differ from both of the foregoing kind of horns, as each is at first a separate bone placed over the junction of the frontal and parietal bones of the skull, with which, however, they ultimately unite. There are three of these structures, a pair and a small median prominence in front of them, all being covered with skin and hair, and none of them ever being shed.

The ruminants are all characterized by the presence of two hoofs on which they walk, but which resemble a divided or cloven hoof. They represent the third and fourth fingers and toes, and the horny matter of the hoof re-

presents the nails of these digits. In all the ruminants, with the exception of the Mouse-deer, the bones of the digits, corresponding to the long bones that intervene, in the human hand, between the knuckles of the third and fourth fingers and the small bones of the wrist, unite to form a long bone known as the cannon bone. The little toes that generally occur behind the former, correspond to the second and fifth fingers and toes of the human hand and foot, the thumb and great toe not being developed in ruminants.

The collection of ruminants begins with the Sheep and Goats, which with the oxen, buffaloes and antelopes constitute the family *Bovidæ*. Sheep and goats are very closely allied, one of the most prominent features by which they are distinguished from one another being the presence of a beard in the goats. The horns of sheep are less recurrent than in goats, and more outwardly divergent and curved forwards. The sheep also are provided with small pouches between the functional toes, and by this character a real leg of mutton can be distinguished from a leg of goat mutton. The majority of sheep and goats have horns in both sexes.

The sheep in the first paddock is the Wild Sheep of the Salt Range of the Punjab and Afghānistān, *Ovis cycloceros*, and which also inhabits the hills of Sindh and occurs in Southern Balūchistān. It has the most southerly distribution of all wild sheep, and it is very tolerant of heat, as there are not many places hotter in summer than the hills of Sindh and Southern Balūchistān. It is generally found in small flocks. A nearly allied sheep, *O. vignei*, is found in Ladak, and another, *O. gmelini*, in Persia.

The next ruminant of note is the Wild Goat known as

Capra ægagrus, or the Ibex of Asia Minor, Persia and Sindh. It is supposed by most naturalists to be the original stock from which all the domesticated breeds of goats have descended. In the stomach of this animal are occasionally found the famous calcareous concretions, like round pebbles, known under the Persian name of *Bezoar*, and which have been highly esteemed from time immemorial, as an antidote to poison and as a remedy of great value in many diseases. They are also often enclosed in golden filigree and worn as charms by the Persian women. Bezoards, although chiefly found in the stomachs of ruminants, occur also in horses, dogs, and other animals. Their constitution varies much, as some of them consist essentially of phosphate of lime, others of phosphate of ammonia and magnesia, while a few are derived from the principal constituent of the bile which has been called lithofellinic acid, while others are composed of a substance known as ellagic acid, which appears to be the product of the transformation of the gallic acid contained in the vegetable matters taken as food. The concretions which are so often found in the stomach of the horse consist chiefly of phosphate of ammonia and magnesia, deposited in concentric layers around some foreign body, such as a small pebble introduced into the stomach with the food. Bezoards of this nature are also found in the stomach of the Indian Gazelle, *G. bennetti*, and of the Gazelle of Persia, *G. subgutterosa*. Other bezoards are largely composed of hairs, rolled so as to form balls by the movements of the stomach, while another kind, such as those of the sheep, is formed of fragments of plants belonging to the Family of which the thistle is a member.

After the goats come the Gazelles and Antelopes, con-

stituting a group of the Ruminantia for which it is extremely difficult to find a definition which will embrace them all, as they exhibit considerable diversity of characters, some of them presenting affinities with the oxen and others with the sheep and goats. A few are as large as the largest ox, and others as small even as the mouse-deer. Both sexes in some species are provided with horns, but generally these structures are confined to the males, and it is in this group that we alone find the presence of four horns. The number of their teats also varies, as some have two teats only, whilst others have four. Some are provided with dewlaps like oxen ; and other species are distinguished by the presence of glandular pouches between the toes, or have similar structures in the groin, and very many of them have knee-brushes. The form of their head is much varied, and in some, such as *Alcelaphus bubalis*, the Bubaline antelope of Africa, it is remarkably elongated ; their horns also present considerable diversity of form. In the Gazelles, they are generally nodulated and deeply ringed anteriorly, and more or less erect and doubly curved. The majority of them have a pouch before the eye known as the *larmier*.

The common Gazelle of India, *G. bennetti*, is sometimes erroneously called by sportsmen the Ravine-deer, its native name being the *chikara*. Its distribution is not restricted to India, but extends through Balūchistān to the head of the Persian Gulf. In India, it is confined to the drier and even more desert regions, being especially abundant in Rajputana, Hurriana, Sindh and Kachh, but it also ranges over the greater part of the North-West Provinces and the Punjab, and over Central India as far south almost as the latitude of Madras, and is unknown in Lower

Bengal and in Assam. It is generally found in small herds, and is essentially a lover of open uncultivated districts, and both sexes have horns. The name '*Tiska*' is applied to it by the Canarese, from the habit it has of stamping with its feet when irritated but this habit is not peculiar to the Gazelle, as it characterises many other wild ruminants, more especially some of the deer, which also use their fore-limbs as formidable organs of offence, stamping and striking with them; the hornless females even becoming formidable opponents under such circumstances. An incident that happened in the Gardens, a few years ago, may be mentioned here in illustration of this. Mr. Schwendler, who always took a lively personal interest in the welfare and comfort of the animals, was on one occasion superintending the transference of the female Wapiti from one paddock to another, when she suddenly reared, and struck him down with her fore feet and commenced battering him with them until she was driven off.

The next paddock contains a very handsome African species, *viz.*, Grant's Gazelle, *Gazella granti*, distinguished by its very handsome long lyrate horns which occur in both sexes. It is a rare species and only a few specimens have reached Europe. It was discovered by the African explorers, Captain Speke and Colonel Grant in Ugogo. The African continent is distinguished from all other regions of the globe, by the great variety of its Gazelles and Antelopes.

In the neighbouring enclosure will be found some examples of that remarkably graceful animal, the Indian Antelope, *Antilope cervicapra*, which abounds on the plains of India, of which it is a highly characteristic species, as it is not found in any other country in the world, not even

to the west of the Indus. Its eastern distribution extends to Midnapore, and it ranges into Assam, and large herds have been observed at Gowhatty and on both banks of the Brahmaputra. It generally associates in herds of twenty, in each of which an adult male appears to be lord and master, as he drives off the younger males as they begin to arrive at maturity, and to assume the characteristic dark, almost black colour which confers on the adult male the common term of Black-buck. The female is distinguished by a pale fawn upper surface, and by the absence of horns. In the act of running, this species executes remarkable jumps or upward and forward hops, exactly like the stotting of a ball, by which they easily clear an enclosure 6 feet in height. This antelope very well illustrates the large pouches that occur before the eyes in this group, and which are known as *larmiers*, and which in this species are capable of being turned inside out at the will of the animal. These sacs are lodged in a depression of the lachrymal bone, and contain follicles which secrete and discharge a peculiar thick and odorous substance, which is especially abundant in the Black-buck at the breeding season. The combats at this period are sometimes so serious, that they kill one another, butting each other after the manner of goats and rams. The characteristic external features of the adult male animal are its spirally twisted horns, dark upper parts, and white belly.

That remarkable small Antelope with four horns, *Tetraceros quadricornis*, which is like the preceding species essentially characteristic of the Indian fauna, is represented in the adjoining compound; its Hindustani name being "*Chousingha.*" It appears to extend as far west as the Indus, but it does not occur in Lower Bengal

nor to the eastward. It is common in Central India, and occurs in open forests at the base of the Himalaya. Like the Indian Antelope it does not frequent the forest country of the Malabar coast. Col. A. A. Kinloch says of them that "four-horned Antelopes are generally found alone, or frequently in pairs; they conceal themselves in long grass or among low bushes, and somewhat resemble hares in their habits. They are seldom to be seen out feeding, but usually jump up at the feet of the hunter and bound away at a great pace." The horns of this animal are short and pointed, the posterior pair being the longest and rarely exceeding 4 to 5 inches, whilst the anterior pair are seldom more than one-inch in length, and are occasionally not developed, which has led some naturalists to suppose that there are two races. The female has no horns.

In the next division will be found examples of that exceedingly handsome animal, the *Oryx beisa*, the Beisa Antelope of Abyssinia. It equals in size the domestic ass. Its general hue is grey, with a series of strongly marked black bands down and across the face, on the back and along the flanks, with black points on the limbs. It has a short black mane and a long black tail. The horns are recumbent, and are extremely long and sharp-pointed, and ringed in their lower thirds; the males having heavier horns than the females. The Beisa uses its horns with the greatest dexterity, and they are very formidable weapons of offence and defence. Mr. W. T. Blanford remarks that "the appearance of a herd of Oryx is very imposing. They are some of the most elegant and symmetrical of animals, the motions being those of a Wild Horse rather than of an Antelope."

Major Gordon Cumming says of the Gemsbok of South

Africa, a species allied to the Beisa that it "thrives and attains high condition in barren regions, where it might be imagined that a locust could not find subsistence; and burning as is the climate, it is perfectly independent of water, which, from my own observation, and the repeated reports both of Boers and aborigines, I am convinced it never by any chance tastes. Its flesh is deservedly popular, and ranks next to that of the Eland. At certain seasons of the year they carry a great quantity of fat, at which time they can more easily be ridden into. Owing to the even nature of the ground which the Gemsbok frequents, its shy and suspicious disposition, and the extreme distances from water to which it must be followed, it is never stalked or driven to an ambush like the Antelopes, but is hunted on horse-back and ridden down by a long, severe, tail-on-end chase. Of several animals in South Africa which are hunted in this manner, the Gemsbok is by far the swiftest and most enduring." As all animals require moisture, the Gemsbok receives its supply from the succulent plants which occur in the regions which it frequents, and more especially from the bulb of a liliaceous plant known in South Africa as the Water-root, from the power it has of absorbing and retaining moisture. From these facts regarding the Gemsbok, and which are common to a number of other species of African antelopes, it will be seen how well the desert of Western India would suit them, and into which they might be advantageously introduced.

Passing on to the next division we find another very large and peculiar looking Antelope, *Portax picta*, the Nilgai of India, the male of which, when fully adult, becomes jet black and is known as the Blue Bull, the female being of an entirely different colour, *viz.*, a pale fawn and

without horns, the young males resembling the females. The muzzle is attenuated ; the lips, and the front of the neck behind the jaw, and some spots external to the eyes and also on the limbs are white, whilst the insides of the ears are barred with black. The male has a short erect black mane, and a tuft of black hair on the front of the throat. The horns are comparatively short, smooth and divergent. The tail is long and tufted. The peculiarity in the appearance of this animal, besides those features enumerated, depends upon the high withers, sloping back, and deep thick and compressed neck, and this appearance is much intensified when the male is excited, arching his back, drawing in his hinder quarters, and moving on sideways to attack, with a wicked cast in his eye, but before delivering a charge he generally drops on his fore knees and advancing in this position springs suddenly to his feet, rushing forwards with great energy and rapidity towards his foe. The female has four teats, and generally produces two at a birth. This animal, in its distribution, is confined to India, extending from the Himalaya as far south as Mysore, being especially numerous in Central India. It is not known in Assam, or in the countries to the east of Bengal. The Nilgai frequents light forest and low jungle, and it is said to drink very seldom except in the hot weather. Although very courageous in its wild state, it has been not unfrequently tamed, and even yoked and driven. Its temper, however, is uncertain, and during the breeding season the males are excessively pugnacious and have deadly feuds.

The Eland Antelope, *Oreas canna*, from Central Africa, occupies the next paddock. It is the largest of the African Antelopes, attaining to a height of six feet at

the shoulder. The females have horns nearly as large as those of the male. An attempt was made to introduce this animal into England for the sake of its flesh, which is said to excel the very finest ox-beef in texture and flavour, but the experiment was abandoned as it was too costly.

After the antelopes come the Oxen, which constitute a very natural assemblage, the members of which may be grouped under one generic term, *Bos*. As many as six sub-genera have been recognised—the Yak of the high plains of Western Tibet constituting the sub-genus *Poephagus;* the Bison of Western Europe and its congener of North America forming the sub-genus *Bison;* the wild cattle of Southern Asia, the sub-genus *Bibos;* and the domestic cattle of Europe, the descendants of the ancient wild cattle of that area, the sub-genus *Bos*. The buffaloes are generally considered as constituting a distinct genus *Bubalus;* and the forest buffalo of Celebes, the genus *Anoa*.

In the paddock adjoining that occupied by the Nilgai is a remarkably fine example of one of the wild cattle of Southern Asia, *viz.*, the Gyal or Mithun, *Bibos frontalis*. This animal is an inhabitant of the hill tracts of Chittagong. and extends northwards through the mountainous region of Assam to the Mishmi country, where it has been recorded, as having been observed at considerable altitudes grazing with the yak. Over this area it is partially domesticated and is generally to be found in the neighbourhood of villages, associating with the ordinary cattle of the homesteads, which is brought about in the Kookie country by the following method as described by Mr. Macrae. "On discovering a herd of wild Gayals in

the jungle, the Kookies prepare a number of balls, of the size of a man's head, composed of a particular kind of earth, salt, and cotton. They then drive their tame Gayals towards the wild ones, when the two herds soon meet and assimilate into one ; the males of the one attaching themselves to the females of the other, and *vice versâ*. The Kookies now scatter their balls over such parts of the jungle as they think the herd most likely to pass, and watch its motions. The Gayals, on meeting these balls as they pass along, are attracted by their appearance and smell, and begin to lick them with their tongues ; and relishing the taste of the salt, and the particular earth composing them, they never quit the place until all the balls are consumed. The Kookies, having observed the Gayals to have once tasted their balls, prepare a sufficient supply of them to answer the intended purpose, and as the Gayals lick them up, they throw down more ; and it is to prevent their being so readily destroyed, that the cotton is mixed with the earth and the salt. This process generally goes on for three changes of the moon, or for a month and a half, during which time the tame and the wild Gayals are always together, licking the decoy balls, and the Kookie, after the first day or two of their being so, makes his appearance at such a distance as not to alarm the wild ones. By degrees he approaches nearer and nearer, until at length the sight of him has become so familiar that he can advance to stroke his tame Gayals on the back and neck without frightening the wild ones. He next extends his hand to them, and caresses them also, at the same time giving them plenty of his decoy balls to lick. Thus, in the short space of time mentioned, he is able to drive them, along with the tame ones, to his parrah, or

village, without the least exertion of force ; and so attached do the Gayals become to the parrah, that when the Kookies migrate from one place to another, they always find it necessary to set fire to the huts they are about to abandon, lest the Gayals should return to them from the new grounds." The leading features of this animal, are its very short and game-like head, and the thick outwardly divergent black horns which are but little curved inwards, and the great dewlap. Like the Gaur, the adult bull is a dark, almost black brown; the legs being white below the knee and fetlock. The cows in both species are paler than the bulls, and with a reddish tint. When there is any impurity in a Gyal it shows itself generally in pale or white spots, or blotches, and in imperfectly marked white stockings. One of the distinguishing features of both the Gyal and Gaur, but to a much less extent in the Banting, is the prominent ridge on the anterior portion of the back, produced by the great elongation of the spinous processes of the vertebræ in that region ; and, as these processes become short at the 11th dorsal vertebra in the Gyal, there is a sudden fall in the back at that point.

The Gaur as well as the Gyal occurs in the Chittagong hill-tracts, the Gaur being a much wilder animal than the Gyal and never found semi-domesticated. The chief distinctions between the two species lie in the form of the head and horns, and in the absence of a dewlap in the Gaur. The Gaur has a much longer skull than the short truncated skull of the Gyal, and the forehead is more concave and defined above, between the horns, by a prominent arching of the bone. The skin also above the eyes is always thrown into a series of wrinkles.

Its horns more resemble those of domestic cattle in their cylindrical character, and especiaily in the way in which they are curved upwards and inwards towards their tips, a character which is never present in the divergent horns of the Gyal. The Gaur's horns also in their colour, approach more to those of domestic cattle than do the black horns of the Gyal. In other respects, especially in make and colour, the two are much alike. Both of them attain a considerable size, and a full-grown bull Gaur sometimes stands six feet at the shoulder.

The Gaur is excessively wary, but very courageous, and it is said to charge its human opponents without the slightest wavering. It is distributed throughout Southern and Central India, and extends into Orissa, where it is known as the Gyal, and it is found also in the Bhutan Terai, and spreads through Assam and Arakan to Burma, and to the Malayan peninsula. The calf here exhibited of this species was obtained by Mr. Wallich in the Bhutan Doars. It is a large animal for its age, of a dark reddish-brown or rusty colour, with white 'stockings' and rather long legs: its horns were only beginning to show when it came to the Gardens. It was reared with the greatest difficulty, as it was still in the milk stage and had to be hand-fed with milk which it would only drink out of a metal vessel, the deep rim of which it seized and sucked. As all previous attempts at rearing Gaurs in confinement had signally failed, this calf was allowed to roam through the Gardens even to the detriment of the plants, and being a shade-loving animal, frequenting the densest forests, the instincts of the little creature led it to seek seclusion and shade in the centre of the most choice groups of shrubs. This freedom conferred upon it, however, no doubt kept it alive, and even

now, when about two years old and a large animal with formidable horns, it is still so tractable, that it is permitted to wander about the Gardens for a few hours daily. Another Gaur-calf, a female, was presented to the Gardens in February of this year by Col. A. A. Kinloch, so well known as an enthusiastic sporstman and as the author of the "Large Wild Game of India." He captured it while on a shooting excursion after Gaur in the Chutia Nāgpur District, and brought it down to Calcutta. It was treated in exactly the same way as Mr. Wallich's animal, and throve admirably for three months, being very active and a great runner,—running and jumping as fast as any deer; but one hot day, in the close of May, its breathing suddenly became rapid, and in about twelve hours it was dead. The Committee's efforts to obtain a Gaur from Burmah were so far successful, that they purchased a young bull-calf for Rs. 150, very shortly after the arrival of Col. Kinloch's animal, but although similarly treated it did not thrive, and died in about two months.

The Bantings, *Bos sondaicus*, a bull and cow, and their calf bred in the Gardens, are very handsome and beautiful animals, of a rich reddish fawn colour, the male being somewhat darker and tending to brown. They have white stockings; and a large white patch on the buttocks, a feature which is not found in any other species of ox, but it occurs in some deer, for instance, in the Wapiti on the other side of the road. These animals are perfectly tame and were obtained by exchange with Mr. Rutledge, the well-known dealer in animals, in Calcutta. They are supposed to have been procured from the island of Bali, near Java, where the species has become domesticated much in the same way as the Gyal or Mithun, *Bos frontalis*,

in the Chittagong hill-tracts and among the Cacharis, and the Mishmis and other wild tribes of Assam. In its wild state, the species is found in Pegu, Tenasserim, the Malayan Peninsula, Sumatra and Borneo. The horns of this animal more resemble those of the Gaur than of the Mithun, but they have this peculiarity, that in old bulls the horns become connected at their bases in front by a great horny thickening under the skin.

Some examples of the humped breeds of Indian cattle, *Bos indicus*, are generally to be found in these cattle paddocks. This breed which is erroneously considered by some as specifically distinct from the humpless cattle, presents a great many varieties, some of which like the Hansi breed are gigantic white animals with drooping ears, while others are quite dwarfed; the colours also are most varied. In some parts of Bengal the cattle are small and appear to be deteriorating from bad treatment and scant and inferior food, and because the calves are generally very early deprived of their mother's milk. Those in the deltaic portion of the country appear also to be losing their horns, probably owing to the circumstance that there is a deficiency of earthy salts in their food, and this cause also doubtless contributes to dwarf their bones.

Along with the domestic cattle in the Garden may be seen a humped cow of a greyish hue, with black points on the limbs, similar to those on the limbs of the Beisa antelope. Blyth has noted the fact that some Indian cattle present markings like those which occur on the feet of the Nilgai, which resemble those on the feet of the Beisa antelope. Curiously enough this cow was received from Aden along with the calf of the Beisa antelope of which it was

the fostermother, but whether the cow came from Somali land, in Eastern Africa, along with the young antelope, is not known, but it is probably an Indian cow that had been imported into Aden. This cow has yielded a very fine cross between itself and the Gyal in the Gardens; and it is curious to notice that her calf does not in any way resemble her except in the form of its muzzle. The hump which is so pronounced in the mother has entirely disappeared in the calf which is uniform blackish brown but with a russet area on the forehead corresponding in position to the grey area of the male parent. The back is remarkably straight, and in this respect it resembles some of the best breeds of English cattle. Its horns are compressed from before backwards as in the Gyal parent. Although it is only fifteen months old, it is considerably larger than its mother.

The importance of introducing new blood amongst European cattle has been already recognized by Dr. Khün, the head of the Agricultural School of Halle University, and the Calcutta Gardens have forwarded several Gyals to Halle for the purpose, and fresh applications have been received for more. But notwithstanding the repeated efforts of the Committee to purchase examples of these animals, in 1882, from the Chittagong District, where formerly they had no difficulty in obtaining them free of cost, not a single specimen has been forthcoming, the Committee are therefore now endeavouring to obtain them from Assam to forward to Halle.

On the other side of the road, opposite to the Bantings' paddock is a large enclosure with a tank at the western end of the Sonebursa House, and the Wapiti or Canadian

deer, *Cervus canadensis*, one of the largest of the deer kind, is kept in it. The animals, male and female, have on the whole thriven well, and have even bred, but the young one was unfortunately killed at its birth. They are never exposed to the sun, except in the very early morning, and just before sunset; every care being taken to preserve their health. The Wapiti is restricted to North America. It is closely allied to *Cervus affinis*, or the *Shou*, which frequents the Chumbi valley that intervenes between Independent Sikkim and Bhutan. But the Committee have not yet succeeded in obtaining any examples of this handsome deer, although many endeavours have been made to procure it. The horns of the Wapiti are also so similar to a deer found in the Thian-shan Mountains of Western Turkestan, that it is hardly possible to distinguish between them. These deer are included in that section of the genus *Cervus* to which the Red Deer belongs, and in which there is a second brow-antler above the brow-antler below, the latter forming a right angle to the beam, and in which the posterior terminal tine is more strongly developed than the anterior terminal tine. This group is also distinguished by a light patch surrounding the tail. The young of the deer of this group are spotted.

Returning to the paddocks on the left, we now continue the series of the *Cervidæ*. The deer are arranged according as the ground suits their habits.

The first species met with is the *Cervus taëvanus*, belonging to the sub-genus *Pseudaxis*, an inhabitant of the mountains of Formosa and restricted to that island. The full grown male has antlers about twice as long as its head, with a short brow-antler given off at an acute

angle from the beam, and there are two other tines besides the brow-antler, one being a strong tine developed from the anterior surface half-way up the beam, and the other from the posterior surface in its upper third. A number of Asiatic species of deer have been described as belonging to this sub-genus, but the probability is, that as our knowledge extends, they may be found referable to three, if not to two species only. They are remarkable from the circumstance that their coats undergo peculiar changes of colour, as during summer they resemble the spotted deer, whereas in winter they are an uniform brown. The young are very indistinctly spotted. It is very remarkable how sudden are the changes the coat of this deer undergoes. No sooner has he shed his horns in the month of March, or April, than the sandy-brown spotless coat is transformed, in three weeks, into a beautiful reddish-fawn sleek coat, covered with prominent white spots ; the change in appearance being so great, that the deer can hardly be recognized as the same animal.

The adjoining compound is occupied by *Cervus moluccensis*, the Molucca Deer, which inhabits the islands of Bouru, Amboina and Celebes. This deer belongs to the sub-genus *Rusa*, the members of which have the brow-antlers strongly curved upwards at an acute angle to the beam, the latter dividing into two strong tines. These are the general characters of the horns, but there are various modifications, giving rise to small groups even in the sub-genus. They are generally uniform brown, and the young are unspotted. The Molucca deer is pale, sandy brown, with rather coarse hair, and the neck of the male, as in the majority of the sub-genus, is maned. This species has bred in the Gardens. It is extremely fond of wet

muddy hollows in which it rolls and covers itself with a layer of mud to protect itself from the flies.

In the neighbouring compound are usually numerous examples of the well-known Spotted Deer of India, *Cervus axis*, than which there is perhaps no more handsome of the deer tribe. In the adult male, the antlers are about three times the length of the head, with a brow-antler forming a slightly obtuse angle with the beam, which divides a little above the half of its entire length into two tines, the anterior or external tine so formed being excessively long. These characters distinguish the sub-genus *Axis*, as defined by Sir Victor Brooke, whose classification of the deer has been followed. Unlike the sub-genus *Pseudaxis*, the males and females are always spotted. This deer is spread over Central and Southern India, along the outer ranges of the Sub-Himalaya and the Terai region, and is very abundant in the Sundarban of Bengal, but it does not extend further to the eastward, nor is it found in the Panjab. Two or three races have been recognized, but the differences are very slight, and chiefly depend upon the slimness or greater heaviness of the antlers, and perhaps also on the size of the deer, which varies in different localities and is doubtless influenced by its food supply. In the Sundarban, this deer may be seen in immense herds on the islands of the Delta, close to the sea-face, and where the most beautiful open glades occur of considerable extent, surrounded by dense forest and covered with the most exquisite velvety turf on which the herds graze morning and evening, retiring to the shade of the forest during the heat of the day. In these places they constitute the food of one of the largest of the Indian Carnivora—the Tiger. This deer sheds its horns generally

in the months of February or March. Unlike the Samber and many other Asiatic deer, it has not been observed to roll itself in mud, nor does it appear to take to water, and its coat is always preserved scrupulously clean. It has great powers of jumping, and, even without running, will clear a fence six feet high.

Immediately following the Spotted deer comes the Equine deer, and, on the opposite side of the road, is the Samber of India proper. These two deer are so closely allied to one another, that a consideration of them, as they here occur in contiguity, must convince any one that it is impossible to maintain their specific distinctness. The difference is more in size than in any other feature. The so-called Equine deer is nothing else than the Samber of Borneo, Sumatra and the extremity of the Malayan Peninsula, and the Phillipine deer is the Samber of the Phillipine islands; there is also another and insular race of the same species on the island of Formosa. Besides the foregoing distribution, the Samber ranges over the greater part of India, from the Himalaya to the extreme south of the Peninsula, and it ascends to conderable altitudes, even to 10,000 feet. It is a forest animal, and rarely ventures to the open plains. Its horns conform to the sub-genus *Rusa* already indicated. It casts its antlers about April. It is very fond of shade and water, also of muddy hollows, and its food chiefly consists of leaves.

After these deer will be found a pair of *Cervus duvaucelli*, and their fawn bred in the Gardens, representatives of another sub-genus which contains the most handsome of the Indian deer, *viz.*, the sub-genus *Rucervus*, chiefly distinguished by the length and strength of its brow-antler which pro-

jects forwards more or less at a right angle from the beam, being sometimes forked and at other times producing little tines along its upper surface. The beam, about its upper half, divides into two strong upper tines which have subordinate tines developed from them by bifurcation. The young of these deer are spotted. The most familiar example of this sub-genus is the deer just mentioned, sometimes known as the Swamp-deer, or as the Barasingha, from the circumstance that each antler has generally six well developed tines. It is a large animal, with a long elegant head. The changes of colour and also of temperament which this deer manifests are highly interesting, both having reference to the rutting season when the horns have become fully matured. It sheds its horns about the months of March or April, and after this the colour changes from a sandy-brown to the beautiful reddish-fawn of the female, and its temperament also assumes the mild character of the female. The change is very marked, as, when the male has his horns, he is excessively fierce and even dangerous, using them to tear down his house, or violently charging at the enclosing railing, if any one approaches him, and pawing the ground restlessly with his fore-feet. He also employs his time in digging with his horns, holes in the ground in which he lies, covering himself with mud. It is only during this period that he makes his voice heard, and a very loud and unmusical voice it is, being a combination of the bray of an ass and the squeaking grinding sound of a native oil-press. This deer is confined to swampy localities on the banks of the Indus, in the Himalayan Terai, Orissa, Maldah, and Assam, and in certain limited districts of Central India.

A nearly allied species is Eld's deer which is prevalent in Manipur and throughout Burma, and apparently occurs as far eastwards as the island of Hainan. Another *Rucervus* is Schomburgh's deer which occurs in Siam.

This line of deer paddocks terminates with the Hog-deer, *Cervus porcinus*, which belongs to the same sub-genus, *Rusa*, as the Samber. It occurs throughout India, Ceylon, and Burma; the Ceylonese differing in no respect from the Indian animal.

On the opposite site of the road, at the right hand corner of the lane leading along the northern side of the Rhinoceros compound, is a high enclosure in which the Barking or Rib-faced Deer, *Cervulus muntjac*, is kept. The high railing and wire netting were found necessary to prevent the animals straying. The peculiarities of this deer, are the very long pedicel on which the horn is placed, the short brow-antler, the unbranched beam with its recurved tip, the two well-defined ridges down the face, the large lachrymal pit, and the strongly developed canine teeth of the male. The ridges on the face are apparently for the protection of a series of glands in the skin along their inner surfaces. This species occurs throughout India and ascends the Himalaya to about 8,000 feet, and extends eastwards through Burma, the Malayan Peninsula and Sumatra. The Javan species is supposed to be distinct.

The visitor will now follow the main road, keeping the Rhinoceros enclosure immediately to his right, until he reaches

Two Cages

containing monkeys, the first an example of the common monkey, *Macacus rhesus*, and the second, the Pig-tailed monkey of Arakan and Burma, *Macacus leoninus*. The latter

is a thick-set, powerful animal with long much annulated hair on the shoulders. The males are usually fierce, but this monkey which has been in captivity for sometime has been trained to salaam, when he is told to do so. The females are docile, and one which was sent to the London Zoological Gardens as the Andaman monkey, was taught to smoke a pipe and perform a number of antics. There are, however, no monkeys in the Andaman islands, and the foregoing female, it was afterwards ascertained, had been taken to the Andamans from Burma. It is generally found in rocky places in Arakan, and along the banks of the Irawadi.

Immediately beyond these cages is a miniature

Thatched Cottage

which contains the last of the deer represented in these Gardens, and the smallest of their tribe, *viz.*, the Mouse-deer, Chevrotains, or *Tragulidæ*, which are not provided with horns. These animals are very delicate in confinement and require the utmost care. It is a curious fact, that although they are abundant in the moist region of the Malayan Peninsula, it has been found here by experience, that if they are exposed at all to damp, they become paralysed in their hind-quarters, and eventually die. They generally frequent forests in which the undergrowth is moderately dense, and they are most frequently to be seen running about just after sun-down, and in some districts, such as the Province of Tenasserim, they are almost as abundant as rabbits, but do not appear to be gregarious. The species represented here is the animal known as *Meminna indica*, which is not much larger than a hare, and is found in Central and Southern India, and Ceylon. It is of a brown colour, with large palish spots tending to

an arrangement in lines along the sides. The males of this, as also of the other species, are provided with long formidable, curved and downwardly-directed canine teeth in the upper jaw, these structures taking the place of horns as weapons of offence and defence. A peculiar structural feature has been observed in one of the Malayan members of this group, and it is this, *viz.*, that the superfical tendinous portions of the muscles over the pelvis and part of the loins become ossified, forming a kind of subcutaneous bony shield, the function of whch is unknown, unless it may serve the purpose of a fulcrum for the muscles of these parts, giving the animals great power of forward progression from their hind-quarters. The males of these seemingly gentle little deer are so combative amongst themselves, that it is impossible to keep the different species in one enclosure, and as there is not sufficient space here, an other, *Tragulus kanchil*, has to be kept in the Surnomoyee House. The *Tragulidæ*, or deerlets, have certain features in their anatomy which separate them from the true deer, and these characters are to be found in the construction of their limbs. As in the Swine, the bones which go to form the cannon-bone of true Ruminants are separate in these deerlets.

Immediately adjoining the little house of these deer and its enclosure is

An Aviary

devoted to Doves, and containing usually the following species :—

Carpophaga bicolor, Nutmeg fruit-pigeon ;
Treron viridis, Parrot fruit-pigeon ;

Columba leuconota, White-backed pigeon ;
Turtur suratensis, Spotted Turtle-dove ;
Turtur meena, Eastern Turtle-dove ;
Turtur risorius, Common Turtle-dove ;
Turtur humilis, Dwarf Turtle-dove ;
Chalcophaps indica, Green-winged dove ;
Calænas nicobarica, Nicobar pigeon.

Turning to the left from this house and retracing his steps slightly, the visitor will reach

The Peafowl Aviary

in which there are two species, *Pavo cristatus*, the common Peafowl of India, and *Pavo spicifer*, the Peafowl of Burma and the countries to the south-east of Burma. The Peacock of the latter regions is distinguished by its beautiful green and gold colour and the almost absence of blue in the plumage. The finest specimens of the peafowl are generally to be found roaming at liberty in the Gardens, as neither of these species thrives in confinement.

Passing on in the same direction, and thus returning to the Hog-deer enclosure, the visitor has now on his left hand

The Rhinoceros Enclosure.

This enclosure measures 229 feet in length, by 116 feet in breadth and has a tank 165 feet long, by 30 to 40 feet broad. It is surrounded by an iron railing, protected internally by a rustic wooden palisade made of unbarked posts and cross-bars, and it is divided at its middle into two portions by a similar palisade crossing the tank. The enclosure was at first entirely given up to *Rhinoceros lasiotis*, but the Committee having acquired a

pair of the black-haired, two-horned Rhinoceros from Malacca, it was found necessary to divide the enclosure.

The specimen of *R. lasiotis* is an adult female which was caught near Chittagong, on the estate of Begum Latifa Khatum of Ramu, and the following account of its capture appeared in the *Englishman* of the 17th June 1882 :—

"This rhinoceros was captured by the Begum's retainers. A *shikaree* had gone out to hunt, and when he had reached some paddy fields, he was told by the ryots, who were there at work, that an animal had come out from the jungle, on to the fields, and that it was neither a gyal, a buffalo, nor an elephant. The *shikaree* at once sent a message to the Begum, asking that assistance might be sent to capture the animal, and, in a short time, a large number of people had arrived armed with sticks. The locality to which the beast had retired presented facilities for its capture, as it was a small isolated hill or *teelah* separated from the high range of mountains to the east. The *shikaree* arranged his men between the teelah and the main range with instructions not to allow the animal to escape in that direction, but that if it made for an adjoining jheeel, or for an open slope towards the village, it was to be allowed to pass by either of these ways, as it would be possible to noose it in the jheel, and to capture it if it went to the village. The animal, however, refused to show itself, and did not come out of the dense jungle, but the would-be-captors were aware that it was moving round the teelah, and at length the *shikaree*, by climbing a tree, was able to make out that it was a rhinoceros. They then tied a number of ropes to the branches of the trees, letting them hang down as

nooses, in the course the animal was following. In a short time their labour was rewarded, as it ran its head first into one noose, and then into another, tearing them away, however, from the trees, and, in its excitement, rushing out on to the open slope leading to the village, dragging the ropes after it. By this time it was somewhat exhausted, for it fell in a muddy hollow where it was immediately surrounded, secured by ropes and ultimately dragged into the village. Three days afterwards, the male made its appearance from the same teelah, but unfortunately an effort made to capture it did not prove successful. The female rapidly became tame and tractable, and was introduced into the Zenana, where it soon established itself as a favourite, more especially with the children, who used to ride as safely on its back as the London children did on Jumbo. Begum Latifa Khatum, when she became aware that the Committee for the Management of the Calcutta Gardens were in quest of rhinoceroses, with very great self-denial, public spirit and liberality, made up her mind to part with the favourite of the Zenana, and telegraphed to the Committee that it was her intention to present this rhinoceros to the Gardens."

This individual is the second known example of the species, the first having also been a female and having likewise been captured in the neighbourhood of Chittagong, in 1869, from whence it was taken to London, where it was purchased for the Zoological Gardens, at Regent's Park, for £ 1,250 ; and where it still lives. The male of the species is not known.

The other two-horned Rhinoceros, *R. sumatrensis*, of the Malayan region (for no two-horned Rhinoceros

occurs in India proper) being placed alongside *R. lasiotis*, the differences that exist between the two forms can be well observed, and this, indeed, is the only satisfactory way to determine species, for mere written descriptions are apt to be more or less misleading, and the identification of species from isolated parts of animals is frequently most disappointing in its results. It will be observed that the Chittagong animal has much larger ears than the Malayan female, that the fringe of hairs on the ears is longer, softer and more drooping, and also that the whole skin of the animal is much smoother, and that the hair is a rich reddish-brown, instead of black. The difference in size between the ears of these two double-horned species is a feature that also serves to separate the Indian one-horned Rhinoceros from the Burmo-Malayan one-horned species.

The Rhinoceroses exhibited in this enclosure, like their kith and kin generally, are very fond of water, but especially of muddy hollows in which to lie; and their highest bliss seems to be, to rest undisturbed after feeding in a slimy ooze that leaves a coating of mud on their coarse skins, forming an effectual protection to them against the irritating attacks of noxious insects. No sooner was *R. lasiotis*, whose familiar name is Muni Begum, introduced into this enclosure than she set herself to dig a hole, which she accomplished with her fore-feet, scraping out the earth and throwing it behind her. As it was during the rains she arrived, the hole was soon filled with water, so that when she lay down only a small portion of her body remained uncovered, and the exposed part was so smeared with mud and the animal so still, it was sometimes difficult to detect her presence

in her wallow. These animals in their natural state live almost exclusively on the leaves and the smaller branches of trees, such as the various species of fig, and the jack-tree ; and, here, their taste as far as possible is consulted, but it is found to be a costly one, as jack and fig-trees are not easily purchased, so that their food has to be supplemented with grain.

At present there are no examples in the Gardens of either of the two Asiatic species of one-horned Rhinoceroses, but as the Garden has already had both species, and as the Committee are making efforts to obtain other specimens, it may be as well to indicate here their leading external characters and distribution. There has been a misapprehension in the past regarding the relative size of these species, as they have been spoken of as the Greater and the Lesser one-horned Rhinoceroses ; this, however, is incorrect, as both the species apparently attain similar dimensions. The most striking external characters separating the two are the size of the ears, as already mentioned, and the difference between their hides, and this latter feature is very marked.

The Rhinoceros from the Bengal Sundarban has its hide covered over most regularly with a mass of closely-set tubercles, this being the species which has the smaller ears and which is supposed to be the Lesser Rhinoceros, and identical with *R. sondaicus* of Java and the adjoining islands ; whereas the other rhinoceros, that is, *R. unicornis*, the true Indian Rhinoceros, has its hide covered with tubercles, but instead of being closely set together and uniform in size, they are generally separated from one another except on the limbs, and vary much in size, those on the hind quarters being very large. There is

another detail connected with their hides by which the two species can be distinguished; *R. sondaicus* has a saddle-shaped fold over the nape of the neck, whereas this fold in *R. unicornis* is continuous with the shoulder fold behind.

Rhinoceros unicornis is now chiefly confined to the dense jungles that occur along the base of the Himalaya, or at least to the country north of the Ganges, and to the valley of Assam. It is known, however, to have had formerly a much more extended distribution, as it has been found in the Rajmahal hills and near the sacred mountain of the Jains, Parisnath. But, in earlier times, about the middle of the 16th century, rhinoceroses, probably this species, frequented the banks of the Indus where they are said to have been hunted by the Emperor Babar.

In Africa, there appear to be four, if not five, species of Rhinoceros, and all of these have two horns and smooth skins, and the adults do not possess incisor teeth, but these teeth are present in the adults of the four Asiatic species, two with single horns, and two with double horns.

The horns of Rhinoceroses are quite different in structure from the horns of Ruminants. The horn is merely a growth from the skin, consisting of a mass of agglutinated horny fibres, so that, if the horn be knocked off, it leaves a clean surface, and if injured, it apparently has the power of renewal. It is highly prized by the Chinese, who carve it into ornaments of various kinds, and it is also considered valuable as a medicine.

The north side of the Rhinoceros enclosure is separated by a narrow lane from a series of paddocks devoted to the exhibition of the *Ratitæ*, or Struthious Birds, represent-

ed by the Ostrich, the Emu, and the Cassowary, the paddocks being known as

The Ostrich Enclosure.

The Ostriches have about one-half of the space allotted to this group, and at present they are illustrated only by the Ostrich of Africa, *Struthio camelus*, male and female, so-called from the ancients supposing that it had an affinity to the other denizen of the desert, the Camel, to which the ostrich has certainly a marked resemblance when a number are seen at a distance, one following another in Indian file, over a sandy expanse ; as the way in which this bird carries its head and neck, when moving along, also the short thick body and long massive legs produce an outline very like that of a camel. Ostriches are the largest living representatives of birds, but it is not long that they have been so, because the comparatively recent remains of more gigantic birds, even with the feathers and flesh attached to some of the parts, have been found in New Zealand, and an example is the Moa. The Ostrich differs from other birds in many points of its organization, and in the very important circumstance that it is incapable of flight ; the whole force of its structure being concentrated, as it were, in the long robust limbs which endow it with great running powers. It has a much elongated neck, with a keen, liquid, far-seeing eye, in its rather small head, shaded by long eye-lashes, and it has a rather large ear. The breast-bone of the ostrich has no ridge on it anteriorly, as in the great majority of other birds, and this modification has reference to the absence of the powers of flight, there being no muscles requiring a large area of attachment,

the wing-bones being comparatively little developed. The plumage is so sparse over the under surface of the bird and on the thighs, that these parts have a naked appearance ; there is also a large callous patch over the sternum indicating the part of the bird that rests on the ground when it sits. The females of this species are of an uniform grey colour ; it is the male bird that is glossy black with the fine plumage consisting of those black and white feathers so much prized as personal ornaments by womankind. In times, however, of remote antiquity, the plumes of the ostrich were greatly esteemed, and, in the religious ritual of the ancient Egyptians, one erect feather was employed as the symbol of truth. It occurs depicted on the walls of old temples, on the head of Ma, the goddess of truth and justice ; and it is likewise sometimes represented on the head-dress of Osiris as typifying his justice as the judge of souls. The male has generally three or more females which all lay their eggs in one nest, which in their native deserts is merely a hole scraped out in the sand, and the male bird takes his turn with the females in sitting upon the eggs. In confinement in this country, the hen appears to drop her eggs anywhere, and the following interesting story of the hatching of an egg so dropped, and the rearing of the chick is related in Bosworth Smith's Life of Lord Lawrence :—

"Early in 1864, an ostrich domiciled in the Viceregal Park at Barrackpore, happened to deposit her first egg on the grass, exposed to the inclement climate of that time of the year, and the attacks of jackals and foxes. It was picked up by a girl of eight or nine years old, the daughter of the park-keeper, whose father had died shortly before. Proud of her discovery, she carried off

the egg to the bungalow, and having learned something of the habits of the ostrich in its native Sahara, she got some dry white sand, put it into a lidless box, and half burying the egg within it, exposed the whole, in the brightest spot which she could find, to the mid-day sun, and when evening came she would transfer it, box and all, to the care of a hen, whose eggs she removed each day for the purpose. Strange to say, the hen took kindly to the task, and, in due time, the monster chick was hatched. The foster-mother took to flight at the sight of her offspring. But the girl supplied its place, and the young ostrich used to follow her about from place to place, share the bungalow with her, and eat off her table. But the fatal day came when a new park-keeper was appointed, and almost his first act was to claim the bird as Government property. It was accordingly carried off to the Government Aviary. The little girl, broken-hearted at the loss of her pet, took to her bed and became seriously ill. But a kind-hearted military surgeon, who happened to be calling on the widowed mother to see if he could do anything for her, heard the sad story. Through his means, it reached the ears of Sir John Lawrence at Simla, who, by return of post, ordered that the bird should be at once restored to its rightful owner. There was a joyful meeting between the two friends. The girl soon left her bed, and on returning to England, a few weeks later, with her mother, she carried with her the gigantic pet which had been born and bred amidst such curious vicissitudes."

The male ostrich has a peculiar call which has been compared by some to the roar of a lion, and by Canon Tristram to the lowing of an ox in pain. While the bird makes

this noise its neck becomes immensely inflated with air. The male bird in this enclosure has a very peculiar habit which he generally manifests in the morning or early part of the day. He sits down in his usual fashion, but throws his head and neck backwards on to his back, stretching out his wings and plumes, so that they are displayed to the greatest advantage; then he sways his head and body from side to side with a wonderful regularity and rather rapidly, and this may last for nearly half on hour. It would appear that this habit is sexual and is the equivalent of the strutting of a peacock or turkey.

The ostrich of Africa is a most valuable bird on account of its feathers which always command a high mercantile value. In Southern Africa and also in Egypt there are regular ostrich farms in which the eggs are artificially hatched and the birds kept within extensive enclosures, or runs, in which they are fed and as carefully treated as the most valuable cattle, and solely for their feathers which are collected and exported to Europe, realizing many thousands of pounds sterling annually. An enterprise of this kind, which has so generally proved remunerative, might be successfully undertaken on the confines of the desert of Western India and would be a new and profitable industry to India.

The ostriches are not confined to Africa, but they are represented in South America by four species belonging to the genus *Rhea*.

In one of the divisions of this piece of ground, the Emu is generally to be found represented by one or more specimens. This species, *Dromæus novæ-hollandiæ*, is, as its name indicates, an inhabitant of the Australian region. This bird goes in pairs, and the male is smaller

than the female, and in these respects it differs from the ostrich. The female Emu is the bird endowed with the power of making the remarkable noise that is distinctive of the genus. The sound is produced far down in a membraneous bag connected with an opening in the trachea, and if the hand be placed over this region, whilst the sound is being emitted, it will be felt to be due to the vibrations of the sac. The egg is a beautiful object, being of a rich deep green colour, and it is highly prized as a household ornament.

There appears to be another species, a much rarer bird, known as the Spotted Emu, and limited to Western Australia.

The Cassowaries are inhabitants of the Papuan region and islands, including the northern portion of Australia. They are generally distinguished by a casque or bony helmet on the skull, prolonged backwards from the beak, and covered with a horny epidermis. The skin of the neck is usually more or less destitute of feathers, posteriorly and anteriorly, and is generally very brilliantly coloured, and, from the anterior surface, in four of the species, there are developed two bright yellow pendant wattles, and in the case of one species, *C. uniappendiculatus* of Blyth, there is only one wattle. The latter one-wattled species and the Moruk with two wattles have been represented in the Gardens. Like the Emus, the wings are nearly bare, and the feathers are only represented by stiff shafts resembling the long spines of a porcupine, but wholly black. Their wings assist them in running, but they are never used in defence. They, however, strike with their bills and kick dangerously with their legs. The Cassowaries are generally black, but in

the young state they are brown.

Their food consists of soft substances, and like all graminivorous birds they require to swallow small stones to assist digestion. They emit a peculiar chirping noise.

If the visitor has not gone through the lane, but has taken the path round the northern side of the ostrich enclosure, he will have passed a cage in which there are more examples of the Agouti, which animal was described under the Rodent House ; and almost adjoining this, is

A Squirrel Cage,

in which is generally to be found one or more examples of *Sciurus indicus*, the large squirrel of the Peninsula of India, and which is confined to that area. Its coloration is usually maroon, black and yellowish, but it varies a good deal in different localities, and has received different names, for instance, *Sciurus indicus* is also known as *S. elphinstoni.* There are other examples of this species in the Gardens.

A little further on, the visitor will find himself in front of

The Mullick House

so named in recognition of the handsome donation made to the Gardens at their commencement by Raja Rajendra Mullick, Bahadur. This house is generally devoted to Aquatic Birds and to Tortoises. It is a circular house with five compartments, each having a small tank.

The Birds usually represented in the Mullick House are the following :—

Common Water-hen ... *Gallinula chloropus.*
White-breasted Water-hen ... *Gallinula phœnicura.*

Purple Coot	...	*Porphyrio calvus.*
Pheasant-tailed Jacana,	...	*Hydrophasianus chirurgus.*
Paddy-bird or Pond-Heron	...	*Ardeola leucoptera.*
Night Heron	...	*Nycticorax griseus.*
Cattle Egret	...	*Buphus coromandus.*
Large Egret	...	*Herodias alba.*
Black-headed Ibis	...	*Ibis melanocephala.*
Scarlet Ibis	...	*Eudocimus ruber.*
Glossy Ibis	...	*Plegadis falcinellus.*
White-faced Tree-Duck	...	*Dendrocygna viduata.*
Red-billed Tree-Duck	...	*Dendrocygna autumnalis.*
Indian Tree-Duck	...	*Dendrocygna arcuata.*
Sheldrake	...	*Tadorna vulpanser.*
Brahmani Duck	...	*Tadorna rutila.*
Spotted-bill Duck	...	*Anas pœcilorhyncha.*
Common Teal	...	*Querquedula crecca.*
Blue-winged Teal	...	*Querquedula circea.*
Pin-tailed Duck	...	*Dafila acuta.*
Widgeon	...	*Mareca penelope.*
Summer-Duck	...	*Aix sponsa.*
Mandarin Duck	...	*Aix galericulata.*
Red-headed Pochard	...	*Fuligula ferina.*
Red-crested Whistling Duck		*Fuligula rufina.*
White-eyed Duck	...	*Fuligula leucophthalmus.*
Snake-neck	...	*Plotus melanogaster.*
Cormorant	...	*Graculus javanicus.*
Black-headed Gull	...	*Larus brunnicephalus,*

and the following Tortoises :—

Batagur baska : Batagur lineatus : Emys trijuga : Emys hamiltonii, and *Pangshura tecta.*

The two Water-hens of the preceding list are very common in the Gardens, and frequent the large lake and

breed on its island. *Gallinula chloropus* is the bird so well known in England as the Moor-hen, and has a very wide distribution over Europe and Asia.

The Pheasant-tailed Jacana belongs to a group of birds closely allied to the Rails. It is distinguished by its extremely long and straight claws in which it differs from all other birds. It occurs in India and Ceylon, and chiefly inhabits jheels and marshes in which the aquatic vegetation is abundant, especially where the lotus plant thrives, with its broad expanse of floating leaves over which the Jacana is enabled to walk by reason of the great expanse of its foot, and in such localities it constructs its floating nest. Its breeding plumage is remarkably distinct from its ordinary plumage, as it is characterized by considerable changes in colour, and by the presence, in the male, of a long tail, which has suggested the name of pheasant-tail which is applied to it.

In this House, there are two other birds, belonging to the genus *Aix*, the one the Summer and the other the Mandarin-duck, both of which undergo remarkable changes of plumage at the beginning of the cold weather. The latter duck is of course from China, whilst the former is its North American representative.

The large white Egret, although it does not exhibit in its breeding plumage any of those marked changes of colour which distinguish the foregoing birds, as it remains always white, it yet develops trains and festoons of feathers, broken up almost as finely as hairs, and which add greatly to the elegance of the bird; one of these festoons is dorsal and the other pectoral, and there is also a long pendant crest. These feathers are very valuable.

The black-headed Ibis is closely allied to the sacred Ibis of Egypt, which was held in such veneration by the ancient Egyptians, that to have killed one, even by accident, subjected the offender to pain of death ; and there are no mummies in Egypt so numerous as those of the Ibis. There are generally two other species of Ibis exhibited in this House, *viz.*, the Glossy Ibis which has a very wide distribution, and the Scarlet Ibis which is limited to South America.

The Tree-ducks are so called from their habit of building their nests in trees, and one Indian and two American species are exhibited.

One of the most peculiar-looking birds in this aviary is the Darter or Snake-neck, a bird allied to the Cormorants, and not at all uncommon in Bengal. Its most remarkable features are its elongated, mobile, lithe neck ; and its attenuated head, but little broader than its neck ; and its long pointed bill. There are many striking points in the anatomy of this bird, but there is, perhaps, none more interesting than the hair-sieve that occurs at the far end of the stomach and prevents the passage into the small intestines of the bones of the fishes on which the bird feeds. In order to understand its external differences from the cormorants, it may be compared with *Graculus javanicus*, a common Indian bird, in the adjoining compartment ; where also will be found an example of one of the Gulls, a common species, which occurs along the sea-face of the Delta of the Ganges, and which, in the breeding season, assumes a sooty-black head and richly coral-coloured legs.

In this House are also to be found some examples of one of the most interesting sections of the animal king-

dom, *viz.*, that including the Tortoises and Turtles. At first sight it would not be suspected that they had any structural affinities with the birds surrounding them, but so closely are they allied to the feathered division of the animal kingdom, that birds and reptiles are now regarded as constituting one great section, *viz.*, the *Sauropsida*. It would be out of place in a popular notice of the animals exhibited in the Gardens, to enter into an anatomical disquisition regarding the structural features which distinguish the two classes, *Aves* and *Reptilia*. The Tortoises and Turtles form a toothless group of the reptiles called *Chelonia*. They approach the group *Amphibia* represented by the Frog, although they are at the same time markedly separate from it, and also from the ordinary type of vertebrate structure.

They have only to be looked at, to be seen that they are enclosed in an osseous box, or shell, that protects the centres of the three vital systems, the circulatory, the digestive and the generative, and into this shell the head, limbs and tail can be retracted. The box is formed by the ribs and a number of the vertebræ of the back, and by special bones on the under surface, and it is covered either by soft skin or by horny plates. The horny plates which cover the shell of one of the marine species is the substance so well known as tortoise-shell and which is used for making combs and other objects. This species abounds in the Indian Ocean and the Bay of Bengal. On one occasion, the edible marine Turtle was kept alive in a tank in the Garden for three months, but as it found no suitable food, it died. Those exhibited in this House are all fresh-water species, but some of them are semi-terrestrial.

To the west of the Mullick House, is

A Thatched Pavilion

under which a Lynx is exhibited during the cold weather. As the animal is an example of the Lynx of the higher regions of the Himalaya and of Tibet, it is kept, at other times, in a special place to which the public are not permitted access, because it is shy and irritable during the hot weather. This is the first individual of this species that has been brought alive to the plains of India, and it is the first specimen of a Tibetan lynx that has ever been represented in a Zoological Garden. The species is quite distinct from *Felis caracal*, the Lynx of India, an example of which will be seen in the Kuch Bihar House. It was described as *Felis isabellina* from its supposed paler colouring as compared with the common lynx of Europe, *Felis lynx*, from which it seems in no wise to be separable, as it resembles it in all its more important features, which may be summarized as follows: It is about 18 inches high at the shoulder, with a moderately heavy body and powerful forelimbs with large paws; a head large and round, with a short muzzle and big yellow eyes; a ruff round the neck; ears pointed, with black tufts; and a short tail, only about 5 inches in length, the terminal half being black. There is a considerable difference between its winter and its summer coat. During the latter season the hair is short and smooth, and the ruff and ear-tufts are but feebly marked; whereas in winter the hair becomes longer, softer, more dense and paler in colour, and the ruff and ear-tufts are well defined. It may be of interest to record the history of the individual here exhibited.

This Lynx has now been in confinement in Calcutta for a period of nearly six years. It was purchased in Darjeeling, in January, 1878, and was then quite a young animal, standing about 12 inches at the shoulder, and covered with soft fluffy hair. It was perfectly tame, and was kept, by the Bhutea who owned it, merely with a woollen strap round its chest and under its shoulders, and with a cord attached to it. It was at first under my care for two years before it was placed in the Gardens, and it remained quite docile and friendly with those whom it knew, and played and romped like a pup, but always with a collar and chain. During the day it was tied up in the shade and was never allowed into the sun, and doubtless the success that attended the rearing of this animal, which is the inhabitant of a very cold region, may be attributed to this precaution. At night it slept in the stables. It had a regular attendant who bathed it every morning and fed it, and if hungry it made its wants known by its peculiar bell-like call. Its general habit was to sleep much by day, and to be very lively, and sometimes noisy at night. When nearly adult it met with a serious accident. Wishing to stalk some passing cat it sprang over the railing of a lower verandah and was nearly strangled by its chain. When lifted up it was found that the left thigh bone was fractured. It was laid down carefully on its right side, and with great docility the animal maintained this position for weeks until the fracture had united. While a patient, it permitted itself to be carried about from place to place, and purred with pleasure when it received more than usual attention. In the end of 1879, the lynx was placed in the Gardens, but as it had been accustomed to human society, my friend Mr.

N. B.—to face p. 91.

The Schwendler Memorial was ordered from Aberdeen nearly a year ago, and it was therefore confidently expected that it would have arrived in Calcutta and have been placed in position by November, before the completion of this Guide.

Schwendler kindly housed it in his compound at the Hermitage. On my return, after a year's absence, whenever it saw me and heard my voice it threw up its head, uttered its peculiar satisfied cry of recognition, rubbed itself against my legs, purred like a cat, and permitted me to lift it up in my arms. Even up to the present time, I can handle it as freely as a pet-dog.

The species is of solitary habit, generally one, or it may be a pair, being seen at a time. It stealthily stalks its victim, and never attempts to spring until close upon it.

The visitor having made the circuit of the Mullick House, should now follow the western side of the Ostrich enclosure as far as the north end of the Rhinoceros paddock, alongside of which is the house of the Superintendent, and in front of which is

A Small Aviary

in which a few Australian Parrakeets are exhibited. It was thought that, perhaps, the tree growing in the centre of this aviary would have given agreeable shelter to the birds; but unfortunately they were no sooner put in, than they set themselves systematically to cut off the shoots and leaves, and in a few weeks the tree was perfectly bare; so this experiment has not been a success.

The visitor will now retrace his steps past the Mullick House, and the Agouti and Squirrel cages, to the main carriage drive, as far as the circular plot of grass which is occupied by

The Schwendler Memorial.

This obelisk of Aberdeen Granite has been erected to

perpetuate the memory of Carl Louis Schwendler as stated in the inscription. The Medallion on the obelisk was subscribed for and placed there by his fellow-countrymen in Calcutta. Immediately to the north of this plot of ground is the east entrance to

The Andul House,

which was erected by the late Rajah Bejoy Keshab Roy of Andul. It measures 180 feet in length, and 108 feet in breadth at the centre, and 60 feet in width at the sides. It is a light iron frame-work, somewhat cross-shaped, having a central transept, in the middle of which is a little pond filled with gold and silver fish, and from this point four broad paths diverge and wind round and among the clumps of foliage. The iron frame rests on a brick wall about three feet in height, internal to which is another wall of nearly the same height, the interval between the two being filled up with earth. A platform is thus formed which admits of a fine display of tropical vegetation. The high arched roof is supported throughout the interior of the building by slender iron pillars. Numerous beds of dwarf palms and other oriental forms of vegetation are tastefully distributed, the house having been laid out by Dr. King, the Superintendent of the Royal Botanic Gardens, to whom the Calcutta public are largely indebted for the beautiful arrangement of land, water, and vegetation which makes this Garden one of the most effective and attractive efforts at landscape-gardening in India. The Andul House is built after the plan of the plant-houses in the Botanic Gardens, which are a development in iron of the

slim structures made of jute-stems and of grass in which the natives of Lower Bengal cultivate their pepper (pân leaves) plants. Many years ago, the late Dr. Thomas Anderson, Superintendent of the Botanic Gardens, adopted the principle of the native pepper-house for keeping orchids and other shade-loving tropical plants, and Dr. King has amplified the idea by erecting iron structures, the roofs of which are covered with a thin layer of grass in order to break the sun's rays, while creeping plants are trained up the sides to give additional shade. In this House which constitutes the Great Aviary of the Garden, the large cages are placed on handsome iron brackets attached to the outer supports of the building, and are embowered in luxuriant vegetation. Probably no other Garden in the world has such a striking combination of foliage and plumage as is met with here. All the birds are either Parrots, Cockatoos, Fleshy-tongued Parrots, Conures, Parrakeets, or Brush-tongued Parrots. They belong to the *Carinatæ*, or birds with a keeled breast-bone, one of the two great sections into which living birds are sub-divided, and which includes all of them, except the Ostriches, Emus, Cassowaries, and Kiwis, which have no keel on their breast-bone. There are a number of fossil birds, and these constitute the division *Saururæ* or lizard-tailed birds, some of which had also teeth like lizards. But all of these remarkable combinations of lizard and bird are now extinct. The section *Carinatæ* is divided into 13 Orders: 1st, the Falcons, Ospreys and Owls ; 2nd, the Climbing birds and those with wide gapes ; 3rd, the Perching birds, *i. e.*, all ordinary birds, such as crows, sparrows, &c. ; 4th, the Pigeons ; 5th, the Game birds ; 6th, the Wading birds ; 7th, the Herons ; 8th, the Geese and ducks ;

9th, the Pelicans ; 10th, the Gulls ; 11th, the Grebes ; 12th, the Penguins, and 13th, the Tinnamous birds, found only in South America, and intermediate between the *Carinatæ* and the *Ratitæ*.

The Parrots belong to the second of these groups, known as the *Picariæ ;* the Woodpecker (the Latin name of which is *Picus*) having been taken as the type of the group. The Picarian birds are sub-divided into two sub-orders, the first containing the Woodpeckers and also the Parrots, Cuckoos, Honey-guides, Touracoes, Toucans and Barbets ; and the second, the Goatsuckers, Trogons, Swifts, Humming birds, Bee-eaters, Rollers, Motmots, Hoopoes, Puffbirds, Jacomars, Kingfishers and Hornbills. The first of these groups is known as *Zygodactylæ*, in allusion to the fact that all have their toes in pairs, two toes being directed forwards and two backwards. The second group constitutes the *Fissirostres* or wide gaping birds, and in these the toes are more or less connected together. All Picarian birds have one structural character in common, but one that is hidden from sight as it is found in the breast-bone which has always a double notch behind. The Parrots belong to the *Zygodactylæ*, and there are two great sections of them, first the true parrots with large powerful bills, and second, the straight-billed parrots. The Cockatoos belong to the first section, and they are found only in the Molucca islands and in Australia. It will be observed that the lower bill or mandible, is very powerful, and that the cutting edges of the bill are indented behind the tip. The cockatoos form the Family *Camptolophinæ*, so called from the power they have of erecting and bending their crests forwards, a habit very well seen in Leadbeater's Cockatoo when the bird is excited.

The species of Cockatoos generally exhibited are the following:—*Cacatua moluccensis*, the Rose-crested Cockatoo; *C. cristata*, the greater White-crested Cockatoo; *C. galerita*, the Greater Sulphur-crested Cockatoo; *C. sulphurea*, the Lesser Sulphur-crested Cockatoo; *C. citrinocristata*, the Citron-crested Cockatoo; *C. leadbeateri*, Leadbeater's Cockatoo; *C. roseicapilla*, the Roseate Cockatoo; *Licmetis tenuirostris*, the Slender-billed Cockatoo; *L. gymnopis*, the Bare-eyed Cockatoo, and *Microglossa aterrima*, the great Black Cockatoo. The most remarkable of these Cockatoos is undoubtedly the last, which is an inhabitant of New Guinea. Its bill is of enormous power, and appears to be used for stripping off the leaves of palms near the top of the stem, in order to reach the central tender shoot. The plumage is wholly black with a long crest, but the cheeks are flesh-coloured.

The *Androglossinæ* or fleshy-tongued parrots, so named from their tongues being fleshy like that of man, are represented by the so-called Amazon parrots of South America, by the Lories and Love-birds, but the most familiar example is the well known Grey Parrot of Africa which is the most linguistically accomplished of all. The appropriateness of this Parrot's sayings is sometimes very remarkable, and Mr. Bowdler Sharpe relates an instance in which an accomplished bird having been sent to compete at a Parrot Show, and having been kept covered up until its merits came to be settled by the judges, looked around it when its cage came to be uncovered, and exclaimed, "By Jove, what a lot of parrots," a speech that at once gained for it the first prize.

The Conures or *Conurinæ* are illustrated in this house by the well known Indian parrots, *Palæornis cyanocephalus*, the

Blossom-headed Parrot, and *P. torquatus*, the Ring-necked Parrot, both of which can be taught to speak with great fluency. The group is characterized by the absence of a crest, and by the presence of long tail feathers. The genus *Palæornis* extends to Africa, and the group is represented in the New World by the true Conures of which some examples are generally shown in this house. The term Parrakeet is occasionally applied to the foregoing Indian birds, but the Parrakeets proper are essentially Australian, only one genus being found in America.

In the second division of the Parrots, the Straight-bills, there is scarcely any indentation of the bill, the tip being nearly straight, and the tongue is pencilled or provided with a brush at its extremity, hence the term *Trichoglossi* is applied to them. They have also a peculiar odour, fœtid in some, but musky in others, and not unpleasant. The brush-tongues, with the exception of the genus *Loriculus* which occurs in India and in the Indo-Malayan regions, are inhabitants of the Australian continent, the Molucca islands, New Zealand, and the islands of Polynesia. One of the birds classed along with the brush-tongues is that remarkable New Zealand parrot, the "Kea," *Nestor notabilis*, which is the only known instance of a parrot in its wild state eating flesh. Those near the sheep stations appear to live almost exclusively on mutton, claiming the sheeps' heads that are thrown out from the slaughter-sheds, and picking them perfectly clean.

About the middle of the south-eastern division of this house, and on its southern side there is a large cage devoted to Pythons. The seeming incongruity of having snakes exhibited in the same house with birds is here overcome by the circumstance that the cages generally

are so embowered in vegetation, that the Pythons are not seen by the birds. Two large Pythons were received from Assam and placed in this cage, but unfortunately only the male now remains. The female shortly after her arrival laid about 70 eggs, on the 17th May 1882, and, by the 20th of July, all the eggs had been hatched, although many of the little snakes were still in them, only their heads protruding, and they remained in this condition for some days. After they were all out of the eggs, they were taken and placed in a cage by themselves, in order that they might be hand-fed, as all the food that had been given to them in the large cage had been left untouched. Every sort of living food was tried, but they refused to eat, and consequently they were all dead in two months. After the female had laid her eggs she remained coiled above and around them, and, during the whole period that the egg were being hatched, she never left them, and apparently never changed her position, and she also declined all food. An attempt was made to take her temperature during this period, as the temperature of the python is said to increase during incubation, but unfortunately no suitable instrument could be obtained in Calcutta.

The Pythons are known as Rock-snakes, but why this term should be applied to them is not very clear, as they are quite as often found on trees, and the tail is more or less prehensile. They attain to great dimensions, some being even over 20 feet in length. They are distinguished from other snakes by the presence of a horny tubercle, sometimes called a claw, on either side of the root of the tail, and most marked in the male. Internally, this tubercle is seen to cap a long bone, the rudiment of a hind-limb.

The bones at the hinder angles of the python's skull, and to which the lower jaw is connected, are more or less loosely attached to the other bones of the skull, and the two halves of the lower jaw are also only united at the chin by an elastic ligament. It is this arrangement that confers on the python and the Boas of South America great width of gape and a capacious throat enabling them to swallow large animals. The loose connection of the two pieces of the lower jaw also permits of their being worked independently forwards, and from side to side, over its prey, after it has been seized by the mouth, and, as the teeth are directed backwards, the prey cannot escape, after the mouth is once thoroughly filled. The python also makes use of its coils in compressing its prey, and in forcing it further into the mouth when seized, and in this respect it is also resembled by the Boa-constrictor. In this country one not unfrequently hears the latter term applied to the Python, the largest of the old world serpents, but this is inaccurate, as the Boa-constrictor is confined exclusively to the tropical forests of South America. The Python differs from it in attaining to much greater dimensions, and in having the upper surface of the head covered with regular shields, this part of the Boa being simply scaly. The under surface of the python's tail has also a double row of plates, but in the Boa there is only a single row. In all serpents, with two exceptions, of which the Python is one and *Tortrix* the other, there are no teeth in the intermaxillaries or front bones of the upper jaw. The Indian species, *Python molurus*, is not at all uncommon in certain parts of India, and is found frequenting trees, near water, in the neighbourhood of Calcutta. The Burmese and Malayan species is *P. reticulatus*.

Leaving the Andul House, by its north-western door, the visitor will find himself facing a sheet of water, with a bridge to his right, and

The Bandstand

to his left, with a large tamarind-tree before him, underneath which are some cages, and a small house.

A military Band performs in the Gardens once a week, generally on Friday afternoon.

The visitor, instead of crossing the bridge which leads direct to the Giraffe enclosure and to the Surnomoyee House, should follow the carriage drive round

The Great Lake.

In doing so, he will very shortly pass under the tamarind-tree just mentioned, in the cages of which he will find a number of small birds of prey.

The Cages of the Tamarind-tree

usually contain the following species, the Barn Owl, *Strix flammea;* the Brown Fish Owl, *Ketupa ceylonensis;* the Brazilian Caracara, *Polyborus brasiliensis;* the Chīl or Indian kite, *Milvus govinda;* the Shikra, *Astur badius;* and the common Kestrel, *Tinnunculus alaudarius.*

The Birds of prey belong to the great division of birds, the *Carinatæ*, and to the Order called *Accipitres.* They were formerly considered to be the most highly developed type of the whole class of birds, but as our knowledge of the structure of birds has extended, the Raptorial birds are not assigned so high a place, and their affinities are considered to be more towards the aquatic than towards the perching birds. They are distinguished by compact muscular bodies, but the

most marked external feature of their structure is their hooked bill with its sharp cutting edge, frequently provided with a lateral tooth; the upper half of the bill being larger than the lower half. Their feet also are very strong, and have three toes in front and one behind, furnished with powerful claws or talons which can be bent under the feet, so giving the bird a firm hold of its perch, and of its prey. They are divided into two great assemblages, the first of which is represented by all the ordinary birds of prey, such as the Vultures, Hawks, Eagles, &c., and the second by the Owls. The former includes all birds in which the eyes are placed on the side of the head, and in which there is no special radiate arrangement of feathers, around the eyes; and the second embraces those birds in which the eyes are directed forwards and are in the centre of a circle or disc of feathers. The first is divided into two sub-orders depending on the character of the outer toe, whether it can be reversed, or cannot be reversed. The first of these constitutes the Sub-order, *Falcones*, the Falcon being taken as the type, and it contains the great mass of the birds of prey, with the exception of the Osprey and the Owls. The Osprey, along with two Asiatic Sea Eagles, constitutes the Sub-order, *Pandiones*.

The second great assemblage is that of the Owls or *Striges*, in which the plumage is soft and fluffy, and the nostrils are generally hidden by stiff bristles. The Owls are divided into two sections or Families, the *Bubonidæ* and the *Strigidæ*, the former comprising all the owls with the exception of those few species which may be grouped round the Barn Owl, *Strix flammea*, of which an example may

be seen in one of the cages, and which is the type of the *Strigidæ*. The characteristics which distinguish those two groups are chiefly anatomical and internal; but, in the ordinary owls, the inner margin of the claw of the middle toe is not serrated or toothed like a saw, and that toe is always longer than the inner toe; whereas in the *Strigidæ*, the claw of the middle toe is serrated, and the two toes, the inner and middle, are of nearly equal length.

Continuing onwards the visitor will soon reach, on his left, an enclosure containing two or three Bee-hives. This is an experiment which is being conducted by Mr. Douglas, an enthusiastic apiculturist, who is endeavouring to introduce a good strain of honey-bee into India, with the object of creating a new industry.

From the far end of the Lake there is a beautiful view of the large island which occupies its centre, and of the Surnomoyee House, and the portion of the Garden around the Bandstand. A small picturesque wooden house occupies the summit of the island, but no use is now made of it, as it was resolved to allow the vegetation of the island to grow undisturbed, and so encourage the various aquatic birds that frequent the Gardens, and especially those that were introduced on to this sheet of water, to take up their abode and breed. But difficulties have been experienced, as it was never anticipated that Crocodiles would have become so numerous in the lakes as to prove destructive to the Water-fowl. This, however, has been so much the case, that the few birds that remain of those originally introduced seem to be aware of their danger as they very seldom venture into the water. Not only ducks, but large birds, such as Pelicans and Black Swans, have been dragged under water

and devoured by Crocodiles. So serious was the loss of birds from this cause that on one occasion the water was run off, to as low a level as possible, and the bottom of the lake was dragged for crocodiles, but with no result, as they buried themselves in the mud, according to their habit. Two species occur, *Crocodilus palustris* and *Gavialis gangeticus*, but the former only is destructive to birds, whilst the latter preys upon fish. Specimens of both species have been shot, but, as the Gardens are nearly surrounded by public thoroughfares, this method of destroying them had to be discouraged. But even supposing it were once successful, the fact that crocodiles migrate from tank to tank and from nullah to nullah during the rains, would make it only a temporary riddance, for the lakes would be again stocked with these pests in the following rains. On one occasion a crocodile over six feet in length was killed in the Gardens close to the entrance Gate. These facts explain why this fine sheet of water, which affords such a splendid surface for the display of a variety of aquatic birds, is so destitute of bird-life.

The section *Crocodilia* includes three distinct groups, *viz.*, Crocodiles, Alligators and Gavials. The Crocodiles are restricted to the Old World, and are distinguished from the Alligators, which extend from the Lower Mississipi and Texas throughout tropical America, and are to be found nowhere else, by the way in which the first or canine tooth and the fourth tooth of the lower jaw fit into the upper jaw. In the Crocodile, the first tooth fits into a pit in the upper jaw, and the fourth tooth into a groove on the outside of the jaw; whereas in the Alligator both of these teeth fit into pits. In the Gavial, the first and the fourth tooth both fit into grooves on the outside of the

upper jaw. As these are persistent structural characters, it is erroneous to speak of any of the crocodiles of the Old World as Alligators which are essentially distinctive of America or the New World. The Gavials are confined to India proper, Borneo and the north of Australia. They are easily distinguished from either crocodiles or alligators by their long snouts.

But, although this lake abounds in crocodiles it teems with fish, as it is annually stocked with fry. The most abundant fish in the lake are the *Labeo rohita*, the *Ruee*; *Labeo calbasu*, the *Kalbaus*; *Catla buchanani*, the *Catla*; *Notopterus kapirat*, the *Chital*; but the most prevalent of all is *Mugil corsula*, the floating *Vangur*, one of the Mullets, a surface-swimmer.

A considerable revenue is derived from rod-fishing, and there are some enthusiastic and persistent lovers of the piscatorial art, and none more so than an old Muhammadan woman. Ground-bait is largely used in fishing and is made up of highly aromatic substances introduced into a split bamboo, which is taken out for some distance and fixed in deep water. A delicate wand is left projecting above water, and as it vibrates, the presence of fish is indicated, and the line is cast over the spot. The regular fishers generally go to the expense of erecting a small wooden platform, a little distance out from the bank.

The Gate at this extremity of the Gardens exists solely for the entrance of stores and other materials. Across the public road outside, and on the banks of Tollah's Nullah is the Pumping Engine in connection with the chain of lakes and tanks in the Gardens, and by means of which they are kept at an uniform level.

Near to this, as the visitor turns eastwards, is a knoll on the bank of the lake covered with a group of that very handsome Cuban palm, *Oreodoxa regia*, which has a clear grey bole like the shaft of an Indo-Persian pillar.

A little further on to the left, there is

A Kennel

in which there is usually to be found the Dingo or Australian Wild-dog, an animal not indigenous to that continent, although now naturalized there.

Immediately adjoining this, is the

Annoda Pershad Roy House,

named after the late Babu Annoda Pershad Roy of Cassim Bazar, and specially adapted to the larger Birds of Prey, as the divisions are lofty to suit their habits. The most striking bird exhibited here at present is the Forest Eagle Owl of the Himalaya, *Bubo nipalensis*, which is distributed eastward to Tenasserim and southwards to Ceylon. It is a handsome bird with marked ear-tufts. Hodgson states that it preys on pheasants, hares, rats, snakes, and even kills the young of some of the larger mammals, such as the goat-antelopes.

In another division is the White Scavenger Vulture of India, *Neophron ginginianus*, which is very closely related to the Egyptian Vulture known as Pharaoh's Chicken.

A large black Eagle in the next division, said to be young and to have been brought from Japan, has not yet been identified, but it promises to be a fine bird. There are generally other Owls and some Falcons represented in this House.

The visitor will now follow the path leading along the side of the Lake to

The Otter enclosure

on its banks. Only one Otter is exhibited in this admirable enclosure, which is so planned as to include an area of deep water to which the animal has free access, and yet cannot escape. The portion under water is constructed, so as to afford easy access for small fishes and prawns which constitute its food. It was intended that a number of Otters should have been kept in this place, and two were introduced to it originally, but the enclosure not being quite completed one escaped, and the female that remains has now become so combative and jealous, that it has not been possible to allow any other otter to remain with her. After various efforts had been made to accustom her to a companion, but without success, it was thought that if one were introduced in a cage it would be protected, and she would get accustomed to its presence. So jealous and fierce, however, did she prove, that she at once dragged the cage into the water and held it down as if intending to drown the animal. Otherwise, she is perfectly gentle and will follow her keeper when allowed out. This otter, *Lutra nair*, is widely distributed over Lower Bengal, and is numerically abundant. It lives exclusively on fish, has a very voracious appetite, and large numbers of fish are destroyed by it. When caught young, it is very docile, and follows its master like a dog. The fishermen in the Jessor Sundarban take advantage of this disposition and train the otter to drive fish into their nets, rewarding it with a fish each time it is successful. These tamed otters have a collar round their necks and are secured

by it to the prow of the boat, and when their services are required they are slipped like dogs.

There has been frequently exhibited in the Gardens an otter belonging to the sub-genus *Aonyx*, so named because the claws are small and more resemble nails than claws. It is also a much smaller animal than the common otter, and is peculiar to Southern Asia. As the Indian otters are not well understood, living specimens are always most acceptable, and the Committee intend to erect more otter houses along the margin of the lake.

The visitor will now proceed onwards for a few yards and will find a flight of steps leading up to the large walled oval enclosure on his left that forms the airing ground to

The Buckland House

which was originally constructed for rhinoceroses, but is now inhabited by Tapirs. The outer aspect of the wall has had an embankment thrown up around it to the height of nearly three feet, the top of this embankment constituting a path which runs round the enclosure, and from this the visitor looks down upon the animals below. At the end next the lake, this path is interrupted by the house for the shelter of the animals, which has its outer gate facing the lake, its inner gate opening directly into the enclosure which has a tank for the use of the animals. The enclosure is planted with trees and the tank is luxuriant with reeds.

The first rhinoceros that inhabited this enclosure was an example of the common one-horned species, the *Rhinoceros unicornis*. This animal was presented by the late Maharajah of Dumraon. It was at first thought that there would be insuperable difficulties in bringing it

to Calcutta as it had been 45 years in confinement in a small house. The task of bringing the Rhinoceros to the Gardens was entrusted to Mr. Rutledge, the dealer in animals. When he arrived at Dumraon and informed the people in charge of the Rhinoceros, that he had come to remove it, they were incredulous of his ability to do so, and were much astonished on the following morning to find it quietly standing outside its house with its limbs manacled. It was walked to the Railway Station without any difficulty and placed in a truck and brought to Howrah, whence it was walked over night to the Gardens.

This Rhinoceros was always fed at one place out of a stone trough, from which a good deal of grain used to fall while it was eating, and, during the first cold weather, it was observed to have a constant companion in a Widgeon which was believed to be one of a number of birds that had been let loose upon the lakes. It was also observed that this bird disappeared at the end of the cold weather. The following notes regarding it appeared in the Calcutta *Englishman* of November 14, 1881:–

"The Widgeon, which has annually visited these Gardens for the last four cold seasons has again returned; it having been observed for the first time this year on the 7th of November, one week earlier than the date of its arrival last year. As usual, it has taken up its abode in the Rhinoceros enclosure, to which it was doubtless originally attracted by the quiet seclusion of the spot, perhaps, also, by the plentiful supply of food. Considering how remarkably timid wild ducks usually are, flying off at once on the slightest alarm, it is surprising that this male bird has from the very first been distinguished by the absence of timidity, and has evinced this character more and

more every year. The other morning, the arrival of this annual visitor to the Zoo having been duly notified to the Honorary Committee of Management, a few of its members adjourned to the enclosure to welcome their old friend. The bird was found standing on the brick slope leading to the tank, and when a keeper was sent in with moistened paddy to place near it, the Widgeon showed no fear, but merely took quietly to the water, swimming off a little way as the man approached, and returning leisurely as he withdrew. However, before it had reached the 'gamlah,' some of the deer now inhabiting the enclosure, since the Rhino's decease, had gone and sniffed at its contents, but this in no way scared the bird; rather their presence and acts of investigation seemed to give it confidence, and after one or two cautious glances at the food, it inserted its bill and enjoyed the provided repast.

The peculiarity of the periodical visits to the Zoo of this solitary Widgeon will be best brought out by the mention of one or two facts regarding the species, *Mareca penelope*, to which it belongs. The leading characteristics are these, *viz.*, that it is not a native of India; that it is a migratory bird; and that its habits are known to be gregarious. In spring, summer and autumn its home is probably on the banks of one of the lakes of Central Asia, or among the reedy marshes of Lob-nor in Eastern Turkestan; localities from which it only departs on the advent of snow, winging its way to more genial and sunnier lands in the south, returning again by February to its loved swamps in the north, which it generally reaches even before winter has given place to spring. Eight or nine months of its life are thus spent in these northern regions where its fellows pair and rear their

young, but the unsocial habits of our Calcutta visitor incline us to credit it with confirmed bachelorhood. When the instinct of migration comes upon this bird, it suddenly leaves our Zoo, generally departing early in February, and long, tedious and dangerous must be its flight towards the north. Colonel Prejevalsky, who visited Lob-nor, tells us that he observed the first widgeons arrive on the 6th of February, and that "all the flocks without exception came from W. S. W., occasionally from S. W. and W. Not a bird flew direct from the south over the Altyn-tagh mountains, this proving that migratory birds, at all events water-fowl, will not venture to cross the lofty and cold Tibetan highlands in their passage from the trans-Himalayan countries, but pass over this difficult country at its narrowest point. In all probability, the feathered kind follow the Indian valleys to the neighbourhood of Khoten, and then take the direction of the Tarim and Lob-nor across the warmer and less elevated districts. This explains the reason of their following a W. S. W., and not a S. course to Lob-nor. And we were told by the inhabitants that in autumn they depart in the same direction." The journey of our Widgeon must thus extend over thousands of miles, but how long it takes to accomplish this wonderful flight we have no means of knowing accurately, though it probably is not prolonged over many days. It is the habit of widgeons to fly in flocks, although not very numerous, and few are known to come as far south as Calcutta; but whether or not our friend joins itself in its perilous flight to a flock of companions, it always arrives and departs alone."

The animals now occupying this enclosure are Malayan

Tapirs, *Tapirus malayanus*, male and female, from Malacca. The Tapir belongs to that section of the *Ungulata*, known as the *Perissodactyla*, which also includes the Horse and the Rhinoceros. It has four toes on the front foot and three toes on the hind foot, but in some parts of its structure it is related to the rhinoceros and to the horse. Its most striking peculiarity is the elongated character of its nose which forms a very moveable trunk which it uses for conveying food to its mouth. Its eyes are small and unintelligent. In colour it is remarkable, as the hinder portions of the sides, back, and belly are nearly white, whilst the rest of the animal is glossy black. It is covered with short hair, and the tail is very short; and the ears are pointed and their bases white, behind. In its natural state, it lives almost exclusively on the leaves of trees, and it appears to feed either early in the morning or after sun-down, as it is very sluggish during the whole of the day. The Tapirs here exhibited are gentle in their habits, but in this they are not singular, as this would seem to be the disposition of these animals generally, and also of the South American Tapirs of which there are two species. One inhabits the high parts of the Cordilleras range of mountains, and is known as the Hairy Tapir, and, the other, is the common Tapir of South America, and is distinguished by having a mane. This latter animal becomes so tame, that it is said to be allowed to run at large in the streets of Guiana.

Passing round this enclosure to its northern end, a flight of steps will be found leading down to

The Kuch Bihar House.

This house was erected at the expense of the Maharajah

of Kuch Bihar, and is one of the best arranged buildings in the Gardens. It consists of two lines of cages separated from each other by a central passage for the use of the keepers, and it is surrounded by a deep verandah. The cages are raised on iron supports 3 feet off the ground, and are open on all sides and above, the roof of the house giving shelter from sun and rain.

The animals in this House are all small representatives of the great division of the Mammalia known as the *Carnivora;* the larger species, such as the Lion, Tiger and Leopard being exhibited in the house to be next visited.

The Carnivora are so called because they prey upon other animals, and for this purpose their teeth are specially adapted, as with their sharp front incisors and powerful eye-teeth or canines they tear the flesh of their prey, and, with their back-teeth, cut it finely as with scissors. One of the back-teeth is much more prominent than the others, and is known as the *sectorial* or flesh-tooth. The jaws of the Carnivora have only one movement, upwards and downwards, and do not have a double movement as in the case of the Ruminants and Rodents. The formidable character of the jaws of a Carnivorous animal does not necessarily depend upon an increase in the number of teeth, but, as in the case of the *Felidæ*, on the shortening and strengthening of that portion of the jaw that carries the canines and the teeth behind them, so that the tooth area is reduced in size, *e. g.* in the Lion there are only 30 teeth as compared with 32 in man.

The Carnivora embrace 13 distinct Families, *viz.*:—

1*st*, the Cats or *Felidæ; 2nd*, the *Cryptoproctidæ* which contains only a single animal, peculiar to the Island of

Madagascar, and intermediate between the Cats and Civets; 3*rd*, the *Viverridæ* which includes the Civets, Mongooses, and some other curious animals allied to them, found in Africa and Madagascar, and nowhere else; 4*th*, the *Protelidæ*, also represented only by one remarkable animal allied to the Hyæna and Mongoose, and found only in South Africa; 5*th*, the *Hyænidæ* or Hyænas; 6*th*, the Dogs or *Canidæ*; 7*th*, the *Mustelidæ*, which includes the Weasels, Gluttons, Otters, Badgers, Ratels and Skunks, and some other allied animals for which there are no popular names; 8*th*, the *Procyonidæ* or Coatis and their allies; 9*th*, the *Æluridæ* or Cat-bears; 10*th*, the *Ursidæ* or Bears; 11*th*, the *Otaridæ* or Eared Seals, sometimes termed Sea-lions or Sea-bears; 12*th*, the *Trichechidæ*, represented by the Walrus or Morse, and 13*th*, the *Phocidæ*, the ordinary Earless Seals. Of these thirteen Families, the majority are terrestrial, and from the circumstance that their feet have well developed toes they are called *Fissipedia*; whereas the few families which are thoroughly aquatic in their habits and have their limbs consequently modified more or less into fins, are known as *Pinnipedia*; this latter division includes the Walrus and the two families of Seals. Of course, some of the *Fissipedia* are partly aquatic in their habits, but their limbs never become altered into fins: and a familiar illustration of this is the Otter.

In the divisions of the Kuch Bihar House, there are examples of the *Felidæ*, *Viverridæ*, *Canidæ* and *Procyonidæ*. The *Felidæ* or Cats are found all over the globe except in the Australian region, Madagascar and the Antilles, which have no wild cats. Cats always attack their prey by first striking it with their powerful feet, and, not as dogs, by seizing it with their teeth, and their

feet are specially adapted for this mode of attack. They have their toes furnished with strong, curved, retractile claws which, when not in use, are withdrawn by elastic ligaments within sheaths which prevent their sharp points being worn away by rubbing on the ground. When a cat strikes at its prey the claws are unsheathed by the action of flexor or bending muscles on the under surface of the foot, that can be exerted at will and which overcome the action of the restraining ligaments. The following species of the genus *Felis* are usually represented, namely, the Ocelot, the common Fishing-cat, the Leopard-cat, the common Wild Cat, and the Caracal or Indian Lynx.

The Ocelot, *Felis pardalis*, is one of the most handsome of the smaller Carnivora, and, like the Jaguar, is an American animal. It is said to be very voracious and savage in its disposition, but it rarely attacks man. The keepers in this house, however, who have had the foolhardiness to enter the cage of this animal to clean it, instead of doing so from outside, have sometimes paid the penalty of their indiscretion, and on one occasion a keeper had his scalp nearly torn off. The Ocelot frequents trees, and generally drops on its prey as it passes beneath, and as its liking is more for blood than flesh, it is very destructive to animal life, sucking the blood of its victim and leaving the carcass.

The common Fishing-cat of India, *Felis viverrina*, is widely distributed, abounding chiefly in the southern and eastern portions of the country and extending into Assam and Burma. It is fond of moist situations and the banks of streams, and has the reputation of catching and eating fish, and of living on shell-fish as well as on small mammals and birds.

The Leopard-cat, commonly known as *Felis bengalensis*,

occurs in the Himalaya and in the hilly regions of India generally, and extends into Ceylon. It is also found in Bengal and in the neighbourhood of Calcutta, and spreads eastwards throughout Burma, Malaya, and the neighbouring islands of Java and Sumatra. It lives in the hollows of trees, feeding upon small quadrupeds and birds, and is said also to eat lizards, snakes, fish and shrimps. The colour of this cat would appear from the descriptions which have been given of it to be very variable, but it seems likely that there may be more than one species, as the small cats of this group are not at all well known.

Felis chaus, which goes by the name of the common wild cat, or jungle cat of all India, is a species closely allied to, if not identical with, the similar cat found in Egypt and Northern Africa. It has a somewhat pointed and tufted ear like the lynx, and its tail is shorter than in the majority of cats. It is common about Calcutta.

The Indian Lynx, *Felis caracal*, is found only in the drier regions of North-Western and Western India, being found at Delhi, Lahore, and in many parts of Harriana, Rajputana and the Punjab, and it extends to Persia, Arabia and Africa. Some of the Princes of India keep trained animals for hunting purposes. They are kept with the greatest care, and are taught to stalk peafowl, hares, &c., but the sport is tame, as they are generally slipped only at short distances.

Although these were the only cats in this house, while this Guide was being written, it has contained, from time to time, examples, of others, among which may be mentioned the very small beautiful cat of the Madras Presidency, *Felis rubiginosa*, which was extremely shy and would never show itself; the small Malayan cat with a shortish

tail, *Felis planiceps;* the handsome and very long-tailed Marbled Cat, *Felis marmorata,* found in the Himalayan region, Assam, Burma and the Malayan peninsula; and the small cat from Java, *Felis javanica,* which is a miniature representation of the fishing cat of Bengal. Considerable difficulty has always been experienced in keeping these smaller cats alive in confinement.

The Family *Viverridæ* contains the Civets so well known for the perfume which they yield and which is secreted in two pouches beneath the tail, from which it is scraped out at intervals from animals kept in confinement for this purpose. The civets are intermediate between the cats and the hyænas. Their skulls, however, differ much from those of cats in the elongation of the facial portion, and consequently their jaws are much longer and feebler, their teeth are more numerous, and the canine teeth are smaller. These modifications have reference to their modes of life, as they are not nearly so carnivorous as the cats. The forms of the *Viverridæ* are varied, and familiar illustrations are the Civet itself, the Paradoxure or Palm-cat, the Mongoose, and that remarkable looking animal, the Binturong.

One of the oldest residents in the Gardens is the Indian Civet, *Viverra zibetha,* which occupies one of the cages of this house. It was captured at Ballygunge, the species being common round Calcutta, more especially towards the east. It, however, extends as far northwards as Nipal and Sikkim, and southwards to Travancore; it also ranges into southern China and into the Malayan peninsula. A nearly allied species occurs in Africa.

The common Paradoxure which is erroneously called the Tree-cat or Palm-cat, is exceedingly abundant in and

around Calcutta. The name Paradoxure means 'queer-tailed,' and was given to the genus from the circumstance that some of these animals carry their tails in a sort of corkscrew fashion ; but this is not a persistent character, although it is occasionally well seen in the Assam variety, *Paradoxurus quadriscriptus*. The common species in Bengal is *Paradoxurus typus*. It inhabits trees and seems to have a partiality for Palm-trees, such as the Cocoa and Palmyra palms, but it also lives under the thatch of native houses. It is essentially nocturnal in its habits and does not see at all well in day-light. It roams about at night, feeding on small mammals, birds, and lizards, and doubtless eats fruits as well. It seems to have a distinct liking for shell-fish, and in captivity devours with avidity the large spirally pointed land-shell, *Achatina fulica*, a snail which, although very plentiful in every garden about Calcutta, was introduced from the Mauritius not many years ago. The Paradoxure eats shell and animal entire. From the prevalence of this Paradoxure, and also of Civets and Jackals around and within the Gardens, there have been very many serious losses of rare aquatic birds, although the birds have been enclosed within a special railing which it was thought would have protected them from the raids of these animals.

There are two or three Paradoxures allied to the common species, and one of these belonging to the sub-genus *Paguma*, is generally to be seen in this House. *P. grayi* is the name of this species. It is found in the Himalaya and extends apparently to Burma.

The Genets are also represented here. One of the species, *Genetta vulgaris*, occurs in the south of Europe,

and one or more species are African. *G. pardina*, from the latter continent, occupies one of the cages of this house. The Genets have odoriferous pouches, but not much developed, and the pupil of the eye is a vertical slit, indicating a nocturnal habit, that is, these animals see better by night than by day.

There are two examples in this House of a curiously coloured and peculiarly formed animal belonging to a separate sub-section of the *Viverridæ*. It is called *Hemigalea hardwickii*, and is found in the Malayan peninsula and in some of the larger neighbouring islands, but it is rarely seen in Zoological Gardens. It is pale yellow, with broad dark bands across the back. Its habits are very nocturnal, and the two specimens are generally asleep during the day, and hidden in the straw of their box. They chiefly subsist on eggs. Little or nothing is known of the habits of this species in its wild state.

The Dogs, *Canidæ*, are here illustrated by two specimens from England of the common fox, *Canis vulpes;* the Indian fox, *Canis bengalensis;* the common Jackal, *Canis aureus;* the black-backed Jackal, *Canis mesomelas;* and the side-striped Jackal, *Canis lateralis*.

The Foxes differ from the dog, wolf, and jackal in that the pupil of the eye becomes vertical when it contracts under strong light, but at other times it is circular. The muzzle also is more pointed, the head rounder, the ears more erect and triangular, and the limbs shorter than in these animals; also the tail is long and bushy, and is known as the brush. The English fox, as it will be observed, is very different in appearance from the little fox of India. It may be interesting to note that an English fox that has been for some years in this house has become

much paler in the colour of its coat since its arrival in this country, and this will be evident if it is compared with the fox in the adjoining cage, which has only been a few months in India. The intelligence and cunning of the fox are proverbial; and the following anecdote is an illustration of its intelligence:—

'A farmer in Scotland looking out of his window, at a very early hour on a summer morning, saw a fox carrying off a large duck which he had stolen. He was running away with it across a field, at one side of which he encountered a stone dyke, about four feet high, over which he attempted to jump with his prize. The wall, however, was too much for him, as he failed to clear it after three attempts. Finding himself foiled he sat down and looked at the wall, and then seizing the duck in his mouth he stretched himself on to the wall as far as he could reach with his fore-paws, and pushed the duck's bill into a crevice. He then sprang on to the top of the wall, stretched down his head and pulled the duck up, dropped it on the other side, jumped down himself, picked it up, and trotted off.'

The Jackal is closely allied to the wolf, but is a smaller animal, and its muzzle is more pointed. It undergoes considerable changes in its coat, depending on the seasons, as it becomes darker and richer in colour in the cold season, when the black on the back becomes more defined. Similar changes of colour occur also in the two adjoining jackals from Africa, and even in a more marked degree. At certain seasons, *Canis lateralis* seems almost entirely to loose the side-stripes from which it derives its specific name, whilst, at other times, they are most pronounced. A like change also comes over the

black saddle of *C. mesomelas*. The common jackal is distributed throughout India and the countries to the west as far as Asia Minor and North Africa, but its distribution to the east is much more limited, as it does not occur in the delta of the Irawadi, although it extends to the upper portion of the valley of that river and is known about Prome and further to the north. The jackal has been called "the Lion's provider," and there are reliable authorities who have recorded that a jackal may occasionally be seen following or going before a tiger, and at such times the jackal has been heard to emit a peculiar cry which is said not to be heard in districts in which there are no large beasts of prey. This cry is called the "Pheall" cry, and Blyth states that he once heard a pariah dog when it sniffed a collection of live tigers make a noise which he could only compare to the so-called Pheall cry of the jackal. The presumption, is, that this peculiar cry either arises from fear and is a note of alarm, or, as has also been suggested, that it may be sexual.

The Coati, one of the *Procyonidæ*, is distinguished by a long pig-like, but very flexible snout, constantly in motion when the animal is moving about. It is very arboreal in its habits, and feeds on birds, insects, and fruits, but it seems also to be fond of shell-fish, as it eats the large *Achatina*, but in a much more delicate way than the Paradoxures. Its habit is to break the shell first, and then to pull out small fragments of the inmate with its long claws. The Coati is found only in America and extends from Mexico to Paraguay.

The visitor will now leave the Kuch Bihar house and proceed to the dens of the large Carnivora contained in

The Burdwan House.

This handsome edifice is semi-circular and 250 feet in length. It has a broad verandah running along its southern front, and is divided into eleven large dens, in double series, one in front and one behind. It was erected by H. H. the Maharajah of Burdwan, who was the first and most munificent contributor to the Gardens.

The series of the large beasts of prey begins at the eastern end with the Lion which is generally regarded as the most noble of these animals.

Only one species of Lion is known, *viz.*, *Felis leo*, and it is distributed throughout Africa, and extends into Arabia, and Persia, eastwards to India. The Emperor Babar records the occurrence of the lion in his day, in the Benares District, associated with the wild elephant, rhinoceros, and wild buffalo. But even within the present century the lion is known to have ranged from Palamow in Bengal, westwards to the banks of the Indus, and from Poonah to the banks of the Sutlej and to Sindh. At present, however, it is almost exclusively confined to Kachh and Guzerat, but, within the last few years, lions have been killed near Mount Abu, at Saugor, in the Rewah District, and 25 miles west of Allahabad. As the lion is the cognizance of the famous goddess Durga whose worship is so popular in Bengal, it is probable that the animal was even more widely spread in India in early times. An impression formerly existed that the Indian lion was maneless, but this doubtless arose from immature specimens of the male having been observed, for the adult is provided with a mane as in the lions of Africa and Persia, although it may occasionally be not so well developed. It is also said that its physiognomy differs from that

of the African lion, but the physiognomy of no two African lions is exactly alike. The lion exhibited in this house is from Mesopotamia. He was presented to the Gardens when only a few months old, and came under the name of Rasheed to which he still answers. The donor, the late Mr. F. F. Carter of Busrah, also presented a young lioness in the latter part of the same year, 1878, and this animal was so tame, that it followed its keeper about the Gardens and could generally be left tied up under a tree, but unfortunately it died within eighteen months after its arrival. Two specimens of the Indian lion from Kathiawar were presented by the Nawab of Junágarh, in 1877, but the animals were young and never throve, and first one and then the other died before reaching maturity. The lion differs from all the other cats or *Felidæ* in having a tuft at the end of its tail in both sexes, and there is said to be a small horny excrescence or spur hidden in the tuft, and it has been supposed that when the lion lashes his tail against his flanks he is spurring himself with his tail-spur to arouse his courage and ferocity. Dr. Livingstone, the great African traveller, did not consider the lion formidable if met by day, or even in clear moonlight. On moonlight nights the buffaloes of his camp were allowed to roam at liberty, but on dark, and especially stormy nights, they had to be securely tethered near the camp fires, as the lion was abroad in search of his prey, and his tremendous roar heard on these dark nights intimated his success in capturing it. Only rarely does the lion attack man ; indeed, it is said, that when a lion becomes a man-eater he is old and unable to capture his natural and favourite food, the antelope and buffalo. It is also stated that under this condition he occasionally takes to eating grass, and

Livingstone mentions that "the natives observing undigested vegetable matter in the droppings of man-eaters follow up their trails in the certainty of finding them scarcely able to move under some tree, and despatch them with ease." When there has been an unusual fall of rain, a water-melon occurs, in great profusion, on some of the African arid plains, and not only the elephant, rhinoceros, antelopes and mice regard it as a common blessing, but also the hyænas, jackals and lions. But the lion when assisting his lioness to bring up their young, is particularly fierce and aggressive, and boldly approaches human habitations to carry off sheep and goats. It breeds freely in confinement, and the lioness goes with young about fifteen to sixteen weeks, and produces a litter of from two to six cubs, and is a most devoted mother. The cubs are engaging little animals, and their tawny skins are spotted over with brown, and traces of these spots remain for many years.

Several Tigers are exhibited in this house, and some of them having been trapped when fully grown, these specimens are very characteristic examples of this magnificent beast of prey. The tiger, *Felis tigris*, is very widely distributed over Asia, as it may be said, in general terms, to extend from the shores of the Sea of Okhotsk to the southern shores of the Caspian and to the Caucasus, from the Lake of Baikhal to Java, from the Sea of Aral to the Persian Gulf, and from the Himalaya to Cape Comorin; thus occurring throughout Mongolia, Western Turkestan, Persia, Afghanistan, Biluchistan, India, Burma, Siam, the Malayan peninsula, and China, and in the island of Saghalian at the mouth of the Amur, where the winter is almost Arctic, and in the islands of Sumatra, Java and Bali within the tropics. But it is absent

in the high regions of Eastern Turkestan and Tibet, although it ascends the Himalaya to 11,000 feet. It is not found in the island of Ceylon. As it occurs under such varied climatic conditions, for what greater contrast could there be than the climates of Saghalian and Java, it is subject to considerable variation in size, in colour, and in the character of its fur. The sleek, short-haired, richly coloured animals are found in the warm regions of Asia, whereas the tiger found among the snows of Manchuria is covered with long soft hair, has a shaggy ruff round its neck and a light coloured coat. Thus wisely does nature provide for the very different conditions in which the tiger exists in that cold but vigorous climate, so different from the hot steamy atmosphere of the jungles of Bengal where *Stripes* is to be seen in its greatest beauty. The size of the tiger varies considerably throughout these countries, and there are different feebly marked races. It is undoubtedly larger than the lion, but it laeks the nobility of mien so distinctive of that animal, and which is so heightenened by his splendidly maned, massive head and finely tufted tail. But in beauty and elegance of form, and in muscular power and activity, the tiger surpasses the lion. From time immemorial it has been the accepted cognizance of royalty in oriental courts, having been kept alive in royal state, and its skin spread over thrones and judicial seats. It is a nocturnal feeder, although it occasionally kills its prey during daylight. It sometimes attacks the larger ruminants, such as the wild buffalo, but a well authenticated instance is known in which two wild buffaloes attacked a tiger in daylight in the Chutia Nagpur jungles, and left him *hors de combat*, but this is a rare circumstance, and a

single buffalo is generally seized and dragged to the ground without the chance of using his horns. Sir Joseph Fayrer says that the tiger "watches the cattle, creeps stealthily out until within springing or rather rushing distance, then, with a rush or bound and a roar or deep growl, he seizes one of the herd by the throat and drags or strikes it to the ground with his formidable arm, fixes his fangs in the throat, and his powerful fore-claws in the trunk, or neck, and holds it there until it is nearly or quite dead, when he drags it off to the jungle to be devoured at leisure." The favourite food of the tiger, however, is the wild pig and some of the smaller deer and antelopes, but when its appetite is depraved it takes to eating man. When such tigers have offspring at the time, families of man-eaters are thus reared which not unfrequently cause extensive districts of country to be deserted owing to their fearful destruction of human life. In the Central Provinces "a single tigress caused the desertion of thirteen villages, and two hundred and fifty square miles of country were thrown out of cultivation." Again "one tiger, in 1867-8-9, killed, respectively, twenty-seven, thirty-four, forty-seven people," and it "once killed a father, mother, and three children; and the week before it was shot, it killed seven people." The most interesting donation of tigers to the Gardens has been that of two tigers and a tigress, supposed to be man-eaters, and which were entrapped in pitfalls near Hazaribagh by Babu Rameshwari Prasad Narain Sing, Zámindár of Mukshudpur, in the Gayā District. The tiger and tigress sent in 1878 were said to belong to a family of six or seven of which two others were killed when these were captured, and one of the slain was a notable man-eating tigress. During the preceding two years upwards of 200

people had been killed by the tigers in the immediate neighbourhood of where these animals were ultimately either killed, or captured, and, for six weeks before, the road that passed near their lair had been closed, no one daring to pass along it. But after the capture of these two animals and the death of the others, no more persons were killed, and the road was opened. Tigers in which the man-eating propensity is developed become very bold, and while I was at Bhamo, in Upper Burma, where tigers are very plentiful, a tigress cleared the town-stockade, nine feet high, and killed a woman who had been sitting, in the low verandah of a ground hut, making thatch. She had evidently been whisked off by one fell swoop of the tigress's paw, for no marks of the animal's teeth could be seen. The tiger breeds at any season, and the tigress has usually from two to four at a birth, and her period of gestation is from 14 to 15 weeks.

In some of the dens adjoining the tigers are the Leopards, *viz.*, the common leopard and the black leopard. The former, *Felis pardus*, like the lion and tiger, was well known to the ancients who had a curious superstition regarding it that survives more or less to the present day and gives rise to frequent discussion in sporting papers as to the supposed difference between the Panther or Pard and the Leopard. "It was thought not to be actually the same animal as the Panther or Pard, but to be a mongrel or hybrid between the male Pard and the Lioness; hence it was called the Lion-panther, or *Leopardus*. This error, as Archbishop Trench tells us, "has lasted into modern times; thus Fuller says, 'Leopards and Mules are properly no creatures.'" The words Pard, Panther and Leopard have reference to one and the same animal. It has a wide distri-

bution over Africa, and, at the Cape, it is erroneously called the tiger. It is common in Syria and extends into India and the countries to the east, where distinct races are found, for example, the leopards of Japan, and of the island of Formosa. There also appear to be two varieties in India, and these doubtless contribute to perpetuate the erroneous idea that there are two distinct animals, the Panther and Leopard. But the most marked variety of this species is the Black Leopard found in Ceylon, Southern India, and Assam, and the countries to the south-east and in some of the neighbouring islands. It is very black, but this colour is not so intense but that in certain lights the characteristics spots of the leopard can be seen through it. The leopard is a very stealthy animal, and hunts for its prey generally along the sides of pasture-lands and the margins of forests. It also approaches villages and carries off goats and sheep, and it appears to have a strong partiality for dogs. Children also are sometimes carried off by it, and it is well known that men and women have been killed by it. The common leopard, is not a great climber of trees, indeed, it seems only rarely to manifest this habit; but another and distinct species, *Felis macrocelis*, called the Clouded Leopard, and found in Assam and in the countries to the south-east, frequents trees, and feeds largely on birds.

The larger Carnivora conclude with that curious looking animal, the Hunting Leopard or Cheetah, *Felis jubata*. Its distinguishing features are its small round head, long legs, slender figure, with the loins of a greyhound, and long tail. There is a considerable mane, and the hair on the belly is long. It will also be observed that the claws are visible, as they are not so

retractile as in other cats. The dark line that passes down the cheek from the angle of the eye to the mouth gives the face a peculiar and supercilious appearance.

The hunting leopard, as its name implies, is used in the chase, but by no amount of human training can one of these animals be made a proficient hunter, and consequently cheetahs reared in confinement are generally considered of no value. They must have the benefit of parental training to be adepts in coursing game. When taken to the field the cheetah is hooded and carried in a cart to which it is chained, and when the hunter comes within reach of a herd of antelopes the hood is removed, and no sooner does the cheetah see the game, then it cautiously makes for it, taking advantage of any inequalities in the ground to conceal itself from its quarry, but, when it has reached within killing distance, it suddenly springs forwards by five or six vigorous bounds, and strangles its prey. The hunter then runs up, cuts the throat of the antelope, and collecting the blood in a vessel out of which the cheetah is accustomed to eat, gives it the blood to drink, and while it is so engaged he again cleverly hoods it.

Two varieties are recognised; one inhabiting Asia, which is the maned cheetah; a second, without a mane, and confined to Africa.

The cheetah found in South Africa is distinguished by having wooly hair and unusually short hind legs. It is generally considered to be a distinct species, called *Felis lanea*.

The visitor will now retrace his steps along the front of the Burdwan House to the small house immediately to the east of the lion's den, and known as

The Wolf and Hyæna House.

The Indian Wolf, *Canis pallipes*, is represented in the first division of this house. The Wolf of India is a smaller animal than the Wolf of Europe and of Northern Asia, *Canis lupus*, and than the Wolf of the Tibetan highlands, *Canis laniger*. It is widely distributed over India and is not uncommon in many districts. The chief supply to the Gardens has been from the Gayā District. It is not found in the damp region of Lower Bengal, and it does not frequent forest land, preferring a dry open country. It generally hunts in packs, and Sir Walter Elliot records that he had seen the wolf so hunting the gazelle in the Southern Mahratta country, and he mentions that the ryots had a common belief that in the open plains, where there is no cover or concealment, they scrape a hole in the earth in which one of the pack lies down, and remains hid, while the others drive the herd of antelope over him; and this habit noticed by the ryots has been verified some years ago by Mr. E. C. Buck who in a letter to "Nature" quotes Mr. Elliot, B. C. S., Secretary to the Government, North-West Provinces, as his authority for the following incident:—Mr. Elliot "saw two wolves standing together, and shortly after noticing them was surprised to see one of them lying down in a ditch, and the other walk away over the open plain. He watched the latter, which deliberately went to the far side of a herd of antelopes standing in the plain, and drove them, as a sheep-dog would a flock of sheep, to the very spot where his companion lay in ambush. As the antelopes crossed the ditch, the concealed wolf jumped up, seized a doe and was joined by his colleague." A similar habit has been observed in the English fox.

It would appear from recent researches that the Indian wolf is the stock from which some of the best breeds of dogs have been derived, for example, some of the shepherd-dogs and poodles. The ancient Lake-dwellers of Switzerland had a dog known as the peat-dog or Torfhund, the skull of which is identical with that of the jackal of India; and it is therefore probable that the ancestry of the domestic dogs of Europe may be traced to the east, and to the two stocks, the Indian jackal and the Indian wolf. The pups of a wolf, if taken sufficiently early, are quite capable of being tamed, and there are many authentic instances on record of this having been done. Two of a litter sent from Gayā to Calcutta, in December 1876, were successfully tamed, and it was not until they had attained maturity and were becoming a nuisance by their nocturnal howlings, especially in moonlight, that they had to be relegated to the Gardens. Whenever they heard any piano being played or more especially a human voice taking a high note, they howled and bayed as street dogs do at home in front of an organ-grinder, or itinerant band. Both were fond of water, and like pariah dogs, used to lie in it on hot days. The wolf produces as many as four to seven pups in a litter.

The Hyænas, as already pointed out, belong to a distinct family of the Carnivora, the *Hyænidæ*, represented by only one genus, *Hyæna*, allied to the cats and civets on the one hand, and to the dogs on the other. The hyæna of India is known as *H. striata* from its striped coat, but it is also found in Africa where there are two other species, *viz.*, the spotted hyæna and the brown hyæna. It frequents only hilly open areas,

and is not found in forests. It generally either constructs a burrow for itself in the earth, or takes up its abode in crevices of rocks, or in caverns, whence it issues at night in search of food, as its habit is to devour the carcasses of any animals it may find rather than kill for itself, and, when pressed by hunger, its jaws are so powerful as to enable it to devour even the bones of these carcasses. It occasionally carries off dogs from villages and even attacks women and children. The Indian hyæna has a weird howl, but the spotted hyæna of Africa makes a sound which is a very good imitation of a laugh, and it is therefore sometimes called the Laughing Hyæna.

Immediately adjoining this house is

The Orang-Outang House,

in which there are two sections, each with its day and night den.

The Orangs are at present represented only by two females, neither of which is yet mature. One of these, the most healthy of the two, came as a baby at the breast with its mother, in 1877, along with an adolescent male. On their arrival, they were at once placed in this house, and, as they were very docile, they were daily allowed to wander about. Whenever they were let out, their habit was to go to the nearest tree, break off some branches and build a platform for themselves, but as this was daily repeated, it was found necessary to confine them. When permitted, they used to spend the day on their platforms or *machâns*, descending occasionally to the ground to pluck up plants, or inquisitively to stop a visitor who might have something tied up in the end of his cloth, and, if this happened to be food, it was

appropriated. They were not in any way vicious, and the visitors were more amused than frightened by their curiosity. They manifested the most remarkable powers of observation and intelligence, and, as an illustration, it may be mentioned that the male sitting one morning on his *machân*, when a shower suddenly came on, no sooner had observed some visitors putting up their umbrellas than he broke off a large leafy branch and held it over his head; but finding it not giving him sufficient protection he went under his platform for shelter from the rain. At other times, they would imitate the actions of carpenters or other workmen employed near them, and resort to most intelligent expedients to bring objects within their reach, their usual method being to take some bedding-straw and twist it roughly and use it as a fetcher.

This family party of three lived happily together for two years, when the mother suddenly died. The adolescent male appeared to be very much affected by her death, although she never seemed to have any particular liking for him, and her child also manifested unmistakeable grief, as it rolled on the ground, and cried when the dead orang was removed. The male attempted to follow it, and had to be driven back to the house, and when daily let out, he betook himself to the roof where he would sit for hours looking in the direction in which his late companion had been carried away. On one very hot day he could not be induced to retire to his house for shelter from the sun, and he consequently received a sunstroke, from the effects of which he never rallied, and died within a few months. This was another sorrow to the little one, but a companion was immediately found for her in the other female now in this house, which, however,

unfortunately, from some unknown cause, has become partially paralyzed. The young one is now nearly three feet high when standing erect.

Orangs, although they live on trees, are very slow in their movements, and are as cautious in climbing a tree as a man would be. They take special care of their feet, as any injury to their feet seriously affects them. In walking, it will be observed that the Orang cannot place the sole of the foot flat on the ground, but that the outer edge of the foot is turned downwards, so that the upper surfaces of the curved toes rest on the ground along with the greater part of the heel ; and it will also be seen that it supports itself on its arms, the position of the hand being the exact reverse of that of the foot, *viz.*, the inside of the hand is turned inwards and downwards, the animal resting on the upper surfaces of the two first fingers and on the point of the thumb. It is very rarely that the orang is seen to stand erect, unless it has a support above or in front to which it can hold on.

The Orang is confined to the two islands of Sumatra and Borneo. It is first cousin to the Gorilla which is the highest of all the anthropoid Apes, and the animal nearest to man. The Gorilla is found only in Africa which is also the habitation of its second cousin, the Chimpanzee. The characters of their teeth are very similar to those of man, and their number is the same. The skull of a very young animal of any of these Apes has a striking resemblance to that of a human infant in its smooth rounded outline, but, as growth proceeds, it becomes marked by strong prominent ridges for the attachment of the powerful muscles of the jaws. The canines or eye-teeth of the male are nearly as large as those of the Tiger.

They live exclusively on vegetable substances, but when these Orangs were first received, there was considerable difficulty in finding out what would best agree with them. Experience, however, has proved that a mixed diet of *gram* and fruits is the best.

From this house a path leads along the neighbouring lake in a southerly direction to

The Abdool Gunny House,

called after the Nawab Khajah Abdool Gunny, C. S I., of Dacca. It has now only one inmate, a very fine example of the Himalayan Bear, the oldest resident in the Garden.

Two paths diverge from this house, one broad path to the south, and one narrow path to the west. The visitor should follow the latter which will take him to a roadside cage known as

The Armadillo Cage.

The Armadilloes belong to an Order of the Animal Kingdom known as the *Bruta* or *Edentata*, and which contains three well-marked sections—first, the Sloths ; second, the Ant-eaters ; and third, the Armadilloes. The term *Edentata* applied to them is not strictly accurate because the majority of them have teeth, but they are all distinguished by the absence of the front incisor teeth of both jaws. The Sloths are found only in South America and are very different animals from the so-called Sloth of India, which is not a Sloth at all, but an animal much higher in the scale of life, and closely allied to the monkeys. The Sloths are large hairy creatures with a peculiar physiognomy, and live exclusively on trees, hanging, head and body downwards, on to the branches by means of the long claws

of their two or three fingers and toes, and from their slow movements they get the term, Sloth. Their long bones are peculiar, being solid structures, having no marrow cavity. Their food consists of leaves. They have but a small number of teeth, and these are remarkable, because they are constantly growing, and never form roots, and there are no milk-teeth. In structure also their teeth differ from those of ordinary mammals. The group of sloths includes those mammals in which there is a variation in the number of the neck vertebræ, some having nine and others seven or six bones in the neck, whereas seven is the normal number in mammals, as previously mentioned. The stomach of some of the sloths is much complicated, and in this respect it resembles the stomach of the ruminants, and when their exclusively vegetable diet is borne in mind, it would appear that such nourishment requires a number of special cavities for its proper digestion.

The Ant-eaters are represented in Asia by one genus, *viz.*, the Scaly Ant-eaters or Pangolins, which occur also in Africa, but besides these animals the insect-eating *Edentata* include two other remarkable-looking large animals, *viz.*, the Aard-Vark or Ant-eater of South Africa, and generally known as the Cape Ant-eater; and the Great Ant-Bear of South America.

The Scaly Ant-eater, *Manis pentadactyla*, inhabits the drier regions of India, from the Terai to Cape Comorin. Another species, *Manis aurita*, occurs on the slopes of the Himalaya, ascending to 5,000 or 6,000 feet, and extends into China and Burma; but in the latter country another species, *Manis javanica*, is also found. They have attenuated forms; their heads are much elongated and pointed; their ears are small, and their tails broad and flat below,

tapering to a point, and, as long as, or longer than the body. The whole of the upper surface of the animal is covered with overlapping, dark-brown horny scales, with short bristles intervening, the under parts being nearly bare. These scales are merely agglutinated hairs and quite distinct from the osseous armature of the South American armadilloes here exhibited. They have the power of rolling themselves up on the approach of danger, the head being bent in on the belly, and the legs drawn in to the sides, and bound so firmly by the tail which is thrown over the belly, head, and back that it is hardly possible, unaided to straighten out one of these animals when so coiled. They have long powerful claws on both feet, but those on the forefeet are the longer, and by means of them they burrow with astonishing rapidity, and, in a few minutes, they are lost under ground, their holes extending downwards about twelve feet in a slanting direction. Their claws also have special relation to their habits of life, namely, that of digging for ants. Their tongues are likewise specially modified for drawing in these insects, as this organ is a long narrow ribbon-like structure, sometimes twelve inches in length, covered with a viscid saliva to which the ants are glued when the tongue is darted in among them. They have no teeth. These animals have never yet been kept alive in the Gardens from the impossibility of procuring for them a sufficient and regular supply of their natural food. They are now invariably let loose to forage for themselves as soon as they arrive, but as they are usually received in an emaciated and half-starved condition, they have hither to generally died. On one occasion, a Manis or Pangolin, stronger than the generality, was let loose, and encountering

a large tank in its path, at once took to the water and swam across it, but it was nearly killed in so doing, as a Samber deer followed it into the tank and tried to strike it down with its forefeet. Monkeys manifest great fear at the sight of a Manis. Many hill-tribes have a superstitious awe of it, and use its scales as charms, and in Western China they are eaten for their supposed medicinal properties.

The Armadilloes are even more remarkable than the Pangolins or *Manidæ*. They are represented in the cage before which the visitor is now standing by the six-banded Armadillo, *Dasypus sexcinctus*. They are all inhabitants of South America, and the chief peculiarity of their structure, as compared with the other *Edentata*, is the presence of a hard bony armature that serves to protect the upper surface of their bodies, and as it is acted upon by special skin muscles, all of the armadilloes also possess the power, in a greater or less degree, of rolling themselves up like balls. The armature is arranged in the form of bands, or shields, but it is composed of a multitude of small bony pieces, ossifications of the skin, the equivalents of the bony scales that occur in the skin of crocodiles. These Edentates are the only living mammals that have this form of skin structure. The under surfaces of their bodies and limbs are usually covered more or less with hair. The side teeth or molars are present, and the number varies in different species, as many as twenty-four occurring on each side of each jaw in some, but only seven or eight in others. Their heads are long and pointed, and their sense of smell is very acute. They are provided with strong claws, and are rapid burrowers, as their front legs are very powerful. They are nocturnal

in their habits, living on vegetable substances and insects, and probably also on carrion.

Immediately beside this cage is

The Surnomoyee House,

named after that enlightened and philanthropic Hindu lady, the Maharanee Surnomoyee of Cassim Bazaar.

The original plan of the house has been largely departed from, and hence its present arrangement is somewhat complicated, but in order to facilitate description, the divisions are indicated by numbers.

The visitor should enter this house by its northern end where he will find

Division No. 1 devoted to the Crown Pigeons of New Guinea. These are essentially ground-loving birds, and the chief peculiarity of their plumage is their very handsome, laterally compressed crest. There are two species in this compartment, *viz.*, *Goura victoriæ*, distinguished by the feathers of its crest being white-tipped, and *Goura coronata*, the species that was first discovered and which has no white in its crest.

Passing along the verandah two lofty compartments are immediately arrived at, *viz.* :—

Divisions No. 2 & 3, containing Hornbills belonging to two distinct genera, *Buceros* and *Hydrocissa*. The Hornbills are not unfrequently spoken of popularly as Toucans, to which, however, they are not very closely related, as the similarity is more apparent than real, the Toucans being scansorial birds confined to South America, whilst the Hornbills are fissirostral and inhabit Africa and Asia, extending to New Guinea.

Their most characteristic feature is the enormously

developed bill which sometimes has a casque superadded to it, but the latter although bulky is not heavy, because beneath the thin outer layer of bone covered with cuticle, there is a light bony mesh-work filled with air. Another feature of the hornbills is the flat sole of the foot and the united toes. Their flight is heavy, and the noise made by the wings of a large hornbill in progressing through the air resembles the labouring of a steam-engine, and can be heard at a great distance, Wallace says, as far as a mile off. It is one of the characteristic sounds of the forests of the Malayan region where the members of the species are numerically abundant. They frequent only the loftiest trees, hopping about on the stronger branches in a side-wise fashion, gathering the fruit that may be within reach of their long bills. It has been said that the Rhinoceros Hornbill, one of the birds occasionally represented in this divison, cannot long sustain its flight owing to the weight of its body, and that it has to rest about every mile, but the species *Rhytidoceros subruficollis*, also a very large bird, may be frequently seen in the Mergui Archipelago, flying from island to island, and across bays five or more miles in width from headland to headland.

The hornbill has the curious habit, at the breeding season, of building the female into the hollow of a tree wherein she makes a nest of her own feathers, deposits her eggs, and hatches her young. The male plasters up the opening with mud, leaving only sufficient space for him to insert his bill and feed the female and nestlings. It would appear that in order to feed the imprisoned birds, the male throws up from his stomach into his bill pellets of food enclosed in envelopes or 'gizzard sacs,' as Dr. Murie calls them, and which he says, "proved to be

portions of the interior lining of the bird's stomach, and it was evident, from the short time that elapsed between the throwing up of the envelopes, that the bird in the interval had made a new one and got rid of it also, without apparently being the worse." However, as this process is daily continued for about two or three months, it is not to be wondered at, that whilst the female becomes so plump during her confinement as to be considered a *bonne bouche* by the natives of the country, the male becomes so lean and weak, that when a sudden storm, or fall of temperature happens, he not unfrequently dies, and the built-in family is left to perish of starvation. This curious habit of feeding his mate and young family seems to be innate in Hornbills, even in captivity, as Mr. Bartlett, Superintendent of the Zoological Gardens, London, records that "The tame male Hornbill is particularly distinguished at all seasons by this habit of throwing up his food, which he not only offers to the female, but to the keepers and others who are known to him. The male Concave Hornbill *(Buceros cavatus)* now in the Gardens," also exhibited here, "will frequently throw up grapes, and, holding them in the point of the bill, thrust them into the mouth of the keeper, if he is not on the alert to prevent or avoid this distinguished mark of his kindness."

Continuing onwards, the visitor will find a large open space in the centre of the house, surrounded by cages, one containing a flying squirrel, *Pteromys albiventer*, described under the Rodent House, and others, having a variety of little birds, all living together in amity, but too numerous to be described in detail in this book.

Instead of examining at present any of the compartments to the south, the visitor should first proceed

along the eastern verandah towards the north to—

Divisions, Nos. 4 and 5, which contain two species of Curassows, one *Crax globicera*, so called from the globose swelling on its bill, and the other *Mitua tuberosa*, generally known as the Razor-billed Curassow. The Curassows are South American birds, and they may be said to be the New World representatives of the pheasants and grouse of the Old World. They are found chiefly in forests.

In this verandah, a few cages with glass fronts, contain some examples of common snakes, both poisonous and harmless, found in the neighbourhood of Calcutta, while in other cages are generally to be seen such lizards as the Chameleon and the large Gecko.

The Snakes or *Ophidia* are divided into three great groups ; the first, the Harmless Colubrine snakes ; second, the Poisonous Colubrine snakes ; and third, the Viperine snakes which are also poisonous ; but this is a popular more than a scientific classification of this curious apodal or footless modification of vertebrated animals. Some of the most simply organized and most harmless of the snakes, *viz.*, those known as the Blind Snakes and belonging to the Family *Typhlopidæ*, have received a very bad character among the natives of this country, but very unjustly, because they are quite as innocent of biting as the earth-worms which many of them at first sight resemble in appearance, and, moreover, they have no poison fangs. They burrow in the earth, or hide under stones and fallen timber, and their tails and heads are of nearly equal size, so that the ignorant call them two-headed snakes and attribute to them most deadly properties. These are next followed by the ' short tails ' which constitute the Family *Tortricidæ*, or Rollers, of which the

genus *Tortrix*, already mentioned in connection with their allies, the *Pythonidæ*, is the type. The next group of snakes is represented in India by a serpent which having also a thick tail, is likewise called two-headed, and this is the species which is so common in the Punjab and so generally seen with jugglers. It is one of the Sand Snakes, *Erycidæ*, and the species referred to is *Eryx johnii*, and like the Pythons and Tortrix this Family of snakes has rudimentary hind limbs. Closely allied to these are the Rough-tailed snakes, or *Uropeltidæ*. All the foregoing serpents are of a low type of structure and are generally distinguished either by the shields on the under surface of the body being awanting, or, if present, by being very narrow as compared with those on other snakes of a higher organization. As a rule, also, the head shields, if present, are not arranged as in the common serpents. The next group, the Dwarf snakes and their allies, the Bush and the Ringed snakes form sections of the great Family *Colubridæ*, the members of which are all distinguished by their heads being quite distinct from their necks and covered with plates; by their numerous teeth; by two rows of scales on the under surface of the tail; and by the absence of any vestiges of limbs. A familiar example of the *Colubridæ* is the common Grass snake of India, *Tropidonotus stolatus*, and another is the *Damun*, *Ptyas mucosus*, which the natives of India say has the habit of sucking cows. Both of these species are exceedingly common in Bengal, and are generally exhibited here as examples of harmless Colubrides. Many snakes, such as *Ptyas mucosus* and also the very common Bengal snake, *Tropidonotus quincunciatus*, take freely to water, although they do not merit the name

of Water-snakes as this term is specially restricted to two groups of snakes of very different structure, one section constituting the true Fresh-water Snakes or *Homalopsidæ* next to be mentioned. They are distinguished from the Land Colubrine snakes by having the nostrils placed on the top of the head and provided with a valvule by which they can be closed at will. The position of the nostrils has reference to their aquatic habit, because snakes, whether terrestrial or aquatic, always breathe atmospheric air, although they have generally only one lung. Some of these Fresh-water snakes, such as the *Hypsirhina enhydris*, extend their range even to the sea, and one of them, apparently peculiar to Siam, has two long feelers on the snout. Somewhat allied to these snakes is the very peculiar Egg-eating snake of South Africa, in which the eggs, before being swallowed, are broken by a series of throat or gular teeth. The snake is provided with small teeth in its mouth, but they do not prevent the passage of eggs, and they are so feeble, that the shells are not broken, but the egg passes down uninjured as far as the gular or throat teeth which retain it, and the muscles of the throat contracting around the egg, it is cut by these teeth, and no sooner is this done, than the mouth opens and the egg-shell is rejected, its fluid contents passing down into the stomach. Were the eggs broken in the mouth the serpent would lose its only nourishment. These throat teeth are very remarkable from the circumstance that they are not teeth in the strict sense of the word, but processes from the under surfaces of the throat vertebræ, their ends projecting into the gullet and covered with a thin layer of enamel. This snake constitutes the Family of Throat-toothed serpents. Besides these there

are various other modifications of the Innocuous Colubrine snakes, such as the Desert snakes, the Ground snakes, the Blunt-heads, the Nocturnal tree snakes, the Whip snakes and the Wart snakes. There are generally some examples to be seen here of *Passerita mycterizans* the common Whip snake of India. It is a bright green serpent with a long pointed snout, and it is usually found on trees. It has the evil reputation of striking at the eyes of people passing through forests and is ignorantly said to be deadly in its bite. The Tree snakes are also occasionally represented here by the handsome nocturnal species *Dipsas trigonata*, and by the most beautifully coloured of all snakes, *Chrysopelea ornata*. One of the most widely distributed of Indian snakes, and most common about Calcutta, is the small Ground snake, *Lycodon aulicus*, which is not unfrequently mistaken for the deadly Krait, *Bungarus cæruleus*.

All the foregoing snakes are harmless, but the remaining serpents are more or less deadly in their bite. They form two sub-divisions *viz.*, the Venomous Colubrine snakes, and the Vipers. The former includes, first, the so-called *Elapidæ* represented by the Cobra, the Snake-eating cobra, the Kraits, and the Callophides, small thin poisonous snakes, the representatives of the American *Elaps*, and of certain poisonous snakes of Africa and of Australia allied to them ; and second, the true Sea snakes or *Hydrophidæ*, in which the nostrils are on the top of the head with one exception, whilst, in all, the tail is so compressed from side to side as to be converted into a paddle for swimming, a modification found in no other group of snakes. The second sub-division, *Viperidæ*, includes two kinds, *viz.*, the ordinary Vipers represented in India by only two species,

Echis carinata, and *Daboia russellii*; and the Pit Vipers or *Crotalidæ*, to which sub-Family the Rattle-snake belongs and the Tree Vipers of which there are a considerable number of species in Eastern Asia.

Such, then, is the variety of form and structure found in the *Ophidiæ* which are an especially interesting group of animals owing to the deadly power possessed by many of them. Their habits of life also are quite as varied as their forms, and it has been shown that some live in water as well as on land. The fresh-water snakes are all harmless, while the sea snakes are all poisonous and deadly as a rule. The mouth of serpents generally is provided with a long forked black tongue which is being constantly exerted and retracted while the animal is on the alert, and it is a perfectly harmless organ. The poisonous snakes are furnished with fangs by means of which the poison is introduced into the system of the animal bitten. The poison is the product of a gland lying below and behind the eye, and the poisonous saliva secreted by this structure is conveyed to the fang by means of a duct or tube that leads either to a groove in the front of the tooth, or to a canal in the tooth itself formed by the inward folding of its margins, and, as the snake bites, the poison is introduced into the wound made by the two teeth of the upper jaw which are so modified, and its introduction is facilitated by the contraction of the duct and by the pressure of the muscles of the jaw on the gland as the mouth is opened and shut.

The snakes which have the groove in front of the fang belong to the Colubrine division of the Poisonous snakes, and in general appearance do not differ much from the Harmless snakes, whereas the Hollow-toothed poisonous snakes constitute the Viperine section already indicated,

and they have generally triangular heads, very broad behind, and covered only with scales. The Cobra has the power of dilating its neck into what is called the hood, and this is brought about by its expanding the long ribs of its neck. The other large snake, *Ophiophagus elaps* or the Snake-eating Cobra, the largest of all the poisonous snakes, attaining to about 15 feet in length, has also the power of partially dilating its neck. One harmless snake can expand its neck, but the expansion is more vertical than lateral and is not produced, as in the cobra, by elongated ribs. These bones play a very important part in the economy of snakes as these reptiles walk on their ribs which are very numerous, occurring from the neck to the vent. In each pair, in the higher terrestrial snakes, the points are connected below with a ventral plate, the posterior margin of which is more or less free, an arrangement which facilitates the climbing of very much inclined surfaces.

All serpents cast their skins, and as the eye of a serpent differs from the eye of other animals in having a thin pellicle of skin, continuous with the cuticle of the head, extended over it, vision, during the process of skin casting, becomes much impaired. In a healthy serpent, the skin is generally cast entire, but in the Marine Snakes it appears to peel off in shreds. This process of shedding the skin is frequently repeated, even in one year; but snakes in this habit are not peculiar, as it occurs also in the next group to be examined.

The great division of Lizards or *Sauria* includes some animals very remarkable both in structure and appearance; some being practically without limbs, and so resembling snakes, whilst the majority have well-developed limbs.

Their skin is frequently prolonged into ridges, crests, and frills giving an extraordinary, or grotesque appearance, while others have their whole bodies covered over with huge spines producing a horrid and formidable aspect. In many, the tail is long, while in others, such as the Stump-tails, it is shortened and broadened out so as to resemble the head, producing the appearance, at first sight, as if the animal had a head at either end of its body. While some, as above stated, are devoid of limbs, or may have them in the most rudimentary condition, the well-limbed lizards have two distinct kinds of feet, those with ordinary toes and claws, like the common Ground and Tree Lizards, and those in which the toes are provided with adhesive discs, such as the House Lizards or Geckos. There are also the so-called Flying Lizards in which the ribs are prolonged outwards, forming a framework to which the skin is attached, and this framework is expanded as the animal leaps from branch to branch, or from tree to tree, constituting a kind of parachute, generally gaily-coloured, that helps to support it in its long leaps. One peculiarity among very many lizards is the power they have of changing the colour of their skin so as to be in unison with the colour of the object on which they may be at the time. This is most noticeable in that most extraordinary lizard, the Chameleon. The Lizards, with a few exceptions, such as the Chameleons and some of the snake-like lizards whose internal structure is more nearly allied to that of the Chameleon than to any other form, have a hard horny covering, generally of overlapping scales, while in the chameleons and their allies the skin is soft. In a few lizards there is a regular bony armature beneath the

scales. All lizards possess teeth, but these differ in number and position, and are of two distinct kinds. In the first kind the teeth are arranged along the *inside* of a jaw-parapet to which they ultimately become attached by their sides, and are hence known as *pleurodont* teeth ; while in the second kind they are arranged along the *top* of the jaw-parapet and are known as *acrodont* teeth. The individual pieces of the backbone or *vertebral column* are of two distinct kinds, first, those in which the centre or thick portion of each piece or *vertebra* is concave in front and behind ; and, second, those in which this portion is concave in front only. The classification of lizards is sometimes founded upon these structural differences in the vertebral column, associated with characters of the skull, but other classifications have been derived from the nature of the tongue which is also a good guide in arranging them. If the visitor will notice the tongue of the Chameleon,—one of these lizards being in a cage in this verandah,—he will see that the tongue is *vermi-lingulate*, that is, long and worm-like ; the Gecko in an adjoining cage is *crassi-lingulate*, or has a short and thick tongue ; whereas the Water Lizards, a few of which are placed in an isolated cage a little to the south of this house and close to the bridge, exhibit the type called *fissi-lingulate*, meaning, that the tongue is divided or split at its extremity, and it is also long and protractile. With this knowledge we can see how inappropriate it is to apply the term *Iguana* to the Water Lizard of India, which is frequently done in this country, although the Iguana is a short-tongued lizard and peculiar to America. The young of one of the Water Lizards, the Sacred Lizard or *Hydrosauris salvator*, is the famous *Bis-Cobra*, said to be more deadly than the Cobra itself, but this lizard

has no fangs, or poison glands. But a poisonous lizard does exist in Mexico, and this reptile is known as the *Heloderma*, and its specific name is *suspectum* referring to the original suspicion that the bite of this lizard was injurious. It has been proved, within the last year or two, by Dr. J. G. Fischer, that this lizard has poison glands, and an experiment made in the Zoological Gardens of London has confirmed this observation, as a guinea-pig bitten by one of these lizards fell unconscious two or three minutes after the bite had been inflicted, and died exactly as if it had been bitten by a viper. There is in Borneo, a lizard known as *Lanthonotus borneensis* which is also suspected to be poisonous.

The Chameleon is one of the most extraordinary looking animals in nature, and is an object of great interest from the remarkable changes of colour which it undergoes, and which are induced by the will or passions of the animal, and also, apparently, by the influence of differently coloured lights falling upon it. These changes are brought about by the action of two kinds of nerves on a series of structures found in the skin and called *chromatophores*. These structures are little sacs distributed below the surface layer of the skin, and containing minute corpuscles of various colours. Each sac has an aperture which, when open, allows the colour to become visible, and when closed, conceals it ; one set of nerves contracting and the other dispersing. Besides these chromatophores there is a yellowish colouring matter in the skin and a dark blue layer. The Chameleon is also provided with huge lungs which are in connection with air-cells distributed throughout the body, and this arrangement allows of the reptile distending itself with air and so rendering its skin transparent. When the

air is forced out, the chameleon resumes its ordinary size. The limbs are fashioned for a purely arboreal life, the toes being divided into two sets, one anterior and the other posterior, so that a grasping organ is produced, and the tail being also very prehensile, the reptile has a firm hold of the branch on which it lives, and its colour being generally toned down to its surroundings, it waits patiently until some passing insect has settled within reach of its long worm-like tongue, which can be thrust out to a great distance, and as it is sticky at its distended free end, the insect in being struck is glued on to the tip; the tongue is then rapidly withdrawn into the mouth where the insect is pressed off the tongue against the divided palate and swallowed. The eyes also are very extraordinary, as they are minute round holes in the centre of two confluent scaly eyelids, and, moreover, each can look in a different direction from the other. Only one species of chameleon is found in Asia, viz., *C. vulgaris*, also common in Southern Europe, but many species occur in Africa, and two species in Madagascar alone, and one of the latter is provided with horns on its head, and is called the Rhinoceros Chameleon.

The great Tree Gecko, *Gecko verus*, and which, like the generality of its kind, has adhesive discs on the under surfaces of its feet, is usually exhibited in one of the cages in this verandah. Its skin also is subject to much variation in colour, and the outer pellicle is frequently shed as in reptiles generally. The character of the tongue has already been indicated. This is the lizard which is known as the *Tuck-too*, from its peculiar call, which is one of the most characteristic sounds heard in the forests of Burma and of the Malayan peninsula, from sun-down

to sun-rise. It is very loud and can be heard a long way off.

The visitor on leaving this verandah will return to the centre of the house, where, in the large south-west compartment,

Division No. 6—he will find the Argus Pheasant, *Argus giganteus*, the most magnificently feathered of all its kind; the grouping of the colours and the designs on the feathers being in the most perfect taste, and without any approach to gaudiness. In this it far excels the peacock, to which it is more closely allied in structure than to the true pheasants, both birds belonging to one sub-family, the *Pavoninæ*, a section of the family *Phasianidæ*. These birds when first brought to the Gardens were excessively timid. It has been found extremely difficult to rear the young in the London Gardens where the species has bred. This pheasant occurs in the forests of the Malayan peninsula, and where there are open glades it congregates to feed, and the male to disport and display his plumage.

Another of the *Pavoninæ* is also exhibited in this enclosure, *viz.*, the beautiful bird, *Polyplectron chinquis*, one of the Peacock-pheasants, so called from the presence of metallic green or purple spots on their moderately long tails and on their wings, resembling the *ocelli* or eye-spots of a peacock's tail. The colour of these birds is generally greyish brown. This species is found from Bhutan eastwards to Assam and thence into Burma.

The visitor should now descend the steps leading down towards the lake, and walk round the south-western end of the house, so that he may view the following compartments from the outside. The first of these is

Division No. 7—which contains a number of small birds *e. g.*, the Himalayan Black-bird, *Merula bulbul;* the White-eared crested Bulbul, *Otocompsa leucotis;* the Black-headed Sibia, *Sibia capistriata,* and the Common Myna, *Acridotheres tristis.*

Division No. 8—has the following birds: the Red billed Blue Magpie of the Himalaya, *Urocissa occipitalis;* the common Koel, *Eudynamys orientalis;* the Bank Myna, *Acridotheres gingianus;* but besides the foregoing birds, this compartment contains an example of the common Flying Fox of India, *Pteropus medius*, one of the Chiroptera.

The Bats belong to a distinct Order of the sucking animals or Mammalia, as they differ from all of them in possessing wings. The wing of the bat corresponds to the fore-limb of any ordinary quadruped, and to the arm of a monkey or man, but its structure is modified with special reference to the function it has to perform of carrying the animal through the air. The bird's wing is the same organ, also altered so as to adapt it for the performance of a similar function, but the difference between the wing of a bird and the wing of a bat is very great, although in both the principle is the same, *viz.*, a firm resisting structure to which the effective portion of the wing is attached. In the bird the latter consists of long feathers arranged along the side of the fore-arm and hand, while in the bat the fingers of the hand form a fan-like expansion for the flying membrane. In the bird, only one finger of the hand, namely, the second, is strongly developed; the others, of which rudiments remain, being the thumb or first finger, and the third. In the bat, all the fingers are largely developed,

and hence this order of animals is known as the hand-winged, or *Chiroptera*. The first finger or thumb is short, separate from the others, and provided with a claw, the other fingers being clawless with the exception of the second which occasionally has one. The wing-membrane is not merely confined to the hand, but extends between the fore-arm and the side of the animal to the ankle, and another membrane exists between the hind-legs sometimes enclosing the whole of the tail in those species in which a tail is present. The wing-membrane is an extremely sensitive stucture, and it is to this property in the wing that the bat chiefly owes its remarkable facility of flying with impunity through the darkest passages and caverns, away from all light whatever. But some bats are furnished with other highly sensitive organs grouped around the nose as leafy appendages, and by little face-tubercles bearing stiff hair or *vibrissæ*. The correctness of their flight is also doubtless much assisted by their ears which are generally very large and frequently united together over the forehead, and, in some species, the ears equal the length of the body, and they are extremely sensitive and mobile. Their eyes are very small and their vision seems to be supplemented by the organs just indicated, because when a bat has been effectually blinded, by the complete destruction of its eyes, it has been found that it is still able to fly about freely without striking against objects.

Bats are divided into two great groups, the Frugivorous and the Insectivorous Bats, the former containing the giants of this order, and hence Dr. Dobson has called them the *Megachiroptera*, the other section being the *Microchiroptera*.

The Flying-fox in this compartment is an example of a fruit-eating bat which is frequently to be seen in

numbers during the rains in Calcutta, feeding at twilight and over night on the fruit of *Terminalia catappa*, the large tree which yields the so-called almond so often served on European dining-tables. But unfortunately its nocturnal feasts are not always distinguished for their sobriety, as the Blue Ribbon Army is still unknown to it. Mr. F. Day states that the flying-foxes "often pass the night drinking the toddy from the *chatties* in the cocoa-nut trees, which results either in their returning home in the early morning in a state of extreme and riotous intoxication, or in being found the next day at the foot of the trees sleeping off the effects of their midnight debauch." It congregates on its favourite trees, in dense lines along the branches, holding on by the claws of its hind feet, the bat hanging downwards, although the head is turned slightly upwards, the chin resting against the chest. The bat also has the power of enveloping itself in its wing-membrane when it sleeps, and in it also, it protects its young. The nipples are on the chest, although some bats have nipples also on the lower portion of the belly. The fruit-eating Bats form a very small proportion of the Order, as the majority feed on insects alone, but some, such as a few of the Vampire bats of South America, suck the blood of larger mammals and even attack man himself. A very common bat in Calcutta, with great ears connected across the forehead, and a large erect nose-leaf, apparently manifests a habit similar to the true vampires. It is known as the lyre bat, and has received the Latin name of *Megaderma lyra*. It measures about three and a half inches in length. On one occasion in Calcutta, when the well-known naturalist, Edward Blyth, was trying to capture one of these bats which he had followed

into an outhouse, he found that it dropped a bat which he at first thought was its young one, but, on picking it up, it turned out to be a small bat resembling the Pipistrelle of Europe, the blood of which the lyre bat had been sucking from a large bleeding wound behind the ear. He continued his hunt after this Indian Vampire, and at last succeeded in capturing it alive. The little bat, although exhausted by the loss of blood, was alive on the following morning, and when Blyth placed the two together in a cage, he relates, that no sooner had the lyre bat perceived the other, than it "fastened upon it with the ferocity of a tiger, again seizing it behind the ear, and made several efforts to fly off with it; but finding it must needs stay within the precincts of its cage, it soon hung by the hind legs to the wire of its prison, and after sucking its victim till no more blood was left, commenced devouring it, and soon left nothing but the head and some portions of the limbs."

The visitor should now continue onwards to the right, to the neighbouring

Division No. 9, which contains two South American Rails and some examples of that very curious bird of the Philippine Islands, the Blood-breasted pigeon, *Phlogœnas cruentata*, which has a mark on its white breast resembling a newly inflicted bleeding wound, the very feathers forming a depression in its centre, as if the result of a blow. How so remarkable an imitation of a wound came to be gradually evolved, and what purpose this mimicry now serves in the economy of this bird, are subjects for speculation.

Passing round to the south-west end of the house, a flight of steps leads up to

Division No. 10, where a Happy Family is to be

found, consisting of the following members: *viz.*, the Javan Mouse Deer, *Tragulus javanicus*, already mentioned; Carrier pigeons from Bagdad; the Australian Crested pigeon, *Ocyphaps lophotes;* the beautiful Green Nicobar pigeon, *Calœnas nicobarica;* the Ring Dove, *Turtur risorius;* the Dwarf Turtle dove, *Turtur humilis*; the Painted Sand grouse, *Pterocles fasciatus;* the Hill Francolin, *Arboricola torqueola;* the Crowned partridge, *Rollulus cristatus*, and the Chickar partridge, *Caccabis chukar.*

The visitor will now proceed to the two remaining *Divisions*, *Nos.* 11 and 12, on the east side of the house.

Division No. 11 contains two species of Francolin, *viz.*, the Grey Francolin, *Francolinus ponticerianus*, and the Kyah Francolin, *F. gularis.* The Grey francolin or partridge is the bird which is so commonly kept by Muhammadans for fighting purposes, as it is courageous and highly pugnacious, fighting with great determination. It becomes very tame, and Jerdon states that it can be brought to follow its owner like a dog through a crowded street. He also mentions that "it will readily utter its call when spoken to, and is generally liberated on a grassy plain for a run every morning, returning to its cage, when called upon. It is also used as a decoy for wild birds, a tame bird being put down near a covey and made to call, when it is invariably met by a cock-bird and a battle ensues. The bird-catcher approaches cautiously, and seizes the wild bird as it is heedlessly engaged in the fight." It is generally distributed throughout India, but the Kyah has a much more limited range as it is chiefly confined to the north-eastern portion of India, from the Oudh Terai to Orissa, and north eastwards to Assam.

Division No. 12 has a variety of birds, *viz.*, the Black Partridge, *Francolinus vulgaris;* the White-crested Jay-thrush, *Garrulax leucolophus;* the Laughing Jay-thrush, *Garrulax chinensis*, and the Pied Starling, *Sturnopastor contra.* The first of these thrushes is the bird which is so frequently heard in large flocks in the Himalayan forests, at elevations from 2,000 to 6,000 feet, generally by the sides of mountain streams, "bursting out in a chorus of most discordant laughter, quite startling at first, and screaming and chattering for some time."

Leaving the Surnomoyee House, the visitor should return eastwards towards

The Ezra House.

This handsome edifice was erected by Mr. E. J. D. Ezra, one of the Members of the Garden Committee, for the reception of Giraffes and Zebras. Some time before, Mr. Ezra had presented a pair of Giraffes to the Gardens, and the animal now here is one of them, the other unfortunately having died suddenly. It will be noticed that this giraffe has a large airing ground enclosed by an iron railing, on the western side of the house. It is also intended to enclose another piece of ground on the eastern side of the house, as a run for Zebras, so soon as some of these animals, are obtained.

The Giraffe, *Camelopardalis giraffa*, has its place in the Animal Kingdom between the Antelopes and the Deer. Its designation of Camelopard has reference to its fancied external resemblance to the form of the Camel, and to the spotted coat of the Pard. The Giraffe has the distinction of being the tallest of all living animals. As already mentioned, its horns differ from

the horns of other ruminants in being separate bony processes quite distinct from the skull itself. Its long neck conforms to the general type of mammalian structure in having only seven vertebræ, as in man, but the bones are very long compared with the neck bones of other mammals. Its long neck permits of the Giraffe living on the leaves of high trees, and in this it is assisted by its remarkable tongue which 'it appears to use generally as an organ of examination, and the power of prehension is so great, that the tongue, when extented to the utmost, has been seen to grasp an ordinary lump of sugar, of which the animals seem very fond, and convey it into the mouth. It has also been observed to revert the tongue for the purpose of cleaning its nostrils, an office which its flexibility enables it to perform in the most perfect manner. The utility of such a power of prehension and extension to an animal whose principal food consists of the leaves and slender twigs of trees is manifest. It is said that the tongue can be so tapered as to enter the ring of a very small key. The large soft eye of the Giraffe rivals in beauty that of the Gazelle, and it is 'so placed that the animal can see much of what is passing on all sides, even behind it, without turning its head. Thus it is hunted down with the greatest difficulty, and if surprised, or run down, it can direct the rapid storm of kicks, by which it defends itself, in the most accurate manner.' The Arabs have great difficulty in capturing it, as it runs with great speed, and it is stated that "the swiftest horse, if unaccustomed to the desert, could not come up with it unless with extreme difficulty." It also jumps considerable heights, and this Giraffe, when it was kept at the other side of the Gardens, near to the infantry lines, cleared a six-foot fence on the first occasion

it heard a *feu de joie*. The Giraffe is a native of Africa, south of the desert of Sahara, and also of Nubia.

Continuing south-east-wards and again passing the Abdool Gunny House, keeping it on the left hand, the Bridge should now be crossed, when the visitor will observe a circular house in front of him, and, to his left, under a tree

The Hamadryas Baboon Cage

and this he will first visit. It contains a magnificent male of the famous Sacred Baboon, *Thothi*, the God of Letters of the ancient Egyptians, *Cynocephalus hamadryas*, peculiar to North Eastern Africa, and very numerous on the highlands of Abyssinia and on the Western shores of the Red Sea. The unfortunate failing that some monkeys have for spirituous liquors, and this baboon amongst them, is taken advantage of by the natives of Africa for its capture, and Professor Duncan relates that "the natives fill some vessels with strong beer, and put them out in places where they look particularly tempting to the thirsty. The Baboons, ever on the watch for something new and to steal, see the pitchers and pans, and of course just taste their contents. Feeling happy and enlivened, after a while they try again, and finally drink long and deeply, becoming in a short time decidedly tipsy, and unable to take care of themselves. Unfortunately for the tipplers their punishment is greater than the crime; and not only do they suffer all the miseries of headache, thirst, and bodily depression, but they lose their liberty also, and not for a time only. The natives, knowing that after a few hours they may expect to find the Baboons incapable of biting, fighting, or running away, go out and search for their victims, and

bring them home and place them in durance vile. The next morning they awake to a sense of their condition. They hold their aching heads with both hands, and look with a most pitiable expression. Brehm saw some of them in this plight, and gives a most amusing description of their grimaces and laughable conduct. A little wine or beer was offered to some who had recovered from their debauch, but they would have nothing to do with it at the time. They turned away with disgust, but they relished the juice of some lemons which was given to them."

The visitor should now turn to the adjoining circular building

The Jheend House,

which was erected by the Rajah of Jheend, G. C. S. I., a Life Governor of the Gardens. It is divided into seventeen compartments, each having a small retiring place behind, in which the animal can rest and sleep, and as there is an open space in the centre of the house, thorough ventilation is secured. The numbering of the cages begins on the left hand side of the entrance to the central space. At present this house contains nothing but monkeys, and the visitor is referred to the labels on the cages for the names of the animals and the countries from which they have come. His attention, however, may be directed to the Capuchin monkeys which are examples of the New World group called *Platyrrhini* from the wide septum between their nostrils, and it will be observed that the Capuchins, like most American monkeys, have prehensile tails.

Having walked round the Jheend House, the visitor will notice a large house to the south-west, and proceeding towards it, he will pass on his right hand

The Boat House

in which two or three pleasure-boats are kept which can be used on payment of the regular fee. But, before entering the large house, the visitor should walk as far as

The Elephant Picket.

These animals are examples of the Indian species, and their number in the Gardens varies according as they are in demand for export or exchange. They are kept, in all weathers, merely under the shade of some trees, as this has been found amply sufficient for their comfort and health. There are only two species of elephants known, *viz.*, the Asiatic Elephant and the African Elephant. The most distinctive feature of the elephant, apart from its enormous size, huge head, and pillar-like legs, is its trunk. This remarkable proboscis is structurally speaking a greatly elongated nose with the nostrils at its extremity, but it plays a most important part in the economy of the great beast, for by means of it, the elephant collects its food and carries it to its mouth, and also drinks, and syringes its body with water, or blows dust over its leathery hide. It is also used for throwing objects, and it is so powerful and yet so delicate in its movements by reason of the 40,000 muscles which Cuvier calculated it to contain, that with it the animal can pull down a tree, or pick up a pin. Much of the wonderful adaptability of the trunk to grasp objects is due to the presence of a small prolongation of the muscles at its extremity above and between the nostrils, forming, as it were, a finger, and opposed to which is a sort of thumb, and it is between these two processes that small objects are grasped. As an organ of touch, it is exquisitely fine. It is said,

that even when an elephant becomes blind, it can not only collect its food discriminately, but travel over unequal ground, avoiding obstacles, and stepping over ditches. The animal, under such circumstances, rarely touches the ground with its trunk, but lets the finger, which is at the tip of the proboscis and is usually curled inwards to protect the nostrils, skim along the surface to ascertain the inequalities. The elephant is always most careful of its trunk, and on the approach of danger carries it as high as possible in the air. As the elephant breathes through this organ, it can swim across, or ford the largest rivers with only the end of the trunk out of the water. The animal is extremely sagacious and docile, and can be trained to be of great use, both in long marches, and in employments such as are to be witnessed in the wood-yards at Rangoon and Moulmein. The predecessor of these two small elephants was sent to the Melbourne Zoological Gardens in exchange for some Australian cattle expected to arrive inthe Calcutta Gardens during this cold season. Its voyage was an adventurous one, as a terrific storm was encountered which cleared the deck of the ship, but the wise brute held on by its trunk to an iron bar on the leeside of the vessel until the storm abated. The elephant is endowed with a good memory and has been known, after a considerable lapse of time, to return gratefully kindness rendered to it, or, on the other hand, to avenge an injury. A well-known story illustrating the latter trait, is that of an elephant at Delhi, which half-drowned a *durzee* or tailor, with water from its trunk, because the man had pricked its trunk with a needle, instead of giving it an apple that he held in his hand. The following story is also interesting

as an instance of the understanding, reason and gratitude of the elephant. It has been recorded by the late Dr. Daniel Wilson, Bishop of Calcutta, that an elephant belonging to a friend of his had become blind from a disease in its eyes, and a physician bethought himself to try the remedy commonly used for the treatment of a human patient under similar circumstances. Accordingly the animal was made to lie down, and when the nitrate of silver was applied to one of its eyes, it uttered a terrific roar at the acute pain which it occasioned. The effect was wonderful as sight was at once partially restored. The doctor was ready to operate on the other eye on the following day, and "the animal, when it was brought out and heard the doctor's voice, lay down of its own accord, placed its head quietly on one side, curled up its trunk, drew in its breath like a human being about to endure a painful operation, gave a sigh of relief when it was over, and then, by motions of its trunk and other gestures, gave evident signs of wishing to express its gratitude."

In the present day, the Asiatic elephant, *Elephas indicus*, is found wild throughout nearly all the forest lands of India, Ceylon, Burma, the Malayan Peninsula, Sumatra, Siam and Cochin-China. Extensive captures of elephants for the Indian Government are annually effected, on a large scale, by Mr. G. P. Sanderson, Superintendent of Kheddahs.

The African elephant differs from the Asiatic species in many important points, more especially, in the structure of its teeth, so much so that the distinguished zoologist, Frederic Cuvier, proposed to place it in a distinct genus, as he held the opinion "that in its general form,

in the structure of its grinders, in the form of the head, and in that of some of the external parts of the organs of sense, the African differs as much from the Indian elephant as the dog from the hyæna." There appears to be no difference in size, but the ears of the African elephant are much larger than those of the Indian, the forehead is not concave, the eye is larger, and there are only three nails on the hind foot in place of four as in the Indian species. The African animal is likewise darker in colour.

The Gubbay House

now demands the attention of the visitor. The public are indebted for this spacious house to the liberality of Mr. E. S. Gubbay, a Member of the Committee of Management. Eight large cages about 12 feet in height occupy the side walls, while small cages are placed on tables down the centre of the house. As the collection of animals is varied, only the more important groups will be noticed ; for example, the Gibbons, some Semnotes, the Diana monkey, theMarmosets, the Lemurs, the Cat-bear and the Binturong.

The Gibbons occupy three of the larger cages, but only two species are represented, *viz.*, the male and female of *Hylobates hoolock*, and a female of *H. leuciscus*.

The Gibbons are the longest-armed of all the higher apes, and their legs are relatively longer than in man. Their fore-arms are their chief means of progression in the forests, as by means of them they swing from branch to branch with wonderful agility. Martin gives the following account of a Gibbon which was taken to London from Macao where she had been in captivity for four years,

and where he was informed she had so seriously injured a man, by lacerating him with her long canine teeth, as to occasion his death. "Her body hanging by one arm as if suspended by a rope, she launches herself by an energetic movement, to a distant branch, which she catches with her left hand: but her hold is less than momentary; the impulse for the next launch is acquired, the branch she aimed at is attained by the right hand again, and quitted instantaneously, and so on, in alternate succession. In this manner, spaces of twelve and eighteen feet are cleared with the greatest ease, and uninterruptedly for hours together, without the slightest appearance of fatigue being manifested; and it is evident that if more space could be allowed, distances very greatly exceeding eighteen feet would be as easily cleared; so that Duvaucel's assertion, that he has seen these animals launch themselves from one branch to another, forty feet asunder, startling as it is, may be well credited. Sometimes, on seizing a branch in her progress, she will throw herself, by the power of one arm only, completely round it, making a revolution with such rapidity as almost to deceive the eye, and continue her progress with undiminished activity. It is singular to observe how suddenly this Gibbon can stop, when the impetus given by the rapidity and distance of her swinging leaps, would seem to require a gradual abatement of her movements. In the very midst of her flight, a branch is seized, the body raised, and she is seen, as if by magic quietly seated on it, grasping it with her feet. As suddenly she again throws herself into action." As an instance of the dexterity and quickness of the Gibbon, the same author also mentions the following fact regarding the same

animal :—" A live bird was let loose in her apartment : she marked its flight, made a long swing to a distant branch, caught the bird with one hand in her passage and attained the branch with her other hand ; her aim, both at the bird and the branch, being as successful as if one object only had engaged her attention." He adds, "that she instantly bit off the head of the bird, picked its feathers and then threw it down without attempting to eat it."

The species here exhibited in *Cages* 1 and 2, is commonly known as the Hoolock, a word coined in imitation of its call, and which would be more accurately represented by *hooko* which the animal rapidly repeats in a crescendo fashion, with increasing rapidity, until the call almost ends in a screech, when it suddenly drops to a deep guttural *āh, āh,* which gradually dies away. The voice of this Gibbon is one of the characteristic sounds heard in the forests of Assam and in the other regions in which the species is found, and whole troops, for the hoolock appears to be gregarious, may be heard calling in the early morning and in the evening, either while resting, or in progressing from tree to tree down, or up a forest-clad mountain side. Many newly-born hoolocks are pale yellow, and others black, so that the colour of the species is variable, and seemingly independent of age or sex. The old female, in *Cage* 1, is an inveterate hater of the gentler sex of human kind, and carries it even to a passion, seizing every opportunity to vent her spleen in fierce and dangerous attacks, so that the greatest precautions have to be taken that she does not escape, when the door of her house has to be opened. On one occasion, however, she managed

to elude the vigilance of the keeper and escaped just as he turned to close the door. She at once ran after an ayah who had been looking at her a few minutes before, and attacked her, making a frightful gash with her long canines in the woman's leg. Visitors should be careful in approaching her cage as she is wont to throw out her long arms and attempt to drag female visitors towards her, and, in doing so, many a new kid glove and bonnet have been irretrievably ruined, and, on one occasion, a gold watch and chain were carried off, and, on another, a locket.

The Gibbons would appear to live largely on an insect diet, varying it occasionally with fruits, but they also harry the nests of birds, eating both eggs and hatchlings.

In addition to their other accomplishments, the Gibbons have the ability to run erect, and in doing so they balance their bodies by holding their arms bent over their heads, but their progression in this manner, although rapid, is awkward. The formation of their hands and feet confers on them a considerable prehensile power which renders them admirably adapted to their arboreal habit of life. The Hoolock has a narrow white band above the eyes, and, as already said, its coat is blackish, but, in some, more or less yellowish, and a similar variation is observable in the Gibbon of Burma and the Malayan peninsula, *H. lar*, which is distinguished from *H. hoolock* by its white hands and feet. The voices of these two species are quite distinct.

The other species here, in *Cage* 3, *H. leuciscus*, the *Wow-wow* or Silvery Gibbon, is a very gentle creature, having a call resembling the trill of a bird. Its exact distribution has not been ascertained and very little is

known of its habits, but it is said to occur in Sumatra, Java, and the Molucca Islands.

In some of the other large wall-cages there are a few of the Semnotes, the group of monkeys most nearly allied to the Anthropoids ; although it will be observed that they differ markedly from these animals in external appearance, all having long tails besides other distinguishing characters. The most notable of them is shown in this house, *viz.* the Long-nosed or Proboscis Monkey, *Semnopithecus larvatus*, differing in its greatly devoloped nose from all other monkeys. This animal is peculiar to the island of Borneo where it is known as the Kakaw because its loud deep-toned call resembles the sound of this word. Its voice is intensified by the presence of a great sac connected with the wind-pipe, producing a goitre-like swelling of the neck in the adult male animal. Its food consists almost entirely of leaves.

In the same compartment there is usually an example of a reddish monkey known as *Semnopithecus pyrrhus*, and highly prized in Java on account of its colour. It is not quite certain whether or not this is a distinct species, as it has been supposed by some to be only a variety of the common Black or Negro Monkey of Java, *S. maurus*.

Another wall-cage contains two or more specimens of a monkey from Arakan, named after Sir Arthur Phayre, and known as *S. phayrei*. The most striking feature of this species is its ghastly face produced by a broad white ring round its eyes and by its white lips ; the rest of the face being purplish-black and the fur dark brown. This species extends southwards to the Malayan Peninsula, and is extremely common in the dense forests about Mergui. The young, as in the majority of the Semnotes,

is quite distinct in colour from its parents, being pale yellow.

Sometimes associated with these is another Semnote of a very pale sandy yellow colour, with a distinct crest which is more or less tipped with blackish, and hence this species is known as *S. melalophus*, and it inhabits the island of Sumatra. There is also another Semnote occasionally exhibited, *viz.*, the Purple-faced monkey of Ceylon, *S. cephalopterus*, so named on account of its prominent white whiskers.

That beautiful African species, *Cercopithecus diana*, or the Diana Monkey, occupies a small cage in this house. It is a native of Western Africa.

The Marmosets, some of which are exhibited in a small cage, constitute one of the Divisions of the American monkeys, distinguished by having 32 teeth, the same number as in man, and by their tails not being prehensile. They are the smallest of the monkey kind, and are generally characterized by small round heads, and by their hands and feet more resembling the paws of a bear than the hands and feet of an ordinary monkey : hence they are sometimes called the Bear Monkeys. It will be observed that the nose conforms to the Platyrrhine type. Unlike other monkeys they are insectivorous, or even carnivorous in their diet, and have been known to catch fish and eat them. They are not credited with much intelligence, but their affection to one another is very great, and the parents bestow every care on their offspring, carrying them about, clinging on to their bodies, nestling in the thick warm fur. These pretty little animals are the size of small squirrels and jump about like them from bough to bough of the tallest trees.

They are associated with some other affined species in the forests of Brazil, Peru, and Panama. The Marmoset exhibited here is the best known of all, *Hapale jacchus*.

In the various systems of classification of the Animal Kingdom that have been adopted, the Lemurs occupy a position alongside of the monkeys. Like the latter they are quadrumanous, but in other particulars they differ considerably from them in external appearance and otherwise. As the majority are nocturnal in their habits and move noiselessly about the dense forests, gliding like ghosts or spectres, Linnæus gave them the name of *Lemures*. They are chiefly distinctive of the island of Madagascar which contains 66 species of Mammals, of which one-half are Lemurs represented by six genera. They are, however, not confined to that island, but occur from West Africa to India, Ceylon, and the Malayan Archipelago ; three genera being found in Africa, and three in Asia. In this house there are illustrations of several of the common Lemurs of Madagascar belonging to the genus *Lemur*. There is an example of one of the Lemurs of tropical Africa belonging to the genus *Galago ;* and some specimens of two of the Asiatic genera, *viz.*, the Loris of Southern India and Ceylon, constituting the genus *Loris ;* and the so-called sloth, or Slow Lemur, *Nycticebus*, of Eastern Bengal and the countries eastwards. The other Asiatic genus, *Tarsius*, is not represented, as it is a rare animal found only in Sumatra Borneo and North Celebes.

The Lemurs are generally arboreal in their habits. Their opposable thumbs and great toes render their limbs well adapted to this mode of life, and their effi-

ciency is still further secured by the circumstance that the tips of their fingers and toes are enlarged into fatty cushions or discs, acting as fine organs of touch and thus supplementing their vision in the dimness of twilight or in the darkness of night. The toe next the great toe differs from the others in having a sharp claw quite unlike the flattened nails of the other toes and fingers. There is also a peculiarity in regard to their blood-vessels, as, in some Lemurs, the veins and arteries of the limbs break up into masses of parallel branches. It will be noticed that the Lemurs have very large eyes, with a vertical slit, indicating their nocturnal habit of life.

The Madagascar Lemurs are exhibited in one or more of the wall-cages, whilst *Galago garnetti* of Africa, and *Loris gracilis* and *Nycticebus tardigradus* of Asia occupy some of the table-cages. These African and Asiatic forms are more or less insectivorous, or even carnivorous in their habits, chiefly killing and eating birds which they devour with avidity, head first. It is curious to watch the slow Loris seizing its food, especially if it is a living thing. Its hands are moved slowly and tremulously forwards, almost as if they were paralytic, but gradually and surely approaching its prey which it finally seizes with a sudden and rapid grasp. It is known in Bengal as the 'bashful cat,' but of course it has no affinity whatever with a cat. In Chittagong there is a belief prevalent among natives that its bite is poisonous.

Two Families of Mammals very different from the foregoing are generally to be seen in this house. The first of these is the Binturong, an example of the *Viverridæ;* the other the Cat-Bear, an illustration of the *Æluridæ.*

The Binturong is a very remarkable-looking animal

owing to its pointed muzzle, tufted ears, long shaggy black coat, and a very thick tapering long prehensile tail. It is sometimes known as the Black Bear-Cat, *Arctictis binturong* being its scientific name. It is nocturnal and arboreal in its habits, living upon birds, eggs and fruits. It is essentially a Malayan animal, but it extends north-westwards through Arakan to Assam, along the mountains, and has been found as far westwards as the hills of Bhutan.

The Cat-Bear also belongs to a peculiar group represented only by itself, and by an animal as large as a bear, but black and white. The latter occurs in the mountains of Eastern Tibet, having been discovered there by the distinguished traveller and zoologist, Abbé David. It has been described by Alphonse Milne-Edwards as *Æluropus melanoleucus*. The Cat-Bear or Panda is known as *Ælurus fulgens*. No little animal is more beautiful than a young Panda, with its dense reddish-chestnut upper coat and jet-black under surface, white muzzle, pointed white-lined ears, and long barred bushy tail. In its habits it is very bear-like, as even a little Panda, when at all frightened, rises on its hind legs and strikes forward with its paws as if to hug like a bear, but there is also the cat element, as its claws are retractile, and it can scratch and spit like a kitten. What its natural food is, has not yet been very well ascertained, and hence considerable difficulty has been experienced in rearing the young, but it is undoubtedly fond of bamboo-leaves and of eggs. The first Panda brought to these Gardens, having been received partially tamed, was allowed out daily among a clump of bamboos, and having regular exercise and freedom, it was successfully kept for about two years, but at length it succumbed

to the heat of this climate. This illustrates one of the practical difficulties which attends the keeping of animals from temperate and cold regions in a garden within the tropics. The last Panda, however, was sent to Darjeeling during the hot season. The Panda occurs in the forests of the Eastern Himalaya and Eastern Tibet, but the extent and altitude of its range have not yet been satisfactorily ascertained.

Small Marsupials are sometimes exhibited in this house, but the only species at present shown is *Dasyurus geoffroyi*, mentioned under the Sonebursa House.

The visitor will now leave the Gubbay House by one of its eastern doors, and, in passing the Samber tank to the right, it may be mentioned that an experiment has recently been made of introducing the Gourami fish, *Osphromenus olfax*, into Lower Bengal from Madras. This experiment was conducted by Mr. H. S. Thomas, C. S. the author of 'The Rod in India,' who had a very large number of young Gourami fishes imported for this purpose. This tank was one of those selected because it was thought to be free of predatory fish; but how far the experiment has proved successful, yet remains to be seen. Continuing onwards to the main road, the visitor will pass a cage embowered in creepers and known as

The Ratel Cage,

as it contains one or more Ratels, sometimes called Honey Badgers, of which there are two species, one peculiar to Africa, *Mellivora capensis*, the Cape Ratel, and the other to India, *M. indica*, differing but little from each other in external appearance. They have an offensive odour due to the presence of glands at the base of the tail. The

Indian Ratel kills rats and eats them with the greatest avidity. There is another cage at the opposite side of the road generally occupied by a Ratel, as the occupant of the larger cage steadily refuses to have a companion of either sex.

The visitor should, now proceed to the large circular house to his left, and, in so doing, he will pass

The Mongoose Cage,

which contains two specimens of the Banded Mongoose of Africa, *Herpestes striata*, which have taken the place of a very tame example of the Mongoose of Bengal, *Herpestes auropunctatus*. Recently the Committee have brought together large collections of Indian Mongooses for exportation to New Zealand and Australia, where the attempt is being made, at their suggestion, to introduce the Mongoose for the purpose of destroying and thus keeping down the immense numbers of rabbits that now threaten the sheep industry of these two countries. The Mongoose should be much appreciated in India as it attacks snakes, even the most formidable poisonous species, and invariably attempts to destroy them. There is no more exciting and interesting scene than to see a Cobra, or a powerful Russell's Viper tackled by a Mongoose. The tactics of the animal seem to be to seize the Cobra by the front of the head; the Cobra rises to strike with distended hood, the Mongoose standing in front on the alert, and no sooner does the reptile strike downwards at him than the head is grasped, dragged down, and held to the ground with a bull-dog tenacity of purpose, and shaken as a terrier does a rat. When the Mongoose is exhausted he loosens his grasp

and the Cobra crawls away a short distance, but being watched by its enemy it again rises to the attack, and is again dragged to the ground. This is continued until the snake is so mauled about the head, that it can offer no further resistance, when the Mongoose proceeds to crunch up the head to a pulp. After such a fight it has been observed that the muzzles of some Mongooses were covered with little blisters, and, immediately after a fight, a poison fang of a Cobra was once removed from amongst the hairs of the face of a tame Mongoose. The Mongoose, however, has no immunity from the effects of the poison of the Cobra, and, when bitten, dies under its influence like any other mammal or bird. He escapes in the deadly fight simply by his agility and dexterity.

The large circular house which the visitor now approaches is

The Schwendler House,

so named, in honour of Carl Louis Schwendler, during his life-time, and in which his rich collection of pheasants was deposited. As it has been found that the pheasants from the high regions of the Himalaya and the temperate regions of Asia, do not thrive here, the birds represented are generally those pheasants characteristic of southern regions, such as the various species of *Euplocami* which have quite different tails from the true pheasants, and in this respect resemble the jungle-fowl. In this house the following species have lived for some years: *Euplocamus lineatus*, the Lineated Kaleege; *E. horsfieldi*, the Purple Kaleege; *E. andersoni*, Anderson's Kaleege; *E. nycthemerus*, the Silver Pheasant; *E. erythropthalmus*, the Rufous-tailed Pheasant; *E. vieilloti*, Vieillot's Pheasant, and the Horned Tragopan of the south-eastern

Himalayas, *Ceriornis satyra.* Three species of Jungle-fowl have also been kept for years in the Gardens, *viz.*, *Gallus sonnerati*, the jungle-fowl of Southern India ; *G. bankiva*, the common jungle-fowl of India ; and *G. varius*, the fork-tailed jungle-fowl of Java. The Gold Pheasant of China, *Thaumalea picta ;* the Bar-tailed Pheasant of Northern China, *Phasianus reevesi ;* and the Ring-necked Pheasant of China, *Phasianus torquatus*, are the only northern species that have been kept at all successfully. Some attempts have been made, from time to time, to exhibit that handsome bird, the Monaul Pheasant, *Lophophorus impeyanus*, but unfortunately this species has invariably succumbed to the heat and damp of Bengal.

Along this portion of the carriage drive that skirts the northern and eastern sides of the Garden, a small cage will be seen in a north-easterly direction, and it generally contains some examples of the *Paradoxuri* already described under the Kuch Bihar House. Further on, in the same direction, is the large structure known as

The Durbhunga House,

called after one of the Life Governors of the Gardens, the Maharajah of Durbhunga. This house is at present most usefully employed as a depôt for the reception of animals as they arrive at the Gardens, and for others when under observation.

The visitor after leaving the Schwendler House, and proceeding towards the Entrance Gate by the central carriage drive, will observe to his left

The Restaurant,

and a few cages scattered about the northern side of

the Dumrāon House, and generally containing young monkeys. At the angle opposite to the Borassus palm from which the visitor started is

An Octagonal Cage

containing a pair of Malbrouck Monkeys, *Cercopithecus cynosurus*, from West Africa. This species has bred in the Gardens.

It may be noticed that immediately behind the Aquatic Bird Pond, there is a very good Rink, but it has not proved a financial success, as rinking was only in vogue in Calcutta for a very short time. The Rink, however, has been occasionally utilized as an enclosure on which to hold Dog-shows.

The visitor has now completed his walk round the Calcutta Zoological Gardens.

APPENDIX.

Constitution of the Gardens.

MEMBERS OF THE GARDENS.

A.—Extraordinary Members.

Patrons:

H. R. H. THE PRINCE OE WALES.

HIS EXCELLENCY THE VICEROY AND GOVERNOR-GENERAL OF INDIA.

President of the Gardens:

HIS HONOR THE LIEUTENANT-GOVERNOR OF BENGAL.

General Council of the Gardens.

The members of the General Council of the Gardens consist of the above and of *DONORS* classified in three grades :—

Donors:

(1). LIFE GOVERNORS—

are donors of Rs. 10,000 and upwards; also such persons who, by their influence and interest taken in the Gardens, have greatly assisted in its successful establishment and future development.

(2). LIFE MEMBERS—

of the General Council are donors of Rs. 5,000 and upwards.

(3). HONORARY MEMBERS OF THE GARDENS.

are donors of Rs. 1,000 and upwards.

B.—ORDINARY MEMBERS.

They consist of three classes :—

(1)—Holders of personal life-tickets (Rs. 150), *transferable* on payment of a registration fee of Rs. 25 for transfer.

(2)—Holders of personal life-tickets (Rs. 100), *not transferable.*

(3)—Holders of *free* tickets. Such tickets can be issued by the Managing Committee to persons who are considered useful to the Gardens, but who otherwise would not become members of their own accord.

COMMITTEE OF MANAGEMENT.

The Gardens are managed by an *Honorary Committee* and a *paid staff.*

The committee consists of a *President*, and *Honorary Secretary* and *Treasurer*, and an unlimited number of *Members*, all of whom must, however, be members of the Gardens. The Committee is appointed by His Honor the Lieutenant-Governor.

The paid staff consists, at present, of a Superintendent and a number of subordinates, according to requirements. But, in future, it is intended that the paid staff should consist of a *Scientific Director* and a *Secretary*, in addition

to the Superintendent, all of whom will be servants of Government.

PRIVILEGES OF MEMBERS.

WITH reference to the privileges of members of the Gardens, a special memorandum has been issued, and can be had on application to the Superintendent or to the Gatekeeper. Here it will suffice to state the privileges in a general manner—

All members of the Gardens, whether *extraordinary* or *ordinary* members, have—

(1)—Free entrance with their families on *all* days. By a family is understood *one* wife, *any number* of children, and usual attendants.

(2)—Free entrance in carriage, on horseback, or in palanquin.

(3)—Free use of the rink and skates, of the boats, with permission to fish.

(4)—Permission to introduce *two* friends on any day, *except Sunday*, either personally, or by means of tickets. (Each member receives a book of tickets.)

(5)—Facility for the import and export of animals.

Extraordinary Members have the following additional privileges :—

(1)—A voice in the management of the Gardens, and membership of the General Council of the Institution.

(2)—Their names will be enrolled on a memorial list to be put up in the future Hall of the Gardens.

Life Governors, as far as practicable, will have buildings erected in their honour, and called by their names.

Houses have been dedicated already to the following Life Governors :—

Abdool Gunny House—(Bear den).

Andul House—(Plant house, containing Parrots and Pythons).

Annoda Pershad Roy House—(Birds-of-prey house).

Buckland House—(Tapir enclosure).

Burdwan House—(Carnivora building).

Cooch Behar House—(Small carnivora).

Doomraon House—(Monkey building).

Durbhunga House—(Rare and delicate mammals and birds).

Ezra House—(Giraffes and Zebras).

Gubbay House—(Small and rare mammals and birds).

Jheend House—(Small mammals' pavilion).

Maharanee Surnomoyee House—(Aviary).

Mullick House—(Aquatic birds).

Rai Dhunput Singh—(The Rink).

Schwendler House—(Pheasant House).

Sonbursa House—(Swine, Kangaroos, and Wapiti-deer stables).

ADMISSION FEES.

One anna for each person on all days, from sunrise to sunset, except on Sunday afternoon, after 4 o'clock, when the charge is 8 annas for each person.

Children *in arms* admitted free.

Carriage.—One rupee, *plus* daily fee for each person in a carriage, except the coachman and syces.

Palanquin.—Eight annas.

Horseback.—Four annas.

Boat.—One rupee per hour for four persons, and one additional rupee for any number of persons in excess of four.

Rink.—One rupee per person, including the use of skates belonging to the Gardens.

Fishing.—Eight annas per day, Rs. 5 per month, or Rs. 3 for two weeks, for *one rod.*

The Gardens are open from sunrise to sunset.

The Committee trust that the liberal support already received from the public will continue, in order that they may be in a position to develope the Gardens in accordance with the original prospectus, and that the Gardens may ultimately become the greatest attraction possessed by the metropolis of India.

INDEX.

Names printed in Roman characters, are either Houses, and Cages, or Animals represented in the Menagerie.

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Dr Andrson
47 Chinnage Rd