

STUDIES ON WILDLIFE OF NARBADA VALLEY

I. GENERAL INTRODUCTION AND SUMMARY OF RESULTS

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(With one Text-figure and three plates)

OBJECT AND SCOPE

Central Regional Station, Zoological Survey of India was established in Jabalpur, Madhya Pradesh, in 1960 and includes under its jurisdiction whole of Madhya Pradesh, the largest state in Indian Union and adjoining six districts of Maharashtra, the area which is generally known as Central India. Because of vast extent of the area, and varied ecological conditions, it was decided to collect knowledge of at least a cross section of the fauna within about ten years by undertaking the survey of the Narbada river, the largest and the most important river of the area which roughly divides Central India into two halves originating in north east of the area and flowing towards west practically for whole of its length within the area except a small portion within Gujarat state. Also several important smaller rivers and streams of the area are its tributaries and, have practically same fauna as the Narbada. In order to have a good knowledge of terrestrial fauna of Narbada valley also, the area on the either side of the river within a distance of about 15 km. from the river was also included in the survey. However, Jabalpur district was surveyed within 40 km radius of Jabalpur city.

Studies on wildlife in Kanha National Park, which is drained by tributaries of the Narbada river though not within the limits Narbada Valley, were also carried out.

This report deals only with wildlife terrestrial vertebrates of the Narbada valley. A thick populated and agriculturally important area of Central India. Although Narbada valley is considered to lie between Satpura and Vindiyachal Hill ranges starting from Jabalpur dist., the portion outside the main valley along the river has also been included. The wildlife as here understood (Khajuria, 1975a) includes terrestrial

vertebrates only, *i. e.*, terrestrial reptiles, birds and mammals but in the case of reptiles chelonians have also been included because only a couple of species are involved. The important points which have been kept in view are: present status of the species, success of conservation measures, ecological distribution, discovery of new taxa, field studies of common species and intergration in subspecies, the area being a well known intergrading zone particularly the northern and southern races, geographical and individual variations with special reference to age groups.

The surveys were undertaken after the rainy season, which is rather heavy, in view of transport facilities on forest roads and when the staff was reasonably free from administrative and other duties at the headquarters. The period covered was from October to March. However the Jabalpur district, where the Central Regional Station is situated, is more or less midway between the origin and fall of the river was surveyed in all seasons to make the survey more thorough. Only one survey in a year lasting for about four weeks could be undertaken in view of other programmes in hand. The period covered was from 1962 to 1972 but because of some administrative difficulties no survey was carried out during 1966, 1967 and 1968 except in Japalpur district. In which survey were carried out for much longer period (1960-1976).

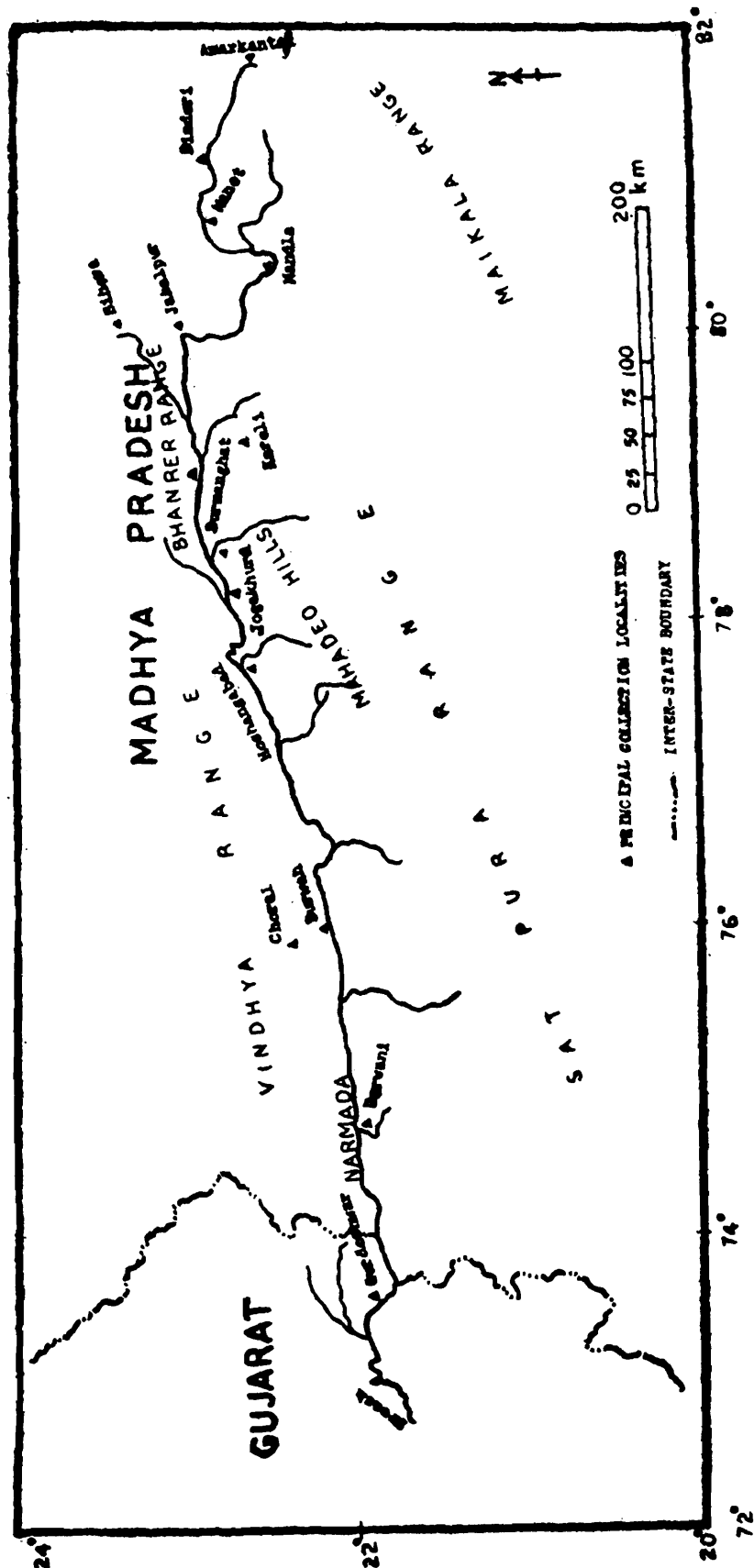
The portions of the area falling in the following districts were surveyed with principal halting stations indicated within brackets Shadol (Amar-kantak), Mandla, (Dindori, Manot), Jabalpur (*ca* 60 stations) Narsinghpur, (Karelidi, Burmanghat), Hoshangabad, Khandwa (Joga Khurd,) Khargone (Burwah) Indore (Choral), Dhar, (Barwani) and Broach (Broach, and Gurdeswar). The last district although not in area of jurisdiction of the station (because it is in Gujarat state) had to be surveyed to complete the survey programme.

PREVIOUS SURVEYS OF THE AREA BY OTHER PARTIES

The parties from the head office of the Zoological Survey of India conducted short surveys mainly of the aquatic fauna of the river in 1926 (one survey), 1927 (three surveys), 1941-42 (two surveys), 1974 (one survey) but very little information was collected on the groups under report as the main object was the aquatic fauna. No recent published information on the subject appear to be available except some old short reports given under the head "references" at the end of various parts of this report and *fauna of India*, which, however, do not cover exclusively the area under report.

BRIEF DESCRIPTION OF THE AREA

The area falls within 21.40 -22.40 N. lat. and 73.02-81.48E long. The total length of the river is 1290 km out of which about 4/5 fall within



Text-fig. 1. Sketch map of the Narmada river showing principal collecting localities.

the area of jurisdiction of Central Regional Station. The number of districts traversed by the river are twelve out of which two could not be visited because of lack of communication facilities. They were also not much of ecological interest. The altitude varies from 1050 m. (Amar-kantak) to sea level (Broach district.) The detailed climatic data could

only be collected in Jabalpur city (*vide* Khajuria, in press c) The other data as found in available district gazetteers is as follows:

Hoshangabad: highest temp. 118.5 lowest 39.1 average rainfall 4.7.
Broach: Average rainfall 4.8 temp. in winter 98 to 60 p-1 (of notes)
average rainfall 3.3.

Description of Narbada river

The Narbada river from its origin in Amarkantak to its fall in the gulf of Cambay covers a distance of about 1290 km with a catchment area of about 90,000 sq. kms. The river is usually divided into five parts with different ecological conditions. The first part, about 320 km, lies between Amarkantak and Jabalpur district or more or less upto the origin of Vindiyachal hill ranges from the northern bank of the river. Basalt is exposed at numerous places with marble here and there in the river bed. The river starts as a very small stream but gradually increases in flow after receiving tributaries big and small, The fall from Amarkantak (Maikal range) (Pl. I, fig. 1) is steep. There are a number of falls like Doodh Dhara and Kapil dhara (Pl. I, fig. 2 & 3). After leaving Maikal range it takes a tortuous course from Dandori on rocky bed on the right side of Satpura hills. There is important fall of Shahastardhara (Pl. I, fig. 4) near Mandla from where it follows a more or less straight course to the wellknown marble rocks (pl. II, fig. 1) near Jabalpur. After the origin of the Vindiyachal range in Jabalpur District, the real Narbada valley starts. About 320 km. stretch of the river between marble rocks and Handia town is bordered by highly fertile valley which is supposed to be a lake at one time. From Handia to Haran fall, the river loses in altitude considerably on its rocky bed with a few falls. From Haran fall to Makrai fall there are numerous cataracts and rapids before it reaches the plain of Gujarat after traversing a distance of about 400 km. Near Broach it becomes an estuary with banks separated near the fall by a stretch of muddy bed of about 20 m.

A notable feature of the river is that all its banks and even bed where they are alluvial are under cultivations particularly of vegetables. Because of high fertility of alluvium, the crops are very good. A peculiar feature of this alluvium is that in dry season it shows wide cracks in which several animals seek refuge (Pl. II, fig. 2). Formation of numerous islands, both rocky and sandy is also peculiar feature of the river because of scanty flow before the rains (Pl. II, figs. 3 & 4). Several human settlements including important towns of Mandla, Jabalpur, Narsinghpur, Hoshangabad and Barwani are on its banks or in close vicinity. As a result the river is highly polluted though at the same time being the best worshipped river in India. It is one of a couple of rivers which flows from east to west.

Amarkantak is perhaps the best worshipped place being the origin of the river. Parties of pilgrims who take a full round of the whole river on foot are sometimes seen. The river is also worshipped at numerous ghats where there are numerous temples which serve as good roosts of bats and some other animals. These ghats are veritable sanctuaries because no animals are killed. Even marsh crocodiles have succeeded in survival near these ghats (e.g. Beraghat) because of the protection.

Some constructions including forts (e.g. Joga khurd fort) are constructed on big hilly islands on the bed of the river.

The flora of the area can be divided into eastern sal forest zone and western less humid teak forest zone merging in middle near Narsinghpur District. Near about Barwani, a semi arid area starts extending westward. The salinity in Narbada water conspicuous in Broach district.

BRIEF NOTES ON PRINCIPAL COLLECTING LOCALITIES

A. Shadol District. M.P. (1962)

(1) *Kund or the point of the origin of the Narbada river at Amarkantak:-* The place of the origin of the Narbada river is situated at an altitude of 1850 metres at Amarkantak village (Pl. I, fig. 1) in a clearing at the top of a thickly forested hill (Maikal range) in Shadol District, Madhya Pradesh. The place is visited by numerous pilgrims. The actual point of origin is called 'Kund' and is in the form of a pacca tank about 300 sq. metres in area with rather an irregular outline inside a spacious pacca enclosure which contains 8 temples out of which 5 are inside the tank, the water in the tank is at places about 12 m. deep. The bottom of the tank although cemented is very muddy at places. Because of the scanty discharge and use of the tank for bathing by numerous pilgrims every day, the water is very dirty and replete with plankton giving it greenish brown appearance. The portion of the wall of the tank inside the water are overgrown with abundant algal vegetation. Temperature of water at the surface taken at 9.30 A.M. was 24°C (May) No other fauna except plankton and two forms of small fish was met with in the Kund.

Just outside the kund, the discharge passes for about 50 metres through a spacious channel with pucca bottom where the water is again collected at places into shallow dirty tanks for unceremonial bathing and washing.

(ii) *Portion of the river between Kund and first waterfall*

The portion of the river between Kund and first waterfall called Kapildhara, is in the form of a small stream about 8 km. long and from about 1 to 3 metres wide with muddy or rocky bottom. The discharge of water is scanty in the beginning but gradually increases because of the confluence of several spring-fed streams. Water temperature taken

between 11 A.M. to 12 A.M. varied from 24-31°C (May). Aquatic vegetation is met with at places. On either side of the stream are spacious pasture lands bordered by thick Sal forest. B. Mandla Dist. M.P. (1963)

Narbada river, flowing on E. side of Bindori, Mandla distt.

(i) *Din dori* Lat. 22° 57' N. Long 81° 4' 30" E. Alt ca 2185¹.

Width of river 70-90 m., 0.5-1m deep. Water muddy, but at places clear. Vegetation in water consists of tufts of long grass projecting from surface of water. Bottom rocky with a good amount of silt and often some scum on surface of rocks. The water being very shallow, at many places, portions of rocky bottom can be seen above the surface of water. Banks rocky, ca 5-10m. high, slope variable from 30-90. Vegetation near banks contains small grass. Water moderately fast flowing. People of Dindori bathe and wash clothes on the western bank of the river.

(ii) *Narbada river at Manot, Mandla Distt.*

Lat. 22° 44' N Long. 80° 31' E.

About 1.5 km. from Manot upstream the Narbada appears to be a hill stream with stony and sandy banks and fairly fast current, but after that the bed becomes muddy and sandy and the current rather slow with reedy islands here and there. The water is about 2 mts deep at places near Manot bridge. Bed may also consists of Deccan trap however the nature of bed goes on changing.

(iii) *Right bank of Narbada river at Manot*

The right bank is forested and contains trees like *Dolbergia*, *sesso*, *Fiscus*, *Acacia*, Plant locally called Amla, Saja and Mahua etc and a tree locally known as Chota Jamun. The bank is broken up by a number of seasonal streams. Cultivated fields growing wheat, rice mustard, jute and vegetables are common. Even the main bed of the streams where the water has receded grows raddish, tomato, potatoes, cauliflower, brinjal etc. lantana bushes are very common. Forested hill ranges begins about 3 km. upstream.

C. Jahalpur District (1960-1976). The details of ecological conditions have been given by Khajuria (in press)

(NARSINGHPUR & HOSHANGABAD DISTRICT, M.P. 1964.)

(i) Kareli— Lat. 22° 10' N; Long. 79° 3' E; Alt. 240 mts approx.

Kareli is a small town in Narsinghpur district. The collection was mostly made within about 40 km. radius of Kareli.

The Narbada river is about 15 km. towards north flowing from east to west. The width of the river bed varies from 50-60 metres deep at places. The nature of bed and banks varies. They may be sandy muddy,

stony, or rocky at places. Very little aquatic vegetation was seen. The river receives a number of tributaries with similar ecological conditions.

The forest wherever present is scanty and is confined to hills. It consists mainly of the teak, the bamboo, species of *Ficus* and *Acacia* with shrubby undergrowth here and there. Some other species of trees are also common. Termatoria are common.

Most of the area is under cultivation and the blackish soil devoid of stones grows mainly various kinds of cereals.

(ii) Barmanghat-Lat. $23^{\circ} 1\frac{1}{2}'$ N; Long. $79^{\circ} 1\frac{1}{2}'$ E; Alt. 240 mts. approx.

Barmanghat is a village in Narsinghpur Dist. and is situated on the right bank of the Narbada river. The ecological conditions of the river and the banks within about 5 km. radius are more or less similar to those described earlier except the river bed is wider reaching about 100 metres or more in width at places and down stream the bed is more sandy or alluvial with extensive cultivations of vegetables such as tomato, bringal, chilie, etc. The current is also slower and deeper. At places there are extensive grassy and shrubby plains around. A few trees and shrubs (*Lantana* bushes) are found scattered on the banks. The river bifurcates into two branches near Barmanghat and forms a large island before the two branches rejoin each other. There are numerous temples, some of them located on the highest point on the island.

D. Hoshangabad and Sehore Dists. M. P. 1964-66)

(i) Hoshangabad and Budini Lat. $22^{\circ} 42'$ N; Long $77^{\circ} 42'$ E; Alt. 235. mts. approx.

Hoshangabad is a large town and district headquarters and is situated on the right bank of the Narbada river while Budin is a smaller town with Tehsil headquarters in Sehore district on the left bank of the river more or less opposite to Hoshangabad. The area within about 10 Km radius present the following ecological conditons.

The bed of the Narbada river attains a width of about 200 mts with current only about 100 metres wide. The bed is mostly sandy or alluvial with bare rock only at few places. The current is slow with water at places 5 to 6 mts deep. The river is spanned over by a bridge.

The forest is mainly on the left bank and consists mostly of teak, *Acacia sp.* *Butia sp.* *Ficus sp.* rosewood etc. *Lantana* bushes are common.

The cultivated fields, with greyish black soil grow mainly maize and pulses, 'tit', ground nut, mustard and wheat.

(ii) Joga Khurd - Lat. $76^{\circ} 45'$ N; $22^{\circ} 40'$ E; Alt. ca 200 metres approx.

Joga Khurd is small forest village situated on the left bank of the Narbada river in the Harda subdivision of Hoshangabad Dist., Madhya

Pradesh. The collections were made within about 40 km. radius of the village.

The Narbada river flows from north to south. The width of the bed reaches about to 100 mts. The current is moderately fast with water upto about 6 mts. deep at places aquatic vegetation is scanty. The bed may be sandy, muddy, stony or rocky. There are several islands of varying dimensions. Shrubs and herb locally known as Tamalaya, Karoti, Danola, Jurun and Jharu are common on dry river bed. On one of the islands a dilapidated fort built in 18th century A. D. is situated. The river receives several tributaries with similar ecological conditions.

On the banks of the river, particularly on the left one, is a teak forest. Other trees locally known as Tendu, Kalry, Sarai and Palas are also common. The undergrowth is thin, and soil is alluvial with a few stones.

In the cultivated fields which are patchily spread in the forest, the brownish alluvial soil devoid of stones mainly grows cotton, maize, wheat, pulses and oil seeds.

(iii) Handia villege - Lat 77° N; 22° 30' E; Alt ca 200 mts.

Handia is a fairly large village in Harda subdivision of Hoshangabad distt., M.P. and is situated on the right bank of the Narbada river. On the other side of the river is Nemawar village. The river flows from east to west direction with width of about 1 km., hardly reaching a depth of about 0.5m. There are small rocky islands here and there. The banks are mostly sandy. There is some algal aquatic vegetation, Jamun bushes and Dongle plants are common on the river bed. On either sides of river trees locally known as Maru, Fepar, Neepi, Jugulas are common. *Mangifera indica*, *Ficus religiosa* and *Azadiracta* are also found. Fields of wheat, cotton, til, pulses, jawar and maize are frequently met with.

E. Indore Dist, M. P. (1969)

(i) Choral : Lat. 22° 30' N.; Long. 75° 46' E.

It is a small village surrounded by hills and forest. The forest consists mainly of planted teak, *Arjan*, *Acacia*, bamboos etc. with sparse undergrowth. Forest is thin everywhere and spacious grassy, patches are present frequently.

The area which is under cultivation has blackish soil which is devoid of stones and grows mainly millet, pulses and cotton. Railway line and a mettled road passes through the village.

Nearby there is a good-sized hill stream, called the Choral river. It is a tributary of the Narbada. The width of the river bed varies from place to place, but its maximum width is about 60 mts. near the village. The current is moderately fast with water about 0.5m. deep at places, forming pools of nearly stagnant water separated by fast flowing shallow

current. The bed and the bank of the stream is mainly stony with rocks showing up here and there. Very little aquatic vegetation was seen.

F. Khandwa Dist., M. P. (1969-1971)

(ii) Burwah Lat. 22° 25' N; Long. 75° 40' E.

Burwah town is subdivisional headquarters and is situated at about 2 kms. distance from right bank of Narbada river.

The ecological conditions of the river are same as described under the Burwani station (p. 13).

(ii) *Barwani* : Long 74° 54' E.; Lat. 22° 01' N.

Barwani is a small town (a subdivisional headquarters) in Khargone dist. about 5 km. on the left bank of Narbada river. The area around Barwani presents typical semiarid environment. The black and red soil, are common. The sparse vegetation consists mainly of *Acacia*, Palms, Jujube, Dhatura, Thistle, tamarind, *Ficus* sps. The cultivated fields mainly grow barley, millet, pulses, wheat, maize, sweet potato, groundnuts and cotton. The area appears to be poor in fauna.

G. Broach Dist. Gujarat state (1971)

(1) *Garudeshwar*:—21° 58' N. Lat. 73° E. Long.

A small village *ca* 105 km. E. of Broach on the right bank of the Narbada river. Ground undulating with a few hillocks on right bank and a range of hills (the Satpuras) *ca* 4-5 kms. from left bank.

Vegetation consists mainly of Palmyra palms, Gulmohr, *Acacia* spp., *Opantia* spp., *Zizyphus* spp., *Azadirachta* spp. and some other xerophytes. Cultivated fields grow mainly cotton, pulses and maize but those on the alluvial bank of the river grow sometimes in addition some rice. The lower branches of all palmyra palms are chopped off depriving some bats of their favourite roosts. The hills contain mainly teak forest.

The bed of the Narbada river is alluvial, sandy. stony and rocky at places with water at places with 7-8 metres deep.

(ii) *Broach town*:—73° 05' E Long. 21° 45' N. Lat.

A town with a population of 2.5 lakhs on the bank of Narbada river. The river is about 2.5 km. wide. In this season about half of the river bed is exposed and covered by alluvial and sandy soil. The exposed areas are used for cultivation of pulses, jawar and for brick manufacture. Fishing is extensively carried out by the help of boats. Water is saline in taste. Several pools of water are common on alluvial and sandy bed.

SUMMARY OF RESULTS

The collection consists of about 470 specimens including 171 taxa (Reptilia, 25; Aves, 115, Mammals 36). In addition to this collection over 2,000 specimens of Chiroptera including twenty taxa were collected in Jabalpur District and the result of investigation are published in a separate monograph. Practically all larger species already recorded from the area were seen but not collected, except a few specimens for museum exhibition, because of their rarity and enforcement of wildlife conservation measures. Detailed ecological observations were made by the author on the following species (see references). Mammals received special attention for ecological investigation as the author was specially interested in the group. One lizard *Chamaeleon zelanicus*, was however studied by other workers [Durve and Sharma (1975)]

1. *Mammalia*:

- (i) Insectivora: *suncus m. murinus* Linn. *Crocidura* sp., *Talpa* sp.
- (ii) Chiroptera : *Pteropus g. giganteus* Brunn, *Rousettus l. leschenaulti* Desm., *Cynopterus sphinx gangeticus* K. Anderson, *Rhinopoma h. hardwickei* Gray, *Taphozous m. melanopogon* Temminck, *T. theobaldi secatus* Thomas, *T. l. longimanus* Hardwicke, *T. k. kachhensis* Dobson, *Megaderma l. lyra* E. Geoffroy, *Rhinolophus l. lepidus* Blyth, *Hipposideros bicolor fulvus* Gray, *H. cineraceus durgadasi* Khajuria, *H. yabricus brachyotus*, Dobson *H. lankadiva unitus* K. Anderson, *Myotis peshwa* Thomas *Pipistrellus c. coromandra* Gray, *P. m. mimus* Wroughton, *P. ceylonicus indicus* Dobson, *Scotozous d. dormeri* Dobson, *Scotophilus temmincki wrough-toni* Thomas, *s. heathi* Horsfield.
- (iii) Carnivora : *Cuon alpinus dukhunensis* Sykes (the wild dog). *Panthera t. tigris* Linn (the tiger).
- (iv) Artiodactyla : *Cervus duvauceli branderi* Pocock (the central Indian swamp deer), *Tetraceros quadricornis* Blainville (the four horned antelope).
- (v) Rodentia : *Rattus blanfordi* Thomas, *Vandeleuria o. oleracea* Bennet, *Tatera i. indica* Bechstein.

Special mention may be made of very important studies on the wild dog, the tiger and the swamp deer which aim at the discovery of limiting factors in their population dynamics with the object of manipulation of their numbers. Chiroptera were studied in more detail and include the following investigations:

New methods of collections and observations, taxonomy, location of type material, synonymy, all kinds of morphological characters which a taxonomist can possibly study (general body form, colouration, fur, tests, external genitalia including bacula, skull dentition, tongue, form of stomach, etc.), distribution, habitat selection, general habits (inter-specific and intraspecific relationships, daily activity, methods of flight, suspension, crawling, swimming, sounds produced, means of defence, hibernation, etc.), breeding habits, feeding habits, movements, enemies, parasites and disease, population dynamics and economic importance. A detailed discussion on the various adaptations shown by the bats is given. The work is profusely illustrated.

2. Aves : *Centropus sinensis* Stephens, *Vanellus i. indicus* Boddaerk, *Tyto alba* (Scopoli), *Otus backamaena marathi* Ticehurst, *Athene brama indica* Franklin, *Bubo c. coromandus* Latham, *Dinopium b. benghalensis* Linne, *Acridotheres t. tristis* Linn, *Passer domesticus* Linn, *Megalaima haemacephala* (Ph. S Muller).
3. Reptilia : *Mabuya macularia* Blyth, *Calotes versicolor* Daudin, *Chamaelon zelanicus* Linn.

One new taxon of Chiropters was discovered, one of birds and one of reptiles were discovered but not named for want of sufficient material. Intergradation of number of taxa has been discussed. Geographical and individual variations with special reference to age groups particularly young specimens have been described. Photographs of small animals which are not generally available or provided in their natural habitat.

Some other works by the author on Indian wildlife including the area under report are Khajuria (1953, 1955 a, b, 1956, 1963, 1966, 1970 a, b, 1971 b, 1972 a, 1973 b, 1975 a, b, 1976 a).

Wildlife conservation :- The animals which are hunted for their meal, hides, fur trophies are rare everywhere, except in protected places, National park, wildlife sanctuary, places of worship etc., although no reliable census figures are available except in very rare cases, e.g. swamp deer. Although destruction of wildlife is strictly prohibited. The measures for prevention of poaching are very inadequate. In some places inhabited by tribals even the smaller species were rare as they hurt them for food.

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