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THE BENGAL NATURAL HISTORY SOCIETY

Estd. 1923

The Society under the name Darjeeling Natural History Society was started about the end of 1923, the objects being to maintain the Museum in a proper condition, to promote the study of Natural History and to get together as complete as possible collections of Natural History specimens from a limited area, including "the Civil Districts of Jalpaiguri and Darjeeling and the State of Sikkim", as well as what could be procured from the neighbouring countries of Tibet, Bhutan and Nepal.

Government and Municipal grants not being sufficient for our purpose, it was proposed to enrol members so as to increase our funds, and a quarterly journal has been started. The journal is no longer confined to articles on the Natural History of the above mentioned area, but includes those from anywhere. It is hoped that everybody will join the Society and co-operate to make the Museum and Journal a success.

The annual subscription is only Rs. 10. Life membership Rs. 150 ; those who have been members for over twenty years can become Life members on payment of Rs. 75.

Members get copies of the Journal free and other privileges. All facilities are also given to members to study the museum collection and expert advice is given to them regarding collection, preservation and identification of specimens.

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THE CURATOR
Natural History Museum
Darjeeling.

PREFACE.

Owing to unavoidable reasons, the publication of the Journal has been delayed considerably. We have been unsuccessful in obtaining a suitable full time Curator and Editor since October, 1960.

I would like to take this opportunity of thanking the contributors for their interesting articles, in particular the Information Department of the USSR Embassy in India.

A continuation of "Birds of Duars" by the late C. M. Inglis appears in this Volume. It is hoped to publish this interesting series in the book form some day.

I am deeply grateful to all the respective Chairmen, Vice Chairmen and Committee Members for their close support and co-operation in enabling me to bring out this Journal after such a long lapse.

Finally, I express my gratitude to Dr. Robert J. Miller and Dr. Mrs. Beatrice D. Miller of the University of Wisconsin U. S. A. for kindly going through the manuscript and for their invaluable advice.

E. D. AVARI
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 The Brown-headed Stork-billed Kingfisher. }
 The White-breasted Kingfisher. }
 The Indian Ruddy Kingfisher. }
 The Moth, Bramea Wallichii. }
 Hodgson's Broadbill. }
 The Long-tailed Broadbill. }

- The Painted Bush-Quail.
 The Burmese Red-headed Trogon.
 The Indian Black-crested Baza.
 The Painted Snipe.
 The Black-headed or Brahminy Myna. }
 The Indian Grey-headed Myna }
 The Gold-crested Myna. }
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 The Duars Paradise Flycatcher }
 The Bengal Green Pigeon. }
 The Northern Golden-backed Woodpecker. }
 The Himalayan Whistling Thrush.
 The Assam Spotted Babbler.
 The Northern Bay Owl.
 The Grey-winged Blackbird.
 The Indian Scarlet Minivet.
 The Indian Thick-billed Flowerpecker. }
 The Indian Short billed Minivet. }
 The Yellow-throated Minivet. }
 The Burmese Small Minivet. }
 The Sikkim Yellow-vented Flowerpecker. }
 The Indian Scarlet-backed Flowerpecker. }
 The Nepal Fire-breasted Flowerpecker. }
 The Indian Lorikeet.
 The Turkestan Stone Chat (Male).
 Hodgson's Bush Chat (Female).
 The Black & White, or Jerdon's Chat. }
 The Himalayan Speckled Piculet. }
 The Indian White-browed Rufous Piculet. }
 The Himalayan Tree-pie. }

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Estd. 1923

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JOURNAL
OF THE
BENGAL NATURAL HISTORY SOCIETY

VOL. 1

SEPTEMBER, 1963

No. 1

BIRDS OF THE DUARS

BY

(LATE) C. M. INGLIS.

(Continued from Page 60 Vol. 31 No. 2.)

FAMILY DICACIDAE.

295. The Indian Scarlet-backed Flower-pecker.

Dicacum cruentatum cruentatum (Linnaeus)

Fauna B. I. 2nd. Ed. No. 1297.

Description.— Length $3\frac{1}{2}$ inches. *Male* : Upper plumage from the forehead to base of tail, shining crimson-scarlet, with the black bases of the feathers showing through in places, tail black, the exposed parts glossed with blue, sides of the head, neck and breast, and part of the wings black, rest of the lower plumage pale buff, with the flanks ashy-grey. I obtained a specimen in Cachar with a spot of red on the throat.

Female : Upper plumage olive-brown above, sometimes washed with rufous, rump and above the tail, scarlet crimson, lower plumage buff, washed with ashy-brown on the sides of neck and breast and on the flanks. Bill and legs black, iris dark brown.

In this genus the bill is carved and pointed and serrated on the terminal edges.

Distribution and habits.— This is the commonest Flower-pecker in the district and is mostly arboreal in habit but does descend to bushes and scrub and Stuart Baker has seen it in tall grass. I have found it in compounds as well as in forest, and it visits tea-seed plantations. Like other flower-peckers it is fond of hunting amongst the bunches of *Loranthus* which parasitize trees and feed on the berries, excreting the sticky seed on to another branch of the tree and thus spreading the parasite. It also feeds on small insects, which it finds among the leaves and keeps up a twitter while feeding. It is an active little bird with a fast flight.

The breeding season is from April to August. The nest is egg-shaped and composed of drun from the *Simul* tree, held together by fibre and covered and strengthened, and attached, to the end of a branch by strips of grass, fibre and fine roots. It is situated from 5 to 50 feet from the ground. The eggs number 2 or 3 and are glossless white in colour. They measure about 0.56 by 0.4 inches. These beautiful birds have been kept successfully in captivity.

296. The Sikkim Yellow-vented Flower-pecker.

Dicacum chrysorrheum intensum Stuart Baker.

Fauna B. I. 2nd. Ed. No. 1301.

Description.— Length 4 inches. Sexes alike. Upper plumage olive yellow, brightest on the rump, tail black, wings black, the outer quills narrowly edged with white the others with increasingly broad margins inwardly of olive-yellow, a white line in front of the eye and a broad, greenish brown moristachial streak, lower plumage yellowish-white, boldly streaked with greenish-brown, a patch below the tail orange golden. Bill black above, lower mandible plumbeous tipped with black, iris orange, legs dark plumbeous.

Distribution and habits.— I have not come across this Flower-pecker very often but several specimens in the Buxa forest near Rajabhatkhawa, also at Hantapara and in the Moraghat forest are recorded. Its habits are similar to those of the last

species but I have not noticed it enter gardens though it occurs in the forest close to one.

297. The Himalayan Fire-breasted Flower-pecker.

Dicacum ignipectus ignipectus (Blyth).

Fauna B. I. 2nd. Ed. No. 1303.

Description.— Length $3\frac{1}{2}$ inches. *Male* : Upper plumage deep metallic bluish-green, tail black, suffused with blue and edged greenish, lower plumage rich buff the flanks washed with olive-green, a large patch of scarlet on the breast, with a smaller black patch below it.

Female : Upper plumage olive grass-green, brighter and yellower on the lower back and rump, sides of head and neck and breast olive-grey, lower plumage buff, paler on chin and throat and washed with olive-green on the flanks.

Bill black, paler and plumbeous at the base in the female, iris and legs dark brown.

Distribution and habits.— I have only obtained this bird at Buxa Duar where it appeared to be rare. It is a bird of higher elevations than the other species and is a forest loving bird going about singly or in pairs. Its habits do not differ from those of the other flower-peckers.

298. The Plain-coloured Flower-pecker.

Dicacum concolor olivaceum (Walden.)

Fauna B. I. 2nd Ed. No. 1303.

Description.— Length 3 inches. Sexes alike. Upper plumage dull olive-green, the crown feathers with dark centres and the rump and above the tail, yellower, wings dark brown edged with olive green, tail dark brown edged with olivaceous-ashy, lower plumage olivaceous-ashy with a buffy-yellow wash on the abdomen.

Bill dark brown above, plumbeous on lower mandible, iris dark brown, legs dark plumbeous.

Distribution and habits.— O'Donel found it common in the hills and I obtained it there at Baksa Duar. It descends well into the plains as I secured one in the Moraghat forest at the end of March. It is, probably, resident in the foothills upto about 3000 feet, but is likely to be overlooked on account of its dull colour. It is, like other Flower-peckers, often found in trees covered with Loranthus and other parasites, and Stuart Baker says it is partial to orange groves. It feeds on nectar from the orange flowers and also on any tiny insects it finds there, it also feeds on the Loranthus berries and disseminates the seeds. When flying from tree to tree it utters a constant *chip chip chip*.

It breeds principally during May and June but nests may be found earlier and later. The nest is like that of the Scarlet-backed Flower-pecker and the eggs, 2 or 3 in number, are glossless white. They measure about 0.64 to 0.43 inches.

FAMILY PITTIDAE.

299. The Blue-naped Pitta.

Pitta nipalensis (Hodgson).

Fauna B. I. 2nd. Ed. No. 1317.

Description.— Length 10 inches. *Male*: Forehead, anterior part of crown, sides of head and lower plumage, rufous-fulvous, posterior crown, nape and hind-neck, blue, a concealed black patch on each side of the neck, upper plumage greenish-brown. Some birds have a beautiful fulvous-pink wash on the throat and neck.

Female: Differs in having the blue of the hind-neck replaced by green and the crown all rufous-fulvous.

Bill horny, with gape purple, iris brown, with edges of eyelids flesh-colour, legs fleshy pink.

Distribution and habits.— O'Donel, at first, thought it was resident, but later considered it only a winter visitor. It is found in any type of jungle, forest, scrub or bamboo. Those I have seen were, usually, scratching about on jungle paths in the early morning or evening, in search of insects and worms. According to Stuart Baker, lizards and young field-mice are also eaten. Its usual method of progression is, the same author writes "by immense bounds, several feet long, repeated with extraordinary speed. It can fly quite well but only for a short distance. Its note is a magnificent double whistle".

300. The Indian Pitta.

Pitta brachyura (Linnæus).

Fauna B. I. 2nd. Ed. No. 1323.

Description.— Length 7 inches. Sexes alike. Top of head fulvous-brown, with a broad black band down its centre, a narrow white eyebrow, extending to the nape, upper plumage bluish-green, above the tail, patch near shoulder of the wing, glistering pale blue, tail black, tipped with dull blue, a broad black band from in-front of and behind, the eye, forming a collar on the hind-neck, wings black with a conspicuous white patch on the flight feathers, wing-coverts green, except the glistering pale blue ones,—chin and throat white, nest of lower plumage fulvous with a scarlet crimson patch on the abdomen and below the tail.

Bill black, iris dark brown, legs pale pinkish fleshy.

Distribution and habits.— I have never come across this bird in the district and it must be very rare. O'Donel obtained one at Beech, one of the divisions of the Hasimara Tea Estate, in May and sent it to the Bombay Natural History Museum. This Pitta likes deciduous forest, scrub jungle and bamboos and is essentially, like all Pittas a ground bird, seldom taking to flight but roosting on trees. According to Whistler, "It has a sweet call *wheet pe-u* or *pea-to yew*, a loud clear far reaching note which is uttered again and again". It is insectivorous, feeding chiefly on beetles and ants. It nests both on the ground and in trees.

301. The Green-breasted Pitta.

Pitta sordida cucullata (Hartland).

Fauna B. I. 2nd. Ed. No. 1325.

Description.— Length 7 inches. Sexes alike. Forehead to nape, chestnut brown, upper plumage dark grass-green, above the tail, and shoulder of wing, glistening turquoise-blue, tail black, tipped with dull blue, sides of the head, chin, throat and a collar round the neck, black, wings and lower plumage, light green, the latter washed with blue, centre of upper abdomen with a large black spot, centre of lower abdomen, vent and below the tail, scarlet-crimson. Bill black, iris hazed or coffee brown and legs fleshy pink.

Distribution and habits.— O'Donel considered it common in the hills. It is found in the foothills, and well into the plains as I have a specimen from the Moraghat forest. It frequents evergreen forest, scrub jungle and bamboos and has the same habits as the other Pittas. It is shy bird and oftener heard than seen. It may be resident. It breeds from April to July. The nest is a large structure, oval in shape and composed of bamboo-leaves, grass, leaves, roots and twigs, the entrance is in one side. It is placed on the ground in thick cover such as in a bamboo clump, heavy forest or scrub jungle. The eggs number 4 to 5 and are glossy white in colour, speckled and spotted with purple black or deep maroon with grey and lilac underlying markings. They measure about 1.07 to .84 inches.

FAMILY EURYLAIMIDÆ.

302. The Nepal Collared, or Hodgsons' Broadbill.

Serilophus rubropygius (Hodgson).

Fauna B. I. 2nd. Ed. No. 1334. Plate.

Description.— Length 7 inches. *Male* : Upper plumage dark ashy grey, a broad black eyebrow to the nape, rump, above the tail and innermost wing feathers, chestnut, outer



The Nepal Collared or Hodgson's Broadbill
(*Serilophus rubropygius* (Hodgs.)
This is a hen, the cock has no collar.
♀ Nat. Size.

webs of flight, feathers blue at base, the inner sides with corresponding white spots, rest of wing black, tipped with white and chestnut, tail black, broadly tipped with white on the three outer pairs of feathers, lower plumage ashy grey, thighs black.

Female : Differs in having a demi-collar of white tipped feathers on each side of the neck. Bill light blue, base of mandibles orange yellow, iris hazed to deep crimson, speckled with gold, skin round the eye dark yellow, legs yellowish green.

The Broadbills are easily recognized by their flat broad bills. The tail in this species is rounded.

Distribution and habits.— This small Broadbill is found scattered along the foothills, extending further into the plains during the winter. I secured specimens at Rajabhatkhawa and Gorumara, from December to the end of February. It is a bird of various types of forest, evergreen, mixed either dense or thin, scrub, bamboo jungle or woodland near cultivation. I have seen them in pairs and small parties moving about freely amongst the trees and undergrowth during the early morning and evening, at other times of the day they are rather lethargic. This Broadbill feeds on insects but Hume found the stomach of one "crammed with beautiful little land sheels". Its note is a musical whistle, it also utters a low *chir-r-r* both when resting and flying. It is little bird and allows of a very close approach.

It possibly, breeds in the foothills and adjacent plains during May and June. I found a nest in Cachar which was suspended from the end of sapling near a forest stream only some 4 feet from the level of the water. The nest is pear-shaped and composed of dry bamboo leaves, grass and fibrous material with a tail of rubbish hanging below it. It is lined with green leaves. The eggs number 4 to 5 and are of two types : in one they are pure white and in the other warm pink, spotted and speckled with purplish black. They measure about 0.95 to 0.66 inches.

303. The Indian Long-tailed Broadbill.

Psarisomus dalhousiæ dalhousiæ (Jameson).

Fauna B. I. 2nd. Ed. No. 1335 Plate.

Description.— Length 11 inches of which 5 are the tail. Sexes alike. A narrow line on forehead in front of and behind the eye, yellowish green, a bright blue patch on the crown and an elongate, bright yellow spot behind the eye, suffused with bright blue or green, rest of crown, nape and sides of head, black, chin, throat and collar below the black, bright yellow, the collar broken at the nape, with a small patch of bright blue, upper plumage bright deep green, tail feathers bright deep blue, black below, wings black, the flight feathers of the closed wing bright blue at the base and green towards the tip, lower plumage emerald-green, usually washed with sky-blue.

Bill apple green but sometimes, brownish yellow with dark blue base and pale blue tip on upper mandible, the lower one with a orange patch on each side, tipped with light blue, iris red brown or brown, legs dull light green, dull orange behind. In this Broadbill the tail is long and greatly graduated.

Distribution and habits.— This gaudy coloured Broadbill is common in the hills and penetrates well into the plains during the winter, at any rate up to about the end of March. I have seen it at Gorumara and secured many specimens in the Moraghat forest. It frequents heavy forest, bamboos and scrub jungle interspersed with trees, and is seen in pairs or parties, sometimes numbering as many as twenty individuals. It is especially active in the mornings and evenings, but rather lethargic during the day, exploring the branches and bark of trees in its search of insects and grubs. Some of the former are captured in a very parrot-like manner while uttering its plaintive whistling note which sounds like *pee pee pee pee*. It has a chining note and also several harsh tin-kettly notes when annoyed or disturbed, according to Stuart Baker. It is a tame, confiding bird and has even been known to enter a bungalow. In Burma, Wickham records a case of their utter fearlessness. They suddenly appeared in numbers round the courts, and uttering their whistling call, entered rooms, almost interfering



PSARISOMUS DALHOUSIAE (Jameson)

The long-tailed Broadbill.

$\frac{1}{2}$ Nat. Size

with the ends of justice. It flies well and can thread its way through thick forest quite rapidly and after a short flight settles on a branch with its head tucked in. Besides feeding on insects it also eats small tree frogs. Stuart Baker shot one which had eaten a couple of these.

PLANTS ADVERSELY AFFECTING THE QUALITY AND QUANTITY OF MILK AND MILK PRODUCTS

By

S. L. NAYAR.

CENTRAL DRUG RESEARCH INSTITUTE, LUCKNOW.

The subject of plants affecting the quality and quantity of milk supply by domestic animals, occupies a prominent place in the economy of nation. A number of plants, if eaten by livestock, are known to improve the yield or quality of milk produced by them. The cotton-seeds (*Gossypium* sp.) and the mustard-seed cake (*Brassica* sp.) are well-known examples, and are commonly fed to cattle in India. There is a plentiful supply of aromatic fodder at high altitudes in the Himalayas and Trans-Himalayan regions in summer season, and the yaks in consequence of eating this herbage yield milk with a fragrant odour which is much appreciated by the local people. Cows partaking of a sufficient quantity of violets or 'banafsha' (*Viola* sp.) are believed in India to yield milk which has beneficial qualities imparted by the flowers, which have medicinal properties. Many plants, on the other hand, adversely affect milk or milk secretion in animals eating them and very often the real cause of unusual tastes or odours in the milk is some common wild plant, when the blame for this is laid upon the udder. Some plants give the milk a characteristic taint or odour such as garlics (*Allium* sp.), and others alter its colour; some decrease the total secretion and others lessen the fat content; a few alter the colour and character of butter made

from the milk or the butter may become disagreeable in taste or odour on account of the peculiar flavour imparted to it. All purgatives of the anthracene group, such as senna (*Cassia* sp.), podophyllum (*Podophyllum* sp.), rhubarb (*Rheum* sp.), and cascara (*Rhamnus* sp.), are excreted in milk and are liable to give rise to purgation when such milk is consumed.

Cases of animals eating injurious wild plants are of frequent occurrence in all parts of the world, and they are common in India also. This is due to the fact that injurious plants usually grow among forage plants and so are easily available to grazing animals. In many parts of India good and palatable forage is often not easily available and injurious plants may be ingested when animals are grazing on pastures or on ranges where forage is limited. Under conditions of scarcity of forage animals are forced to eat harmful plants which would be left untouched in times of plenty. Whenever the number of animals grazed into a unit area is in excess of the palatable forage required to satisfy their appetites, the incidence of eating injurious plants increases. Sometimes noxious and harmful plants are harvested with the hay and these become mixed up with it. They may also be included among the forage that is collected, often indiscriminately, and brought in by ignorant people who often have no knowledge of these plants. A biological fact of considerable importance is that animals do not instinctively select injurious and harmful plants as forage, though in some cases the animals do acquire a depraved appetite for harmful plants especially when the fodder supply is scarce.

Our knowledge of Indian plants capable of adversely affecting the quality and quantity of milk and milk products is meagre. However, the undermentioned plants occurring in India, which the author has got together in this work as a result of a general survey of this group, are sufficient to show that research could profitably be taken up in this direction, the importance of which from an economic point of view cannot be overrated. The botanical and English names of these plants, their distribution in India, their important chemical constituents so far as these are known, and the changes they are stated to produce in milk and milk products are considered below :

Name of plant	Distribution	Constituents	Change in milk	Change in butter
1	2	3	4	5
<p>1. Achillea millefolium Linn. English—Yarrow</p>	<p>A small to medium size perennial herb met with in many parts of the western Himalayas from Kumaon to Kashmir at altitudes of 3,500-12,000 ft., especially near about Simla.</p>	<p>The plant contains a volatile oil, tannin, achillein, achilleic acid and a bitter principle ivain(1). The flowers contain essential oil and azulene(2). Older work has indicated the presence of a cyanogenic glycoside 'achillein' and HCN(3).</p>	<p>Characteristic bitter taste and strong odour.</p>	<p>Bitter taste and strong odour.</p>
<p>2. Alliaria officinalis Andrzej English—Hedge Mustard</p>	<p>A biennial herb found in the western Himalayas from Kashmir to Kumaon at altitudes of 6,000-10,000 ft.</p>	<p>The root yields a volatile oil very similar to that of mustard (1).</p>	<p>Undesirable flavour.</p>	<p>Undesirable flavour.</p>
<p>3. Allium sp. English—Garlic and Onions</p>	<p>Foetid scapigerous bulbous herbs commonly cultivated; some of the species occur wild.</p>	<p>The bulbs yield 0.06-0.1 per cent of an essential oil with a disagreeable pungent odour contain-</p>	<p>Strong 'oniony' flavour and smell.</p>	<p>'Oniony' flavour.</p>

1	2	3	4	5
<p>4. Aloe sp. English—Aloe</p>	<p>Perennial dwarf fleshy-leaved plants, planted and naturalized in various parts of India.</p>	<p>ing allylpropyl disulphide, diallyl disulphur containing compounds (4, 1). Also contains alicin (5) and allisatin I and allisatin II(6).</p>	<p>Bitter taste.</p>	
<p>5. Anemone sp. English—Wood Anemone</p>	<p>Perennial herbs found in the temperate and alpine Himalayas from Kashmir to Sikkim at altitudes of 7,000-15,000 ft.</p>	<p>Chief constituent aloin which is a mixture of glycosides. Resin and some water soluble substances. The odour is due to traces of an essential oil (7).</p>	<p>Yields a volatile oil from which can be separated the acrid substance anemonin (1).</p>	<p>Objectionable flavour.</p>

1	2	3	4	5
<p>6. Anthemis cotula Linn. English—Stinking Camomile</p>	<p>An acrid foetid-smelling annual, found in Baluchistan, and probably in Sind and its surrounding areas.</p>	<p>The fresh plant yields 0.01 per cent of an essential oil (8, 9).</p>	<p>Lessened secretion and disagreeable taste and flavour.</p>	
<p>7. Artemisia absinthium Linn. English—Worm-wood</p>	<p>A very aromatic and bitter perennial herbaceous plant met with in Kashmir at altitudes of 5,000-7,000 ft.</p>	<p>Volatile oil (3), a bitter glucoside absinthin (10), and a bitter substance anabsinthin (3).</p>	<p>Disagreeable flavour.</p>	<p>Disagreeable flavour.</p>
<p>8. Brassica sp. English—Turnips</p>	<p>Herbs with underground soft-fleshed tuber cultivated throughout India.</p>	<p>Fixed oil 25-37 per cent, the glucoside sinigrin or sinalbin, and an enzyme myrosin (11).</p>	<p>Turnip taint.</p>	<p>Strong turnip taint.</p>
<p>9. Cassia angustifolia Vahl English—Senna</p>	<p>A small shrub extensively cultivated in South India in Tinnevely, Madura and Trichinopoly districts and in Mysore.</p>	<p>The plant contains flavanol and anthraquinone groups of compounds. The flavanol portion consists of isorhamnetin and kaempferol and the anthraquinone portion contains most-</p>	<p>Bitter milk having purgative effect.</p>	

5

4

3

2

1

ly rhein along with small quantities of emodin (12). The glycosides sennoside A and sennoside B have been isolated (13).

10. *Caltha palustris*
Linn.
English—Marsh
Marigold

A robust aquatic perennial herb, commonly met with in the marshes of the temperate western Himalayas from Kashmir to Nepal at altitudes of 7,500-10,000 ft.

Undesirable flavour; falling off in the yield of milk.

The roots contain helleborin and veratrin (14, 15). Alkaloid jervine (16).

11. *Cichorium intybus*
Linn.
English—Chicory

An erect perennial herb found wild in Punjab and Hyderabad Deccan. It is also cultivated in the Bombay State.

Bitter milk and disagreeable odour.

Disagreeable odour.

The plant contains a bitter principle which is probably a glycoside of fructose and pyrocatechuic acid. The presence of stearin, mannite, tartaric acid, betaine and choline also reported (15).

12. *Cicuta virosa* Linn.
English—Cowbane
- The roots contain the bitter principle cicutoxin (17). The seeds yield about 1.2 per cent of an essential oil (18).
- Lessened secretion and acridness.
13. *Colchicum luteum* Baker
- A small corm bearing herb, found in the western temperate Himalayas at altitudes of 3,000-8,000 ft.
- Corms contain 0.21-0.25 per cent and seeds 0.41-0.043 per cent of the alkaloid colchicine which has a very bitter taste (19).
- Suppression of milk or a bluish colouration; poisonous to calves and infants.
14. *Daphne* sp.
English—Spurges
- Erect shrubs found in the temperate Himalayas at altitudes of 3,000-9,000 ft.
- Diminution in secretion.
15. *Equisetum* sp.
English—Horsetails
- Herbs with creeping perennial rootstock found along shady streams in India.
- Thin watery milk poor in fat content; reduction of entire cessation of secretion; unpleasant flavour.
- Greasiness and unappetising odour.

1 _____ 2 _____ 3 _____ 4 _____ 5

ninlike substances
(20).

Bitter taste.

Nearly all parts of the plant contain the glucosides α -hederin and probably other glucosides (21, 22, 23). Leaves also contain a saponin which is closely related to α -hederin (24).

Unpleasant taste and greatly lessened secretion.

Principal alkaloids in various parts of the plant are hyoscyamine and hyoscyne or scopalamine; traces of atropine and scopoline. Besides it contains volatile bases, a bitter glycoside hyoscyprin, choline, mucilage and albumin and is rich in potassium salts (25, 26, 27, 28).

A climbing shrub found throughout the Himalayas at altitudes of 6,000-10,000 ft. and Khasia Hills at 4,000-6,000 ft.

An erect foetid annual or biennial herb met with in the western Himalayas from Kashmir to Kumaon at altitudes of 5,000-12,000 ft.

16. **Hedera helix** Linn.
English—Common Ivy

17. **Hyoscyamus niger** Linn.
English—Henbane

<p>18. Hypericum perforatum Linn. English—St. John's Wort</p>	<p>A perennial herb met with in the temperate western Himalayas, at altitudes of 6,000-9,000 ft. in Kashmir and Simla, apparently not in Kumaon.</p>	<p>The herb contains an essential oil (0.065 per cent), a resinous substance, tannin and colouring matter known as hypericin red (1, 29).</p>	<p>Diminution in secretion and disagreeable flavour.</p>
<p>19. Matricaria chamomilla Linn. English—Wild Camomile</p>	<p>An annual herb found wild in Punjab and Upper Gangetic plain.</p>	<p>The plant contains a volatile oil of blue colour due to azulene and containing isobutyl and other alcohols combined as esters with angelic and tiglic acids; enanthemic acid (a bitter principle), tannin, malic acid etc. (30) and up to 3 per cent of a glycoside (31).</p>	<p>Disagreeable flavour some-times.</p>
<p>20. Mentha sp. English—Mints</p>	<p>Strong-scented perennial herbs found in the western Himalayas at</p>	<p>Essential oil (32).</p>	<p>Minty odour and taste; rennet action prevented.</p>

altitudes of 4,000-12,000 ft. Some species are cultivated in the plains.

21. **Oxalis acetosella**
Linn.
English—Wood
Sorrel

A small delicate perennial herb met with in the temperate Himalayas from Kashmir to Sikkim at altitudes of 8,000-12,000 ft.

Potassium binoxalate (1).

Difficulty in churning the milk and converting it into butter.

22. **Podophyllum hexandrum** Royle

An erect herb found in the interior ranges of the Himalays at 9,000-14,000 ft. from Sikkim to Hazara, descending to 6,000 ft. in Kashmir.

Chief constituent is podophylotoxin. Also contains an uncrystallizable resin, podophylloresin and quercitrin (1, 33).

Causes purgation.

23. **Polygonum aviculare**
Linn.
English—Hogweed

A variable herb found in the western Himalayas from Kashmir to Kumaon at altitudes of 6,000-12,000 ft.

Glycosides quercetrin 3-arabinoside and avicularin (31, 1).

Bitter taste.

24. **Quercus** sp.
English—Oaks

Deciduous or evergreen trees found in the temperate and subtropical Himalayas.

Contain considerable tannin (1).

Accris

Changes in milk. Cheese develops a sharp acid flavour in about one month after making.

Leaves

Reduction or entire cessation of secretion. Bad flavour.

25. **Ranunculus sceleratus** Linn.
English—Celery-leaved Butter-cup

An erect annual herb met with on river banks in Bengal and Northern India and in the warm valleys of the Himalayas.

The plant contains anemonin, anemon acid and an essential oil (3) and 2.5 per cent proto-anemonin just after flowering (35).

Bitter taste and unpleasant flavour; reduction in secretion; develops a smoky-red colouration.

26. **Rhamnus** sp.
English—Cascara

Shrubs or trees met with in the western Himalayas between 2,500-10,000 ft., central and

Gives rise to purgation; arrests lactation; undesirable flavour.

1	2	3	4	5
27. Rheum sp. English—Rhubarb	eastern Himalayas, Khasia Hills, Assam ; Western Ghats in the Nilgiris and Punjab Hills up to 7,000 ft.	Perennial stout herbs found in the subalpine and alpine Himalayas at altitudes of 10,000- 14,000 ft.	Most important consti- tuents are certain derivatives of methyl- anthraquinone. Besides a small amount of volatile oil, gallic acid and small quantities of tannic acid are present (1, 36).	Cause purgation.
28. Rhododendron sp. English—Rhodo- dendron	Trees or erect shrubs found in the temperate and alpine Himalayas from Kashmir to Bhutan at altitudes of 5,000-16,000 ft. ; Khasia Hills at 4,000- 6,000 ft. ; Nilgiris, Pulney and Travancore above 5,000 ft.	Toxic substance andro- medotoxin (37) and glucoside eriocolin (3).	Bitterness, reduced secretion, reddish colour.	

Undesirable flavour and diminution in milk supply when eaten in large enough amounts.

The plant contains oxalates as well as free oxalic acid; acid potassium oxalate and some tartaric acid, potassium binoxalates (38, 39, 40).

Annual or perennial herbs found in the western and eastern temperate Himalayas, Western Ghats, Khandesh, South Maharashtra, Nilgiris, Pulney Hills, West Punjab, marshes of Assam, Sylhet, Cachar and Bengal.

29. **Rumex** sp.
English—Docks,
Sorrels

Unusual taste.

.....

An annual prostrate weed of cultivation found in Bengal and Punjab.

30. **Senebiera didyma**
Pers.
Lesser Wartcress

Reduction in milk supply during convalescence when plant has not caused death.

Leaves, shoots and seeds contain the alkaloid taxine (41). Twigs also contain glycoside taxicatin (42). Ephedrine also present (43).

A tree met with in the temperate Himalayas at altitudes of 6,000-11,000 ft., and Khasia Hills at 5,000 ft.

31. **Taxus baccata** Linn.
English—Yew

1	2	3	4	5
32. <i>Thlaspi arvense</i> Linn. English—Pennycress	A weed of cultivation throughout the temper- ate and subalpine Himalayas ascend- ing to 14,000 ft.	Plant and seeds contain the glycoside sinigrin. Seeds give up to 34 per cent fatty oil, 0.836 per cent essential oil, 1.84 per cent saccharose and 1.6 per cent leci- thin (3).	Disagreeable flavour.	

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HABENARIA SUSANNAE R. BROWN.

BY

B. N. GHOSE

It is a very handsome terrestrial plant, which was first described by Dr. Robert Brown of Britain. The name *Habenaria* is derived from the Greek word *Habena*, meaning strap, referring to the parts of the flower. It is a terrestrial leafy orchid sometimes grown in bog or moist places in gardens. Its tubers are usually undivided. It dies down in winter and does not come up until the advent of the rains in summer or late spring. The stem of this plant is stout with many sheaths on its lower part, while the leaves generally appear from the middle portion of the stem and some 3 to 5 flowers are borne at the apex. Individual flowers are 4 inches across. The petals are linear but thick, the lip is as long as the sepal, the side lobes are very broad, deeply cut into notches. The spur is very long, more than twice the length of the ovary.

Its native country is the Himalayas from Simla east-ward to Khasia and Naga Hills, Manipur and Lushai Ranges. It also occurs in the hilly districts of Bombay and South India. It is likewise found in Burma, China, Thailand, Java and the adjoining islands of the Malaya Archipelago.

This plant has not been recorded to occur in Sikkim for Hooker, Clarke and other botanists who made extensive collections in this region failed to come across this plant. King and Pantling when preparing their monumental book on "Orchids of Sikkim Himalaya" employed a party of trained Lepcha collectors for several successive seasons but never came across this plant. The credit of discovering this in Darjeeling District rather than Sikkim Himalaya goes to Mr. Gordon Temple, a very keen orchid collector. He got it in a semi-tropical region in the Little Rangeet Valley, growing amongst grass where it is not discernible when it is not in flower. A glance at the

illustration accompanying this article will give you a rough idea of the beauty and shape of the flowers, that are produced in July and August. Few amateurs will deny that *Habenaria susannæ* is one of the finest representative of the genus. It indeed lacks the brilliant colours of other orchid species but it makes up for the deficiency by its stately stature and large pure white, brilliant and attractive waxy flowers.

This plant can be easily grown in compost of good loam with additions of fern fibre and lumps of brickbats to maintain the Porosity of the soil. It requires plenty of moisture during the growing season but care should be taken that no moisture remains in the centre of the new growth when it appears in late spring.

This plant was long known as *Plantenthera susannæ* but it has now been placed under *Habenaria* by modern botanists.

Townend,
Darjeeling

A MAP OF THE PACIFIC OCEAN BED

By

GLEB UDINTSEV.

A new map of the Pacific bottom configuration has been prepared and sent to the press by the Institute of Oceanology of the U.S.S.R. Academy of Sciences.

This map is a result of many years of exploration work carried out by Soviet scientists in the Pacific, including the work of *Vityaz* expeditions.

The compilers of the map—staff of the Institute's marine geology laboratory—more than once participated in long voyages.

An APN correspondent asked Gleb Udintsev, M. Sc. (Geography), leader of the team of scientists who compiled the map, to describe the new map and its contents.

"The all-round exploration of the Pacific Ocean covering, as you know, more than one-third of our planet is one of the major scientific tasks," said Gleb Udintsev. Despite the very old age of the Ocean which has been in existence for millions of years, many problems—depths, the tectonic structure of the bottom, animal life, underwater streams, etc.—have been very inadequately investigated. The investigations of recent years and, in particular, the work by Soviet oceanologists aboard the *Vityaz*, have considerably enlarged our knowledge of the Pacific.

They have compiled a map of the Pacific bottom configuration. According to the scope of data used, their scientific novelty and reliability, this is one of the best maps in the world. The new map is a result of many years of work by Soviet scientists as well as scientists of the whole world.

"In preparing the map, we made wide use of materials of oceanographic explorations sent to us in exchange during the International Geophysical Year," said Gleb Udintsev. Materials obtained by Soviet oceanologists—members of thirty expeditions aboard the *Vityaz* and other ships—formed the basis of the new map. Investigations had covered almost the entire expanse of the Pacific (with the exception of its eastern equatorial section). "The application of advanced and accurate instruments—ultrasonic echo sounders, underwater photographic still cameras and, mainly, a specially evolved procedure of exploration—have enabled us to collect new data and show in map form the bottom configuration of the World's vastest basin." The map

is extremely detailed for the western and northern parts of the ocean where the largest number of echo plottings were done and where depth soundings were made with an accuracy of one metre. The shape of the sea bed is represented by means of isobaths plotted with a 500 metre interval.

"We have already fallen out of the habit of waiting for big geographical discoveries. The Earth has been sufficiently well explored and measured. Tiny islands, capes, peaks have been mapped with minutest accuracy.

Submarine Mountains

"The ocean bed is a different matter. Deep under the waves lapping over the expanses of the Pacific we discovered a multitude of hitherto unknown mountains rising to a height of more than five kilometres, deep troughs, gorges, valleys.

"For instance, in the area of the Kuril Islands alone, something like 80 new submarine mountains were discovered and mapped. A still greater number of them were found in the open parts of the ocean. Many of them have been given Russian names—Lomonosov, Admiral Makarov, Miklukha-Maklai, Vityaz, etc. The majority of the under water mountains are of volcanic origin. Others are assumed to be islands that got sunk into the ocean at some time in the past.

"The data of expeditionary observations have made it possible to correct mistakes of many old maps. It was believed until now that the Pacific, like the Atlantic Ocean, is bisected in the middle by a mountainous ridge. As it has turned out, it was not a high ridge but a line of separate volcanic mountains. Plotted on the map are deep-water troughs of the Pacific, both newly discovered and already known, whose depth and shape have been defined more exactly by Soviet oceanologists.

"The map shows the maximum depths of the Pacific Ocean—11,034 metres in the southern tip of the Marianas Trench, 10,542 metres in the Kuril-Kamchatka trough. They are also

maximum depths of the world ocean and have been accepted in science as 'Vityaz depths.'

"However," said Gleb Udintsev in conclusion, "the new map of the Pacific bottom shape has been compiled not only on the basis of present-day explorations. In our work we familiarised ourselves with the results of cartographic investigations of the Pacific over the past hundred years. We have examined 770 old maps and 300,000 sounding marks, most of which were performed in a primitive way by means of cable. Contacts with foreign colleagues proved to be very fruitful, too. Scientists of America, Japan, Britain, New Zealand and other countries shared with us the materials of depth measuring in the Pacific. In return they received the data gathered by Soviet expeditions."

(Novosti Press Agency)

THE MYSTERY OF LAKE BAIKAL

The World's Biggest and Deepest

BY

A. BELYAKOV

Lake Baikal is the largest fresh-water lake in Asia and Europe and, at 1,741 metres, is the deepest in the world. In volume of water it is second only to the Caspian Sea, in fact local inhabitants call it a sea. A most picturesque part of the Soviet Union, visitors are always impressed by the sombre-

looking tree-covered hills steeply descending to the silver shining surface. The Baikal's inimitable beauty has inspired many an artist and poet. Important events in Siberia's history are linked with Lake Baikal.

The study of Lake Baikal from a scientific aspect began in the early 18th century. For more than two centuries scientists have been attracted by the unusual features and the mystery of the formation of this unique body of water. But regular comprehensive research began only after the October Revolution in 1917.

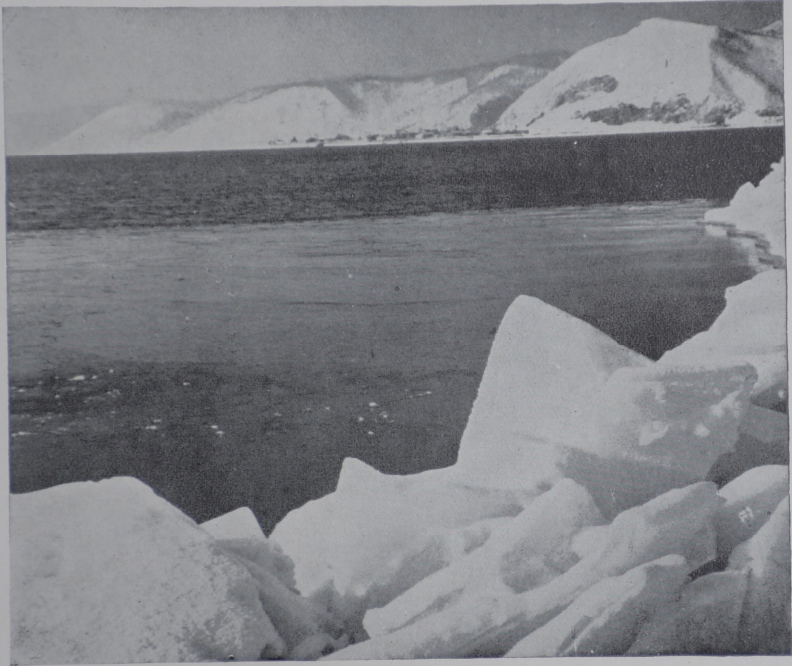
Today several research institutes are working there, the leading one being Baikal Limnological station of the USSR Academy of Sciences. Set up in 1928 in Listvennichny settlement, at the very source of the Angara River, which flows out of Lake Baikal, the station conducts many-sided research, from historical geological surveying to botanical studies of the lake's shores.

An earlier research establishment, organised not far from Listvennichny in 1919, is Irkutsk University's Biological Station which carries out biological and chemical research. It also serves as a place for practical work for the University students in Summer.

The Baikal Depression

The collective effort of Soviet scientists has led to the solution of several cardinal problems of the mystery of Lake Baikal.

It has been proved that the Baikal depression and the lake itself was formed in the middle of the Tertiary Period, that is, some 25 or 30 million years ago. It was formed by the gradual lowering of a long, narrow strip of the earth's crust. A number of theories have been advanced concerning the origin of the fauna of Lake Baikal. It has been established that the formation of the lake has not ended yet and that shifts in the earth's crust in the area are continuing this day. The first signal was an earthquake in 1861, as a result of which



Lake Baikal by the source of Angara, the spot where it never freezes up.

the Proval Bay appeared practically overnight to the north of the Selenga River's mouth.

Vertical shifts of water-level marks, the rising or flooding of coastal wave-washed caves and other phenomena recorded in later years reveal that the Baikal depression is continuing to develop.

The scientists, however, have still a great deal to learn about the lake. Continued research reveals more and more interesting phenomena.

Lake Baikal is a major fish producing centre of Eastern Siberia. Every year it yields as much as 100,000 metric centners of salmon, grayling and whitefish. A promising prospect is the extensive use of Baikal hydropower reserves. A system of electric stations on the Angara River will produce an aggregate 70,000 million kwh of power a year. Approximately one half of the water to generate this electricity will come from the lake.

Another fact of interest is that two-thirds of the 1,500 plant and animal species inhabiting Lake Baikal are found nowhere else.

Among the purely Baikal species are the golomyanke (*Comephorus baicalensis*), a viviparous fish, Baikal bullheads and whitefish, and the Baikal seal, the only mammal inhabiting the lake.

Nature's Miracle

The question of the origin of Lake Baikal's flora and fauna is a complex one. Still much remains in the dark. What is doubtless is that the geologically ancient lake provided specific conditions for an isolated evolution process which led to the emergence of purely Baikal forms of vegetable and animal growth. The scientific importance of Lake Baikal lies in the fact that its study gives an insight into a number of problems of natural science. All theoretical questions connected with living, physical and chemical processes in water can be studied in natural conditions only in Lake Baikal. This,

incidentally, was why Academician L. Berg called Lake Baikal "a miracle of nature."

Measures are being taken to conserve and utilize the natural resources of the Baikal basin. The Barguzin Refuge will be expanded. Littoral forests necessary for water and soil protection are being preserved. Ten-kilometre green zones have been set around all Baikal resorts.

Of special scientific interest are 13 markings of the water level made by the Polish scientist Czersky on coastal cliffs in 1877-1880 to study the variations in the lake's level and the tectonic movement of its banks.

The Siberian Branch of the USSR Academy of Sciences will participate in elaborating the scientific basis of nature conservation in the Baikal basin.

Implementation of these measures will make possible the most efficient use of natural reserves and will enable us to preserve this "miracle of nature" for future generations.

BATUMI BOTANICAL GARDENS

By

Y. S. MOROZOV

DEPUTY HEAD OF THE INFORMATION DEPARTMENT OF THE
USSR EMBASSY IN INDIA.

Half a century ago the Russian botanist and geographer, Andrei Krasnov, planted a small botanical garden on hill slopes on the Black sea coast, nine kilometres from Batumi.

His idea was that the garden would not only contain a good collection of plants, interesting to scientists, but would also serve as a place where the plants could be tested and, if found useful, could be spread throughout the country.

As time went on the Batumi botanical gardens expanded and its collection of plants increased. At present some 60,000 trees of different species and forms grow on a territory of 108 hectares.

The gardens are the largest experimental station, where the Botanical Institute of the Georgian Academy of Sciences conducts research and selection work.

The staff of scientific workers here have acclimatised volatile oil geranium, tanning acacia, australian eucalyptus, the camphor tree, citronella grass, the annual cinchona, feihua and the tung-oil-tree. All these plants have become well acclimatised on the Black sea coast.

The variety of orange called "Washington Navel," whose fruit is considered to be the best in the world, has taken firm root in Ajaria. Bananas and pineapples ripen in the conservatories of the botanical gardens.

The local wild flora is also carefully studied, and citrus plants and other cultures selected, with the object of developing varieties with a good yield and resistance to cold.

On leaving the railway station "Botanical Gardens," the tourist immediately finds himself on the "American boulevard," where the whole vegetable world of the subtropics is represented. Here he can see the flaming foliage of the American maple, tall tulip trees, magnolias, catalpas with their heart-shaped leaves, and further on bald cypresses, called "waterfall trees" for the strange structure of their branches. It is like taking a journey from one country to another. Shady oak groves alternate with thickets of tropical plants, dwarf trees from Japan and China neighbour with great Himalayan pines. An avenue of grey-green eucalyptus trees 100 metres high leads to a beech grove.

A PARTIAL ALBINO HOOPOE (*Upupa epops*)

(Coraciiformes : Upupidæ) FROM DELHI.

BY

JULIAN P. DONAHUE.

The hoopoe (*Upupa epops* Linnæus) occurs in the Indian Region throughout India, both Pakistans, Burma, and Ceylon (Ali, 1961). This species is also widely distributed in Europe, Africa, and other parts of Asia (Ripley, 1961).

While strolling through a plant nursery in New Delhi on 23 July 1961 I was startled by a strangely-coloured hoopoe that flew up in front of me. I had seen many normally-coloured hoopoes in this area before, but this bird was obviously different.

At first glance the bird appeared to be black and white, a noticeable departure from the normal fawn-and-black birds. A closer look showed a few traces of the normal fawn colour were present in the plumage.

An attempt to collect the bird that day failed, but it was collected in the same locality three days later. The habits of the bird (a male, testes not enlarged) appeared normal as compared to other hoopoes present in the same area—behaviour such as walking, feeding, flying, and occasional fanning of the crest was similar to that of normal birds.

Although white is the normal colour for many birds (swans, gulls, terns, etc.), a white specimen of a normally non-white species sometimes occurs—an albino. Albinism results from the absence of pigment-producing cells. The melanophores, responsible for the production of browns and blacks (or *melanins*) are the cells most commonly affected (Wallace, 1955).

Albinism may be total—complete with pink eyes, and pink soft parts—or partial, with only a few feathers (or even a single feather) showing abnormal whiteness. Temporary

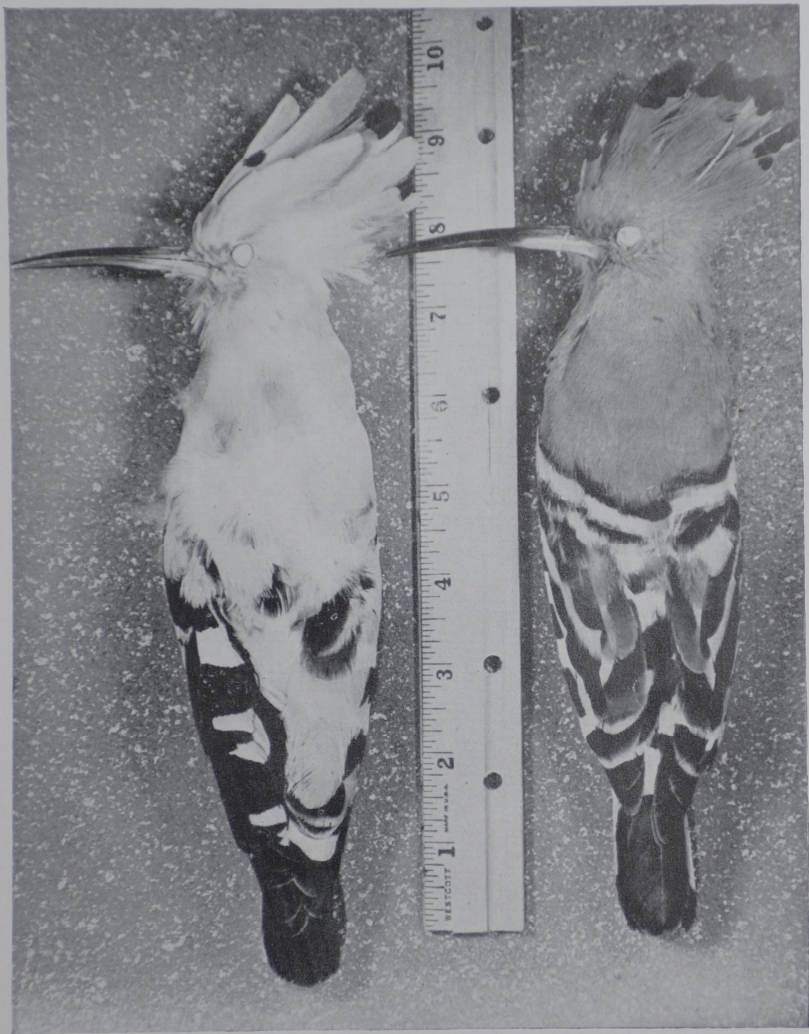
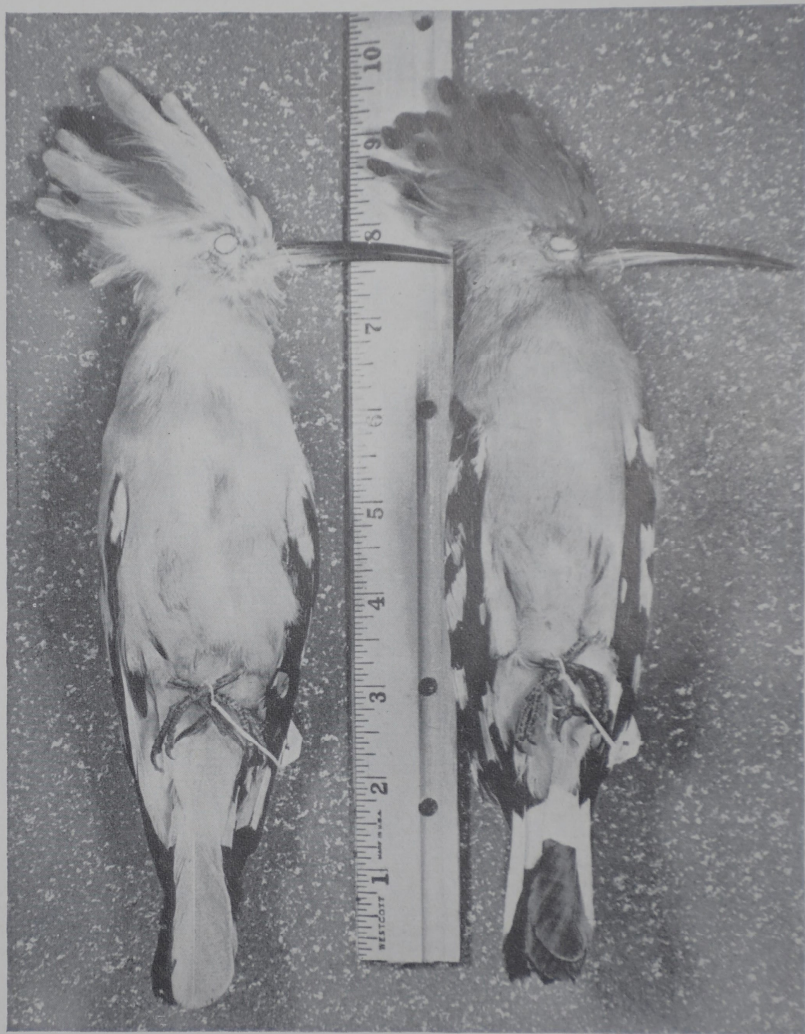


Figure 1. Left: the partial albino hoopoe
Right: a normal hoopoe for comparison.
Dorsal (upper) side. Both are males.
Scale in inches.
Photos by the author.



Figures 2 Left : partial albino hoopoe.
Right : a normal hoopoe for comparison. Ventral.
Scale in inches.

albinism can result from a deficiency in the diet or circulation at the time of feather formation (Wing, 1956).

Van Tyne and Berger (1959) term partial albinism as schizochromism, and state that birds in this condition have the normal plumage patterns but are characterized by an abnormally pale, washed-out appearance, which is the case with the specimen under consideration.

On 23 September 1961 a normal male (testes enlarged) *hoopoe* was collected from the same locality, for comparison (see plates 1 and 2).

The wing feathers of the two birds are similar, except that the partial albino has two pure-white primaries and a white secondary on the right wing. The left wing feathers are the normal black and white colour.

The crest of the partial albino is pure white, except for the presence of six normal black-tipped fawn-coloured feathers.

The tail of the partial albino is normal in colour except for the presence of a single white outertail-feather.

The remainder of the contour feathers are markedly paler than in the normal bird. Some of these contour feathers are normal in colour, others are pure white, but most of them vary between these extremes, with a preponderance of whitish-buff.

The colour of the soft parts (eyes, beak, and legs) is identical in the two birds and is apparently normal.

In the editorial comment following a paper by Molesworth (1951) it is stated that, among other species, total albinism has been recorded for the *hoopoe*. There is a specimen of a total albino *hoopoe* in the museum of the Bombay Natural History Society, Bombay.

It appears that albinism is a rarity in birds. Examples of partial albinism are probably more widespread and more frequent, but it would be of interest to learn for what other species the phenomenon of partial albinism has been recorded.

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THE EXTINCT, RARE AND THREATENED GAME OF
THE HIMALAYAS AND THE SIWALIK RANGES

BY

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(WITH EIGHT ILLUSTRATED MAPS)

INTRODUCTION

India is a reputed *Shikar* land for big game. In this vast country there are some 500 different species of mammals and 1200 species of birds, of which 45 are considered as important

game animals (Mammals) and 80 game birds. These are distributed in wooded riverain plains of Indus, Ganga and Brahamaputra, and in the Peninsular hills and the undulating plains connecting them, but the greatest variety of animal life is exhibited in the Great Northern Mountains, which run more or less in parallel series—the Siwaliks, the Great Himalayas, Ladakh, Kailas and Karakoram ranges—running west to east. The loftiest and the longest range is the Himalayas which spreads over a length of some 2400 kilometres and is limited by the course of the Indus in the west and the Brahamaputra in the east ; the average breadth is about 200 kilometres. In these mountain tiers of extraordinary grandeur, climate varies from tropical at the base to alpine and arctic at the top. Some peaks record the first seven highest points on earth which are capped with eternal snows, exposed to the scorch of sun and are lashed by blizzards ; there optimum living conditions are lacking. The biota on the mountain has therefore been restricted to seasonal altitudinal drift of snow line varying from 2438-5486 metres, with exceptions of a few specialized types that thrive on snow expanse above the tree line. The true Indian fauna is found in the Tarai, the forest belt on the foot-hills of the southern slopes of the Himalayas, whereas other Himalayan forest sub-regions exhibit specialized high-altitude animal life more or less distinct from the rest of India. Such main vertical climatic and forest zonal types are as follows :

(i) *Tropical wet and moist evergreen.*

Comprising a belt of thick evergreen forest at the foothills and the southern slopes of the Siwalik and the Himalayas, known as Tarai and Duars. The altitude of this is almost the same as the plains or a little higher (150-300 metres). Annual mean temperature ranges from 18° - 44° C, and rainfall ranges from 140-250 cm. The forest is mainly composed of Sal (*Shorea robusta*), Sisoo (*Dalbergia* sp.) and *Salmalia* sp., bamboos, canes, creepers, palms and tall grass and at places becomes impenetrable due to tangled undergrowth. The belt is well watered, drained by descending rivers which slow down and deposit silt. Such forests are the abode of Rhinoceros, Wild buffalo, Elephants, Tigers, Swampdeer, etc.

(ii) *Subtropical pine and wet forest.*

Comprising Pine-clad hill slopes between 915-2286 metres. The forest trees are of good height mainly represented by *Pinus longifolia*, bamboo occasionally present and some climber and epiphytes. Mean annual temperature ranges from 10°-21° C. and annual rainfall 94-130 cm. Such forests shelter several species of pheasants, Goral, Takin, Cat-bear or panda etc.

(iii) *Temperate forest.*

It consists of dry and moist temperate forest within altitudinal range of 1525-3658 metres extending from Kashmir to Assam and records a mean annual temperature ranging from 5° to 18° C. and rainfall from 75 cm. to 85 cm. The forests consist of conifers, oak and xerophytic shrubs at different altitudes. Dominant conifer species are *Abies*, *Cedrus*, *Picea*, *Acer*, *Prunus* etc., and oak, such as Kharsu oak (*Quercus semecarpifolia*) are found in Western Himalayas and Bank oak (*Q. incana*) are represented in the Central Himalayas. In the wet temperate forests of the eastern Himalayas, the forests are evergreen. The important plants are *Rhododendron arboreum*, *Quercus spp.* *Viburnum sp. etc.* In these types of forests are found the Markhor, the Thar, the Serow and the Hangul, Musk deer etc.

(iv) *Alpine forests.*

The zone ranging between 2895-3810 metres is comprised of stunted trees of conifers, viz. *Abies sp.*, Himalayan larch (*Larix griffithii*), thickets of *Rhododendron sp.*, *Betulah sp.*, etc., terminating in xerophytic scrub jungle and grassland. Snow fall is in the major part of the year. In this zone are found typical high altitudinal forms such as, the Snow-leopard, Himalayan black bear, Yak, etc..

The Himalayan species can be broadly classified into five faunal types. That is to say that the characteristic elements represented in those regions pertain to the habitats afforded in

the ranges covered. Such faunal types are defined as follows :—

- (i) Palæarctic—belonging to the fauna of the cold temperate and subtropical regions of the Northern Hemisphere ; such examples are Ibex, Musk-deer etc.
- (ii) Palæo-xeromontane—belonging to the fauna of the arid sunny slopes of low and high mountains, mainly the Western Himalayas. Such examples are, the Markhor, Hangul, etc.
- (iii) Palæomontane—belonging to the fauna of the alpine or snow zones of the high mountains. Such examples are the Himalayan Thar, Snow-leopards.
- (iv) Tibetan—belonging to the fauna of Tibetan high Plateaux but also ranging in palæarctic high mountains. Such examples are the Bharal or blue sheep, Yak, Great Tibetan sheep, etc.
- (v) Oriental—belonging to the fauna of South Asia (India) and southeast Asia (Malayasia) but also ascend to certain heights of the Himalayas. Such examples are the Serow (Malayasian), the Mishmi Takin (Malayasian), the barking deer (Indian).

In the Himalayas and Siwalik, the majority of the game species are thriving moderately in a natural balance, but the status of some species have been threatened by direct and indirect interference of modern man as a consequence of which a few have deteriorated to the vanishing point and a few have vanished. A list of the threatened, rare (vanishing) and vanished (extinct) species that have been dealt with in this paper is given below :—

Class Mammalia	<i>Status</i>
Order Carnivora			
Family Felidæ			
1. <i>Panthera uncia</i> Schreber			
(Snow leopard or Ounce)	...		Threatened

Order Perissodactyla

Family Rhinocerotidæ

2. *Rhinoceros unicornis* Linnæus
(Great Indian one-horned Rhino) Threatened

Order Artiodactyla

Family Suidæ

3. *Sus salvanius* Hodgson
(Pygmy hog) Rare

Family Cervidæ

Sub family Moschinæ

4. *Moschus moschiferus* Linnæus
(Musk deer) Threatened

Sub family Cervinæ

5. *Cervus elaphus hanglu* Wagner
(Hangul or Kashmir stag) ... Threatened

6. *Cervus elaphus wallichi* Cuvier
(Shou) Rare

Family Bovidæ

Sub family Bovinæ

7. *Bos grunniens* Linnæus
(Wild yak) Threatened

Sub family Caprinæ

8. *Capra falconeri* Wagner
(Markhor) Threatened

Class Aves Status

Order Anseriformes

Family Anatidæ

9. *Rhodonessa caryophyllacea* (Latham)
(Pink headed duck) ... Extinct
10. *Cairina scutulata* (S. Muller)
(White-winged wood duck) ... Rare

Order Galliformes

Family Phasianidæ

11. *Ophrysia superciliosa* (J. E. Gray)
(Mountain quail) ... Extinct

The above list includes only two extinct species of birds. Circumstances under which they have become extinct are ill-defined, and a hypothetical explanation has been put forward that the Himalayas are recent from geological point of view and that it supported many survivors 'relicts' of the pleistocene age, of the palæarctic region. The Pink-headed duck was a vestige of an early tertiary fauna which had modified its habit from marine or inland sea littoral environment to fresh water pools of the Siwalik foothills and Gangetic plain under forced circumstances. It got trapped in its present habitat due to geological changes in India during the Tertiary time. Recent cultivation of a great part of Tarai and frequent intrusion in their breeding area have acted adversely against the species ; perhaps the species could not stand the rigors and got exterminated. The Mountain Quail, another Palæarctic relict was discovered quite late (1845). Perhaps the few examples collected represent the last survivors of the declining species. The factors that had worked against the species, bringing it to extinction, are not yet known.

The object of this publication is to render information to the public, sportsmen and others interested in the subject of wildlife, regarding our vanishing game. Its present status, conservation, economy, etc. have been dealt in a general way, with an expectation of goodwill and cooperation to protect our threatened and fast vanishing game.

THE SNOW LEOPARD OR OUNCE

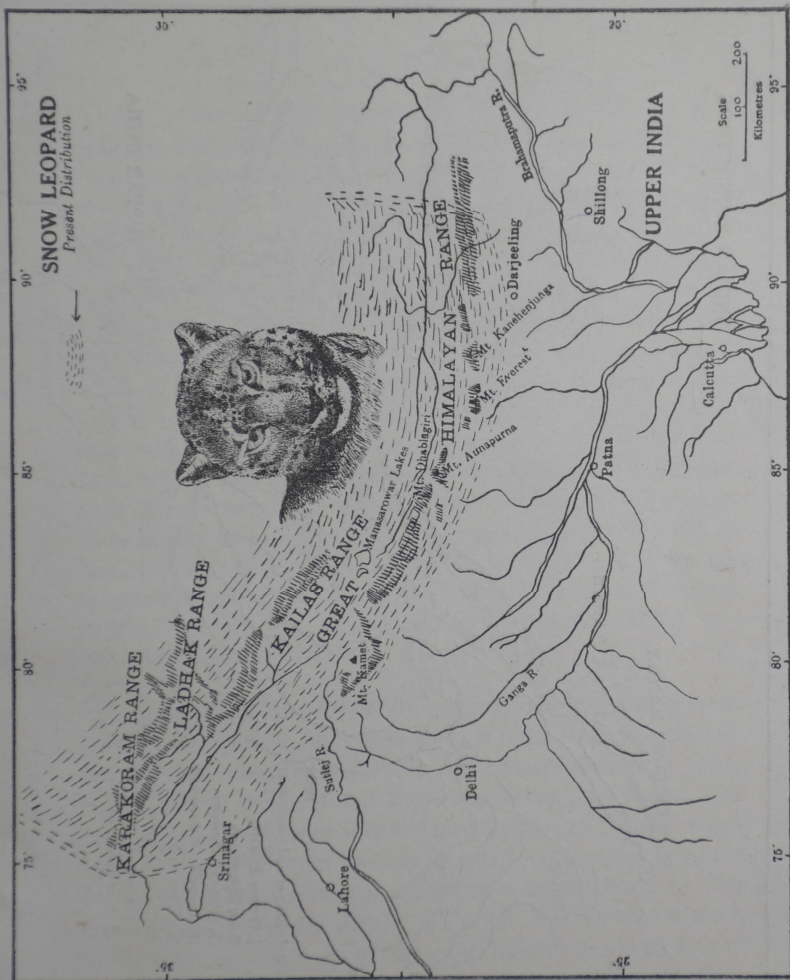
Panthera uncia Schreber

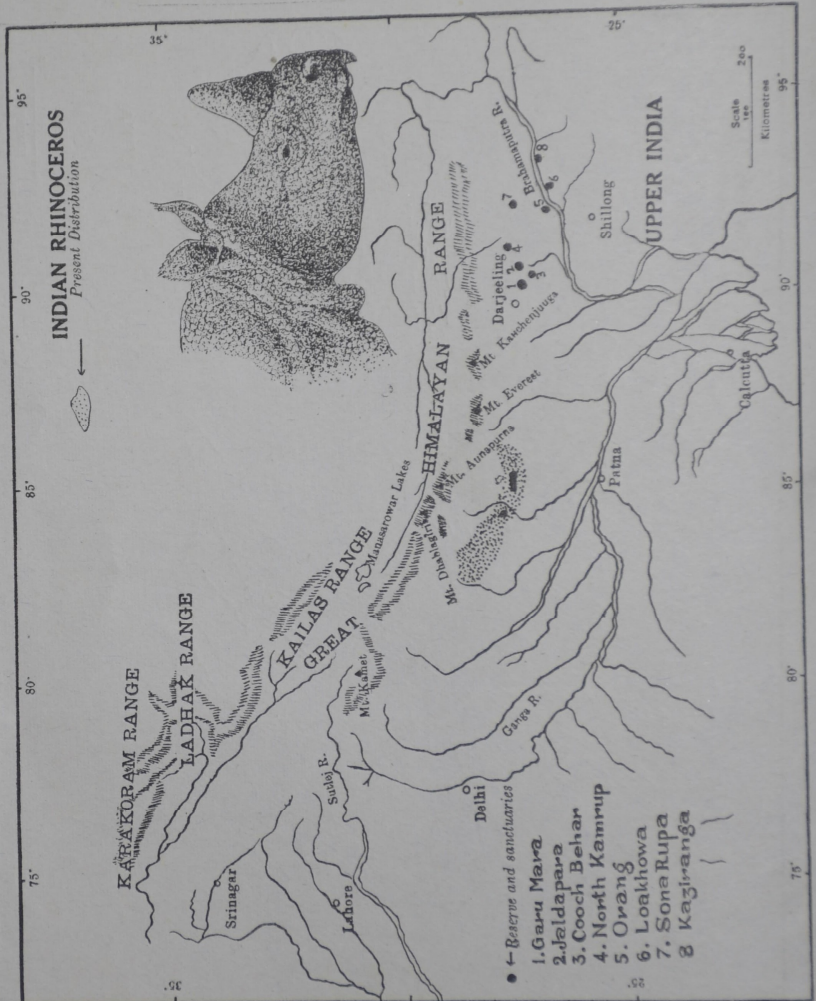
(PLATE NO. 1)

The Snow Leopard, locally known as *Zig*, *Sah* or *Pker* (Bhotia), *Pahle* (Lepcha) and *Burhel* or *Burhel hai* (N. Simla, Kumaon and Garwal), is a smaller size Indian panther differing from the latter in having a short face and head, longish thick fur and comparatively longer and bushy tail. The length of the tail is little less than the head and body and the total length of the animal varies from 200-230 cm. (6-7 ft.). The species extends almost throughout the Himalayas and other connected mountainous ranges of Central Asia, Altai and Tibet. Within Indian limits its distribution is confined from Kashmir to Bhutan. It inhabits snow-covered rocky mountains above the tree line between 2000-4000 metres, migrating up and down with climatic variations. The coat colour which is whitish to creamy grey above and white below with a pattern of solid black spots on the head and shoulder and rosettes on the body, perfectly synchronizes with the alpine rocky background.

The snow-leopard is nocturnal in its habit. It attacks game as large as Markhor, Ibex, Bharal etc. and feeds also on Musk deer, hares, marmots, rodents and birds of all kinds. It has been reported to waylay beasts of burden such as ponies and domesticated yaks and turns a cattle-lifter when camping near about pasture.

The snow-leopard has suffered rather serious depletion in its range of occurrence due to the great demand for its attractive coat. This is a great demand for ladies' fashionable dresses, handbags, hand-gloves, cushion covers, lining etc. There is practically no information concerning the numerical status of this species. It has been persecuted and trapped to such a great extent by the natives that the Zaskar and Pir Panjal ranges, where the animal was described as abundant, and trade in fur was regular and in appreciable quantity some thirty years back, show a grim picture of the status of the species. Since its fur is cash-exploitable, there has been unbalanced human





predation, resulting in depletion of the population and a set back in fur trade.

THE GREAT INDIAN RHINOCEROS

Rhinoceros unicornis Linnæus

(PLATE No. 2)

The Great Indian Rhinoceros locally known as *Gor* (Assamese), *Gondar* (Bengali), *Genda* (Hindi, Nepali), is a slaty coloured, thick-folded and tubercle skinned, single-horned relict, which some five hundred years ago inhabited the grass-land valleys and the plains of Indus, Ganga and Brahamaputra. This is the second largest land mammal of Asia which may reach 183 cm. (6 ft.) at the shoulder and 427 cm. (14 ft.) in length, and the horn which is composed of agglutinated hairs may attain a length of 65 cm. (2 ft.). The horn is highly prized in China and South East Asian countries due to the prevalent superstition that it has an aphrodisiac property and that a horn cup serves to make poison innocuous. These properties have attracted attention of the public. Noblemen, kings and emperors from time immemorial engaged state hunters for killing the animals to procure the horn and other by-products such as skin, blood, flesh etc. The result of this senseless hunting has completely wiped out their population from their extensive habitat except for some remote strongholds which are officially protected now.

In the Himalayan foothills the stronghold of the Rhinoceros is in Nepal. About fifty years back it ranged almost throughout the Tarai forest of Nepal, the area roughly limited by Sarda river valley in the west and Kosi river valley in the east. The animal was numerous in suitable grass patches in Gandak valley (Chitawan), Rapti river valley, Bagmati river valley, Churia-Ghati water-sheds, Jaleswar, Hanuman Nagar forests. The total population of the animal in Nepal was estimated to be about 1100 in 1910. Since then the number is decreasing at an alarming rate and according to Shri E.P. Gee,¹ in 1959 there

¹Gee, E. P. 1959. Report on a Survey of the Rhinoceros Area of Nepal *Oryx*, 5 (2).

were about 300 rhinos in the state, mostly concentrated in the Rapti valley region ; and even this number has further been reduced to 125 in 1961 !

In Uttar Pradesh state the animal used to occur some 50 years back in Rohilkhand (Pilibhit) and it occasionally roamed in the marshy grass jungles and in cultivations in the Nepal border districts *viz.* Kheri, Gonda and Gorakhpur. Even now it accidentally strolls in the eastern districts adjoining the Indo-Nepal border ; such animals perhaps straggle there from south-east Nepal.

In Bihar it was not uncommon in Champaran and Saharsa districts about a hundred years back. The animal has disappeared totally from the state now. By chance it may straggle to northern Champaran district from eastern Nepal or may accidentally be washed down by the Kosi river during monsoon.

In the state of West Bengal, the animal was quite common some 30 years back in Jalpaiguri and riparian forests of the Buxa Division, and some one hundred years back it occurred in the grass jungles of the Rajmahal hills. There is a considerable shrinkage in its habitat and it is now confined east to Tista river in Jalpaiguri and Cooch Bihar districts where some 50 individuals are protected in three official sanctuaries, *viz.* Jaldapara, Garu Mara and Cooch Bihar.

In Assam rhino was very common along the foothills of the eastern Himalayas and in the grass jungles all along the Brahmaputra, with a few stray individuals in Tirap frontier Division, F.W.T. Pollock² in 1879 related that the animal was plentiful in Goalpara, Darrang and Nowgong districts, and Shebbeare³ in 1930-32 estimated that along the foothills for about 330 miles from north Bengal to Sibsagar, there were about 220 specimens. Shri A. J. W. Milroy⁴ in 1934 described two rhino sanctuaries, Monas and Kaziranga, which contained a very fine stock and one rhino refuge in Balipara Political area.

²Pollock, F. W. T. 1879. Sports in British Burma, Assam and the Cassyah and Jyntiah Hills. 2 vols., London. p. 95.

³Quoted from Hobley, C. W. 1932. The rhinoceros. Jour. Soc. Preservation Fauna Empire, n. s., pt. 17, pp 20-21.

⁴Milroy, A. J. W. 1934. The preservation of wildlife in India. No. 3, Assam. J. Bombay Nat. Hist. Soc. vol. 37 (1), pp. 99-101.

Shri E. P. Gee⁵ estimated about 330 rhinos in the whole of Assam. There are five state sanctuaries, viz. North Kamrup, Orang, Laokowa, Sone Rupa and Kaziranga of which the last mentioned sanctuary is the largest (approx. 200 sq. km.) and contains about 260 individuals.

The rhino inhabits two types of forests, viz. (i) Dense moist forest and low hill slopes of Tarai and Duars (ii) Tall grass land and mixed forest. The tropical forest at the base of the Himalayas is scattered partly on low hill slopes and partly on plains at the foot of the hills. The streams that emerge out from the hills form puddles of water due to overflowing during the monsoon. Thus bogland and stagnant pools are formed and maintained which are covered with reeds ; and also tall grass patches grow at places. In such conditions the rhino lives in Nepal Tarai in a 30-40 miles long strip near Hataura (south central Nepal).

The other habitat of the rhino is the tall grassland and mixed forest in the districts of Darrang, Nowgong, Sibsagar and North Lakhimpur districts, situated in Brahamaputra valley. The grasses which serve as fodder and provide cover for the animal grow in plains in extensive patches along the Brahamaputra river course. These grasses are the different species of Kush, *Saccharum* sp., Nal, *Phragmites* sp., Ekra, *Erianthus* sp., and Elephant-grass, *Erianthus elephantinus* etc....The latter sometimes attains a height of 5 metres or more. These conditions are typified in Kaziranga, Loakhowa and Orang sanctuaries. The North Kamrup sanctuary which is about 200 sq. km., harbours some 25 rhinos. They live under somewhat different conditions. The country is more or less undulating and drier than the habitat of the rhino in Nepal Tarai and Kaziranga, and has an extensive grass jungle intersected by rivers and forest blocks mainly composed of trees such as Hollock, *Terminalia*, *Myriocarpa*, Gondroi, *Cinnamomum* sp., Nahor, *Mesua ferrea*, Jhok, *Bischofia* sp., Badam, *Sterculia alata* and *Acacia* sp. etc.

⁵Gee, E. P. 1958. Four rare Indian animals, *Oryx*, Vol. 4 (6), p. 354.

The rhino is a solitary animal ; bull generally loiters singly, and the female is accompanied by the calf. There is no fixed time for its breeding and generally a single calf is born. The gestation period is about 18 months. The animal in natural habitat may survive over 50 years and sometimes a century. It is herbivorous and generally feeds during the morning and evening hours and at a particular spot drops the dung which piles up and forms a large mound. It is harmless in disposition but when it feels cornered, may charge with its tusk.

The lucrative business of the rhino horn and other products is the chief threat to the status of the species. The animal has suffered badly in the hands of poachers who are tempted to butcher them for a handsome return—the horn fetches a price half its weight in gold ! About a century back, the Government of India became conscious of the seriousness of the situation and thereafter promulgated official orders for conserving the species. This resulted in organized poaching on a large scale with the result that many of the areas except those pockets that exist as sanctuaries today, became completely denuded. A further tightening up by rigid rules, (The Bengal Rhino Preservation Act. of 1931 ; the Assam Rhino Preservation Act of 1953 etc.) and strict management of sanctuaries have saved the animal from extinction. But sometimes alarming attacks by the poaching gangs were made and as many as 72 animals were killed in 1954 in Nepal Tarai. In spite of state vigilance the act was repeated and another 500 animals were estimated to be killed in 1957 in the Rapti valley.

Other than the direct action of man against the animal, factors such as flood, transmission of disease from domestic cattle, land acquisition pressure for agriculture and the role of predators such as tigers and crocodiles against young rhinos affect adversely the population to certain extent. The animal may thrive better by effective management and control of such factors.

THE PYGMY HOG

Sus Salvanius (Hodgson)

(PLATE NO. 3)

The Pygmy Hog, *Sano-banel* of the Nepalese, was first described by Brian Hodgson in 1847 from Sikkim Tarai. It is a diminutive form of the wild boar hardly exceeding the size of the Indian Chevrotain or Mouse deer. The height is approximately 30 centimetres and the muzzle to tail is 70 centimetres. It differs from the wild boar in having three pairs of teats, short upper tusk, one pair of molars less, short snout and ears and tail naked. The adult has a coarse coat which is brown or blackish brown and the young are striped.

The animal is distributed throughout the Himalayan Tarai from Nepal to Assam. It lives in the dense moist forest of low hill slopes and adjoining flood plains. The habitat is generally the Sal (*Shorea robbusta*) forests which have scattered dense tall grass patches, predominant species being, *Imperata cylindrica*, *Microstegium ciliatum*, *Saccharum* sp., *Phragmites kakra*, etc. The pigs generally move in herds comprised of five to twenty individuals and their movement is restricted to night only. Since it has been rarely observed and a very few examples have been obtained, it is considered to be a rare species. Its real status has not yet been ascertained. The male stands bravely against any predator which attacks its family. It is presumed that it breeds twice a year and the litter consists of usually three or four young ones.

THE HIMALAYAN MUSK DEER

Moschus moschiferus moschiferus Linnæus

(PLATE NO. 3)

The Himalayan Musk Deer, locally known as *Kasturi Mriga* (Bengali), *Mushk* (Hindi), *Raos* (Kashmiri), is a pretty little deer, height at shoulder about 55 cm. It is of primitive origin combining some characters of antelopes and deers, such as presenting the gall bladder of the former, and exhibiting of the

latter, a developed large canine in males and well developed lateral digits. The animal has developed peculiarities of its own, such as hornlessness, absence of facial glands, possession of a caudal gland at the lateral surface of the rudimentary tail and the globular musk gland (pod) situated beneath the skin of the abdomen of the males. It has thick long hind limbs which help it to progress by bounds. The hairs of the coat are coarse, thick and brittle having a shade of sepia brown or brownish grey sprinkled with golden red.

The species ranges in the mountains of Asia from Siberia, Sakhalin and Korea to the Himalayan region representing half a dozen subspecies of which the nominate race of Central Asia is represented within our limits. In the Himalayas it is found at an altitude over 2440 metres from Gilgit (Kashmir) to Assam (N.E.F.A.).

The Musk Deer inhabits the dry temperate and alpine forests of the Himalayas (*ca.* 2500-3810 metres) in different ecological successions from pine clad ridges of lower altitudes to the border tree line of oak, xerophytic shrubs and dwarf rhododendron etc. It is rather an unsocial animal, moves singly or in pairs, shy in habits like hare, concealing itself in a self scraped out shallow, feeding during dusk and dawn on herbage and lichens. It pairs during the severest period of cold in the month of December-January and breeds in May-June and usually a single fawn is born. The gestation period is about five and a half months and the young attain maturity in about ten months.

The commercial importance of the animal is well known from time immemorial for the valuable musk produced by the male during the rut, which is a crumbly paste when fresh and has an obnoxious odour, but emits a pleasant scent on drying up. The scent is used as perfumery and in medicine. The deer is seldom shot but it is trapped in hundreds by the 'Drive to noose' method which is generally employed in snaring pheasants. The hide being tough makes excellent buck-skin and the tubular leg bones are utilized as arrow heads by nomads. Burrard¹ mentioned that in India the rate for musk pod in 1925

¹ Burrard, G. 1925. Big game hunting in the Himalayas and Tibet, Ed. 2. London, pp. 143-144.

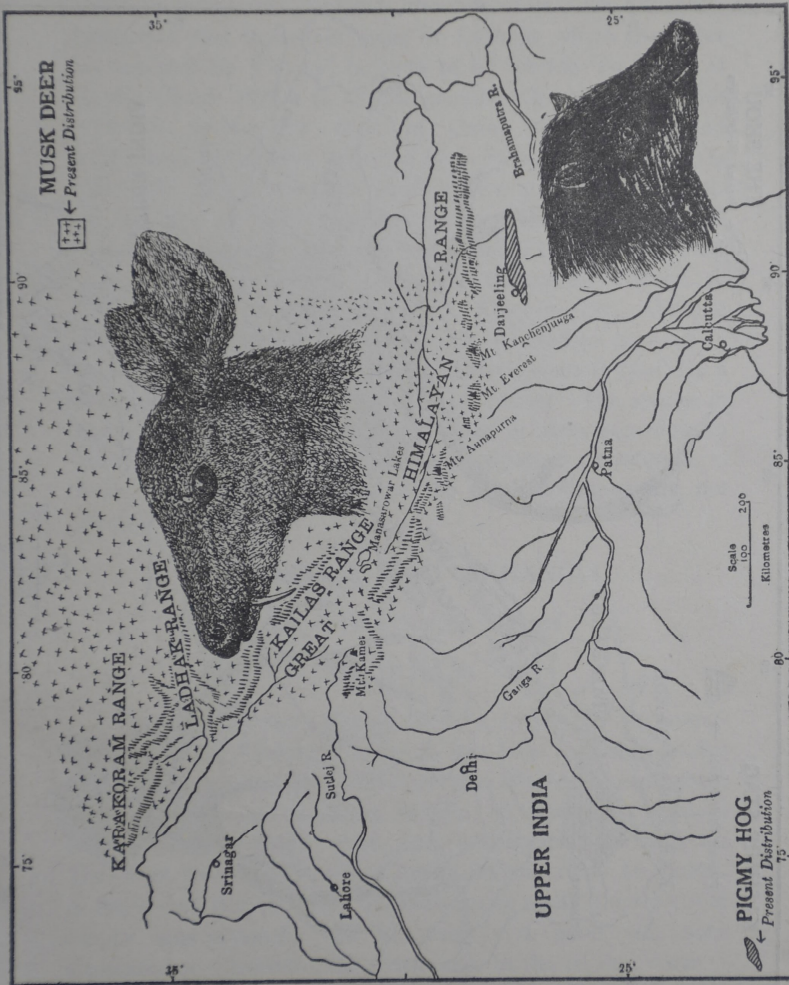
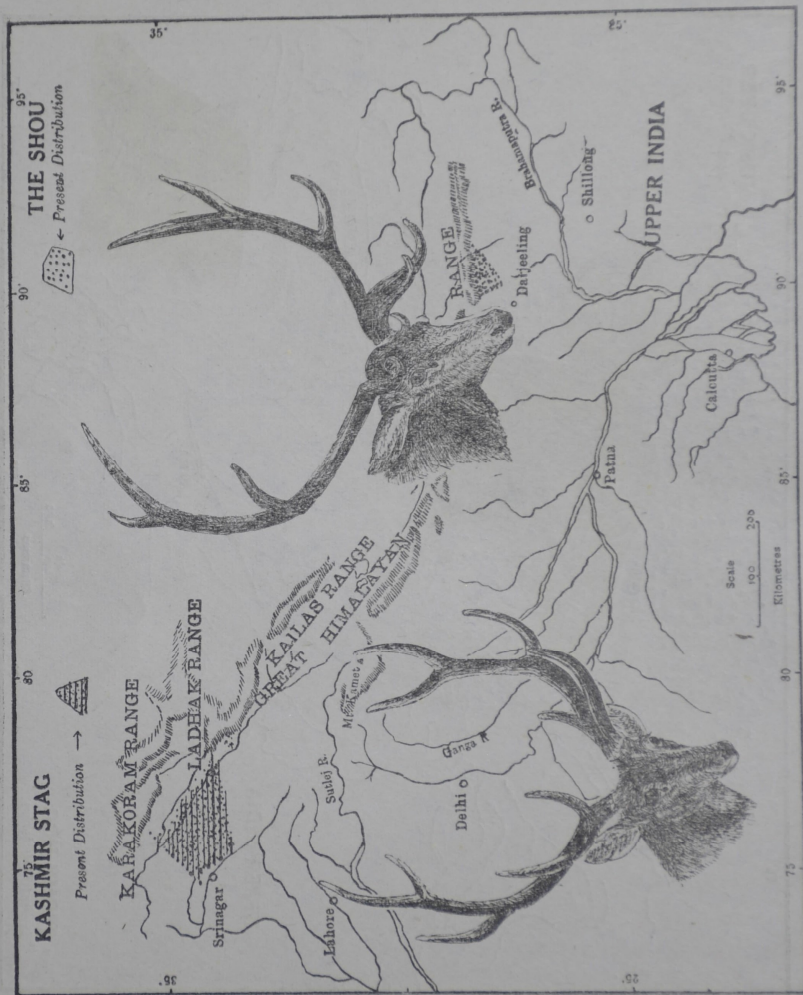


PLATE NO. 4



was Rs. 30.00, and the present market rate in Calcutta, as understood, is about Rs. 150-200 per 100 gms. This being a handsome return, the animal is the subject of such a ruthless persecution that in certain areas of Kashmir where the deer was reported by Vickers² in 1894 to be literally swarming at altitudes about 10,000 ft. (3,000 metres), its population has reached to such a low level in Gares, Tilel, Panji and Kishenganga valley that it should be considered to be standing at fencing. This species has therefore been given special protection by the state throughout the year. A similar grim picture of the population of the species in Himachal Pradesh and Uttar Pradesh is also reported, where the animal is confined to certain pockets in Chamba, Tehri, Kumaon and Almorah forest hills. Relentless poaching is still believed to continue in rugged parts of Nepal, Bhutan and Sikkim since it provides a section of the people a major source of income. The species in these states it is feared will be extirpated in areas accessible to the hillmen and its survival inspite of vigorous persecution, is perhaps due to the reason that the musk collectors are not interested in the doe.

THE KASHMIR STAG OR HANGUL

Cervus elaphus hanglu Wagner

(PLATE NO. 4)

The Kashmir stag, *Hangal*, *Honglu*, (male) and *Minyamar* (female), as the Kashmiris name it, is a large size deer related to the European Red Deer and American Wapiti. It is confined to the northern and adjacent valleys of Kashmir. It has a brown coat and dingy white lips, underparts and buttocks. The head has fine spreading antlers having 10 to 16 points. A full grown stag is about 140 centimetres at the shoulder and weighs approximately 180 kilograms. A good size horn measures approximately 900 centimetres in the outside curve.

About a hundred years back, the territory of the grand deer included the birch forests in the mountain terrain of

² Quoted from Louis, J.A. H. 1894. *The gates of Thibet*, Ed. 2. Calcutta, p. 160.

Kashmir within the boundary formed by the Karakoram range in the north, Kailas and Ladakh range in the east and Pir Panjal range in southwest. This extensive habitat has shrunken to a small territory above the vale of Kashmir. The animal inhabits the thickly forested terrains to the north and east of the vale at an approximate elevation of 2800-4000 metres above the village Aru in summer and to the lower pine valleys (ca 1550-2500 metres) starting 18 miles east of Srinagar during the winter when the snow covers its summer home.

The hangul is in fact a great wanderer and moves in the alpine meadows and birch forests from one block to another in small parties composed of females, fawns and young stags. Old stags generally loiter solitarily in winter but in summer they are found with a harem of 10-20 hinds. It feeds on sprouting grass such as *paspalum ambiguum*, *Panicum isachne*, *Oplismenus undulatifolius*, *Pennisetum* spp., *Spodiopogon dubius*, *Pollinia mollis*, *Erianthus ravenneæ* etc. etc., and budding larches, such as *Abies pindrow*, *A. weffiana*, *Larix griffithii* etc., etc.

The shedding of horn takes place between March and April and new antlers get hardened by the end of September when the stag starts calling in the morning and evening challenging its rivals. It joins the hinds by the middle of October and after disputes between the stags are over, as regards the ownership, by fight, the winner takes possession of the harem. The harem is deserted by the stag after pairing in November. The gestation period is about six months and fawns are born in April.

Before the World War II, the population of the hangul was quite fair, the number estimated was over 2,000, which spread over the valleys, viz. Maru Wardwan, Kishtwar, Badrawar, Tilel and Marbal Pass and Kishanganga valley. As it stands to day the number is about 250, an estimate made by Colonel H. Nedou¹, former Game Warden of Kashmir. Its position appears to be precarious and if the situation remains uncared for, in a few years, the animal with all certainty would be exterminated. The official protection extended to the deer in the

¹Information obtained by Gee, E. P. 'Report from India', *Oryx*, vol. 6 (2) pp. 101-102.

two sanctuaries, viz. Chumnaiye and Dichigam, is rather inadequate. The 200 sq. kilometres Dichigam sanctuary which is situated at an altitude of about 3800 metres requires more forest vigilance to protect the splendid deer from the military, V.I.P.'s and Crop Protection guns and poachers who sell the venison in open market at a high price. The sanctuary, if declared out of bounds to Gujars who engage their mastifs to run down the deer, and the herders who have guns to shoot the animal and are responsible for introduction of cattle-borne diseases, may help in the survival of this elegant Kashmir stag, which is fast vanishing.

THE SIKKIM STAG OR SHOU

Cervus elaphus wallichi Cuvier

(PLATE NO. 4)

The Sikkim stage named by Tibetans as Shou is almost similar to Hangul but somewhat bigger and differs from the latter in having long and massive horn and in the arrangement of the antlers.

It is really a rare animal within our limits. It was first described by G. Cuvier in 1823 from Nepal. Lydekker thought that the 'type' came probably from Manassarowar Lake, Narikhorsum District, Tibet. Its existence in Nepal is subject to question but it certainly exists in West and South Tibet (Chumbi valley) and the adjacent valley of Bhutan, between ca 2745-3660 metres (9000-12000 ft.).

The stag stands from 137-152 centimetres ($4\frac{1}{2}$ -5 ft.) at the shoulder and has a pale rufous brown coat above with a large light rump patch. A good size horn measures 130 centimetres ($4\frac{1}{4}$ ft.) from outside and has 10-14 antler points.

No details about its distribution, ecology, breeding habits etc. are available.

THE WILD YAK

Bos grunniens mutus (Przewalski)

(PLATE NO. 5)

The Wild yak, locally known as *Dong*, *Brong-dong* (Tibetan), *Ban-chour* or *Chamri-gai* (Hindi) is specialized to inhabit the high, desolate and rugged snow-covered mountains and valleys of Tibet and adjoining Western Indian border territories, viz. Changchen-Mo valley in Ladakh, Sotlej valley and passes in Kumaon (Kangri Bingi Pass). It lives between 4270-7100 metres (14,000-20,000 ft.) almost throughout the year facing in winter the bleakest situation in the inhospitable barren plateau where practically no vegetation exists. It has an advantage in the struggle against adverse arctic conditions by having developed a long-haired thick wooly coat which serves as a non-conductor of heat to protect the massive body and short legs.

The wild yak has a cousin which is domesticated and serves the nomads principally as a beast of burden. It is differentiated from the domestic yak by its comparatively larger size and in having superior horns and black colour of the coat instead of mixed black and white. A full grown wild bull stands at 150-180 cm. (5-6 ft.) at shoulder, has horns 60-100 cm. (2-3 $\frac{1}{4}$ ft.) and is 3.35 metres (11 ft. in length exclusive of the bushy tail which is about one metre (3 ft. .

The yaks are either found in small or large herds of several hundred, composed of females, young bulls and calves. The strength of the herd helps in the protection of calves against attacks by carnivores. They are fine mountain climbers and generally travel in a single file through precarious passes. Bulls roam about singly or 3-5 in number together except during the rutting season. Their food consists of tufts of grass, shrubs, salt-encrusted earth and frozen snow when water is not available, and they undergo starvation in the absence of food during the cold when many weak and old ones who fail in the struggle are eliminated by nature.

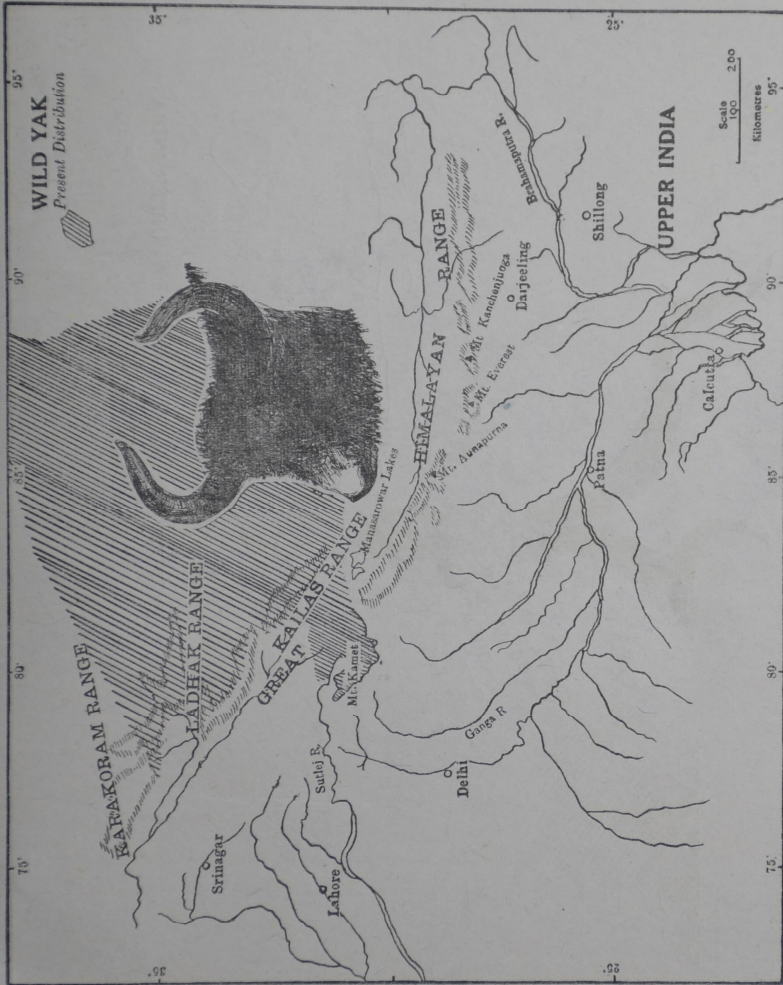
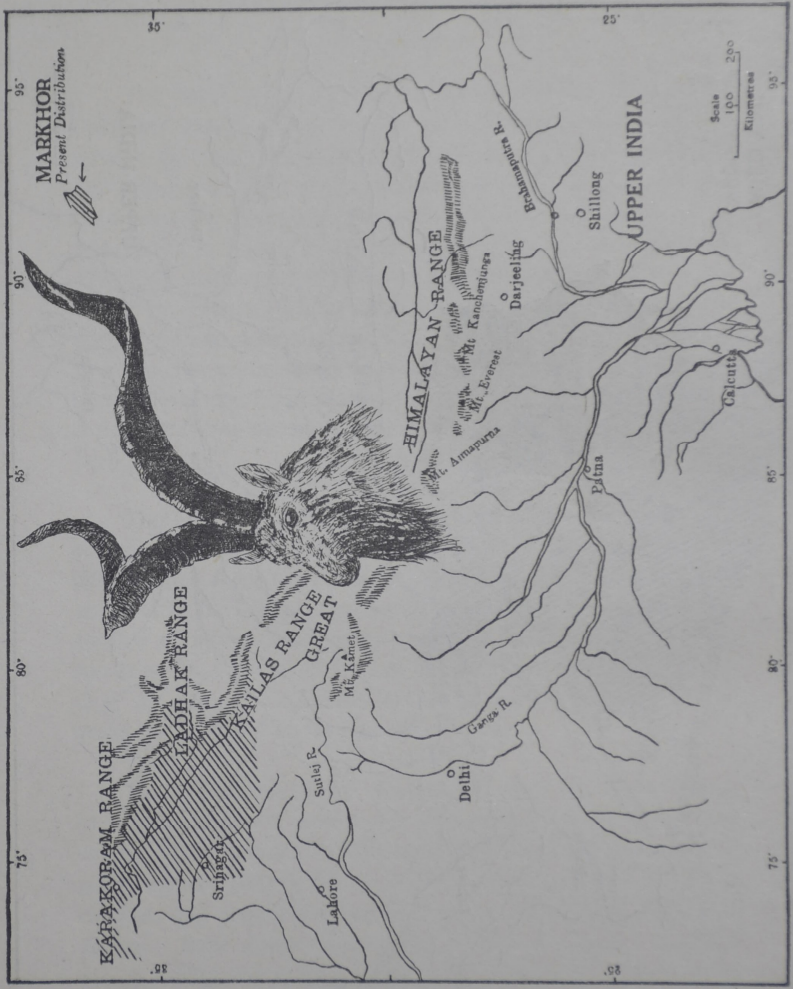


PLATE NO. 6



The wild yak's skin has good commercial potentialities. Many articles of commerce such as, saddles, saddle-girth, bridle reins, whips, boots, ropes etc. are made out of the skin due to its durability. Wool is used for rope and clothing purposes. The tail is used as a flywhisk or a fan in religious offerings and ceremonies. The animal provides fat and meat for the nomads and its heart and blood are used by Mongols for medicinal purposes. The species is thereby suffering depletion in many areas due to excessive hunting. In Chang-chen-Mo valley, Ladakh (Kashmir), their number has gradually been reduced inspite of legislative state protection—perhaps the animal which lives in the vast wild area does not get real safeguard in the land of nomads who have taken to modern arms and understand little about wildlife protection.

THE MARKHOR

Capra falconeri (Wagner)

(PLATE NO. 6)

The Great Himalayan Bearded Goat, locally known as *Markhor* (Afghani, Punjabi and Kashmiri) meaning a snake-eater, is a long silky-haired, thick coated large and heavy animal (approx. 100 cm.=40 inches at shoulder), provided with a long black beard from chin to chest, a shaggy grey mane and large spiral horns in males (122-152 cm.=4-5 ft.) and short twisted horns in females. The colour of the coat varies from gray to reddish brown in different seasons in adults. In old males it is whitish. The species is approximately distributed in the mountainous ranges of southern Russian Turkestan, Afghanistan, North-west Pakistan (West) including Baluchistan, and of Kashmir. There are some seven races, most of them radiating in all directions from Nanga Parbat, Kashmir. Within Indian limits only two races are represented, viz. the nominate race in Astor and Baltistan and *Capra falconeri cashmiriensis* Lydekker in Pir Panjal and Kajnag ranges. The former has extremely open spiral lyre-shaped horns which never make three complete turns, whereas the horns of the latter have the spiral less open and lack all symmetry. The ranges

of these two races overlap and inter-grade on the confines of Hazra and Gilgit.

In the Himalayan and Pir Panjal ranges, the Markhor inhabits difficult, steep, precipitous and high rocky cliffs for the most part of the year. During heavy snowfall when forced by climatic adversity and food shortage they descend to the lower valleys. The animals generally occur in small and large herds, sometimes even 40 in number, but old males generally keep aloof. They are gifted with great agility in climbing the most difficult and dangerous cliffs ordinarily inaccessible to human beings and even to snow leopards, which stalk them regularly when the prey walk into a favourable situation advantageous to the predator.

The Markhor breeds during May and June in Kashmir and generally single or twins are produced.

✓Astor Markhor used to roam 50 years back in large herds in the tributaries of Astor river, Bunji, Jutyal, Khaltar and Haramoosh nullahs, as observed by Burrard¹. Stockley² in 1936 reported a terrible reduction in their number. The Pir Panjal Markhor, the finest of the Kashmir sports, reported plentiful in its typical habitat, Kajnag, Shamsberi, Slakalla spur, and in the nullahs in the lower part of the Kishenganga valley a century back, are now in imminent danger of extermination by the advancing civilization. The indiscreet use of modern long range fire arms and poaching by Gujars and other nomads have seriously affected the Markhor population in Pir Panjal range, Rondu to Baluchi, Mogi Nullah, Kaj-i-nag mountains and Jhelum river basin. It is perhaps only in some forest block preserves, viz. Gilgit, Chitral, Chilas and round about Nanga Parbat, that some markhor herds have found their asylum. Overpopulation has thrown open the wild areas as grazing ground to domestic cattle herds, and thereby has given fair chances of introduction of disastrous contagious diseases. Preservation of the Markhor, is therefore, open to challenge in the vast and rugged territory the species occupies.

¹ Burrard, G. 1925. Big game hunting in the Himalayas and Tibet. Ed. 2. London, p. 181.

² Stockley, C. H. 1936. Stalking in the Himalayas and northern India. London, p. 142-144.

THE PINK-HEADED DUCK

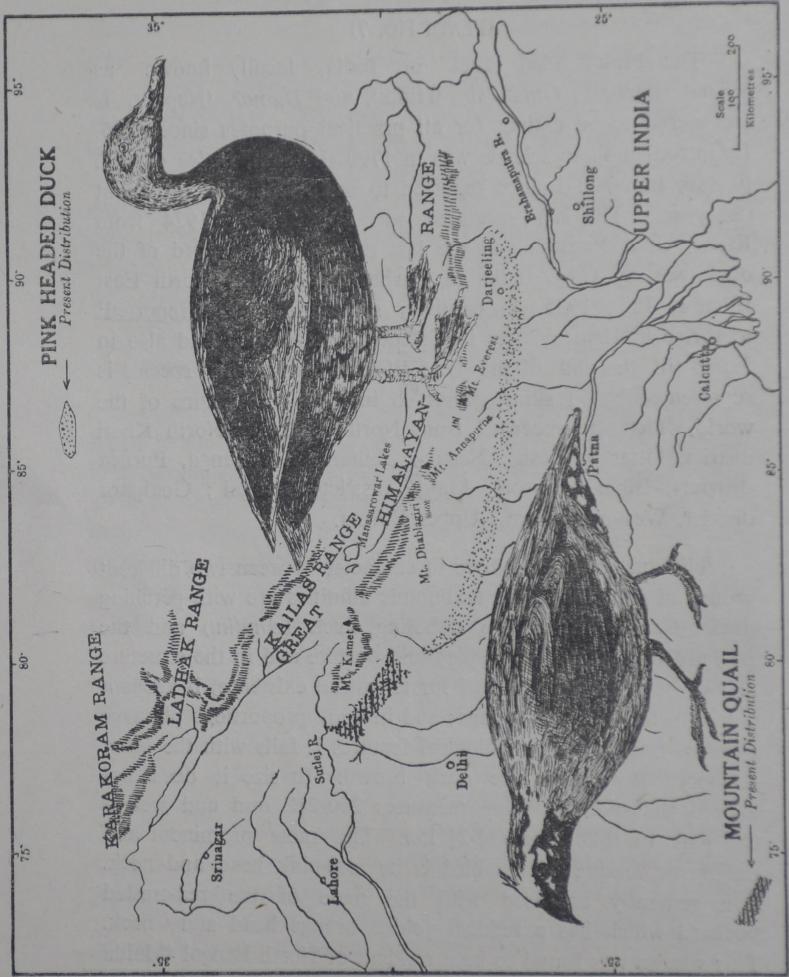
Rhodonessa caryophyllacea (Latham)

(PLATE NO. 7)

The Pink-headed duck of India, locally known as *Saknal* (Bengali), *Gulab sir* (Hindi), and *Dumar* (Nepali), is considered to be extinct for all practical purposes since 1935. Its introduction to science was in 1790 (Latham, *Index Orn.* 2. p. 866, India) and since reported to be in existence for about 150 years. The last specimen was collected in 1924 from Kheri, Uttar Pradesh and the last reliable sight record of the duck was by C.M. Inglis in Darbhanga District, North East Bihar in July, 1935. In captivity some birds were reported¹ to thrive in Ezra aviaries in Calcutta and London and also in Japan till the end of the Hind World War. This species is represented by 71 skins, preserved in various museums of the world, which are recorded from Northern India, North Kheri district, Uttar Pradesh ; Nepal ; Bhutan ; Darbhanga, Purnea districts, Bihar ; Jessore, Malda districts, Bengal ; Goalpara district, Western Assam ; Upper Burma.

The duck is intermediate in character between two different groups of waterfowl. Its taxonomic affinities are with perching duck (*Cairinini*) and the dabbling duck (*Anatini*) and the pochard (*Aythini*). In display and posture and in the structure of its feet which are adapted for terrestrial existence, it keeps a link with the first two groups; and in body proportions plumage pattern, trachea and osteological features it falls with the latter category. Both sexes are dark brown. In size it does not exceed the spotbill (Wing measures 250-282 mm and weighs 680 gms. to 1020 gms. (1½-2¼ lb.). The most prominent and diagnostic feature of the bird is its rose-pink head and neck. It is generally confused with the male of the red-crested pochard which has a reddish golden orange head and neck. This species was found to be a resident of North Bengal (Malda district) and North Bihar (Purnea, Saharsa, Darbhanga districts). During the winter it dispersed to a greater range following the

¹ Ali, S. 1960. The Pink-headed duck. *Wild fowl Trust 11th Annual Report 1958-1959*, p. 58.



forest belt on the southern slopes of the Siwaliks—the Terai and Duars and the adjoining plains, limited to the South by the course of the river Ganga. It casually visited as far west as the river Sutlej and Gurudaspur (Punjab) and to Manipur and Upper Burma in the East, and rarely straggled to South India as far down as Madras.

The bird enjoyed an unimpaired life in the widely dispersed bogland that lies in between the Chauria Ghati-Biratnagar, Jhapa Tarai of eastern Nepal and the river Ganga (86°.0 to 88°.0 long). This area is intersected by large and small streams, viz. Lakhandai, Nirmali, Kamala, Kosi, Saura, Panar, Kankai rivers etc, which drain down to Ganga. Due to excessive rainfall on the mountains which have an extensive catchment area, these rivers are in spate during every monsoon resulting in overflowing of the adjoining areas of the rivers which helps in the establishment of pools and lagoons of perennial type. Local communications being cut off due to difficult conditions, some areas, specially the forests, have remained more or less unexploited unless some enthusiastic sportsmen moved on elephants through the marsh full of reeds, tall grasses, shrubs, creepers and stumpy trees. Such bogland sheltered the bird which built its nests, on tufts of tall grass (*Andropogon* sp.) not far from lagoons. The bird was rather unsocial, lived singly or in small parties and avoided association with other ducks. It preferred to remain in pools throughout the day, fed on the surface of water or sometimes dived in the manner of a pochard. During winter the birds moved out in flocks of 6 to 30 or even 40. The call of the drake is stated to be a whizzy whistle almost similar to a mallard. The bird paired in April and May and laid 5-10 smooth spherical ivory white eggs of 44 × 41 mm. size, in circular nest of 20-22 cm. diameter and 10-12 cm. deep.

THE WHITE-WINGED WOOD DUCK

Cairina scutulata (S. Muller)

(PLATE No. 8)

The White-winged Wood Duck, known by different local names, *Chinaha*, *Rajdeohans* (Assamese), *Hagrani* (Cachari) is

a medium size duck and looks similar to *Nukta* (Comb duck), and bears identical black spots on head and neck. It differs from the latter in having its lower part chestnut instead of white, and the males do not possess the comb of the *Nukta*. A conspicuous white patch on the upper wing coverts is the distinguishing character of the species.

The species is reported to occur in India, Burma and Malayasian islands. Within our limit it ranges from the western district of Assam to the eastern boundary of Lakhimpur district and has also been reported from Manipur, Naga Hills and North East Frontier Divisions. The frequency of its occurrence increases from west to east.

The bird is a resident of dense swampy forest areas which are studded with beels, pools, sluggish creeks etc., that are partially canopied by large trees, creepers and marshy flora. Generally the bird is seen singly or in pairs, either skimming in the pool or perched on a branch of a tree in the vicinity of a stream or a pool. The bird is active from dusk to dawn and avoids the heat of the day by taking shelter under a well shaded tree. The bird is reported to nest in hollows in the trunks or to stumps of trees.

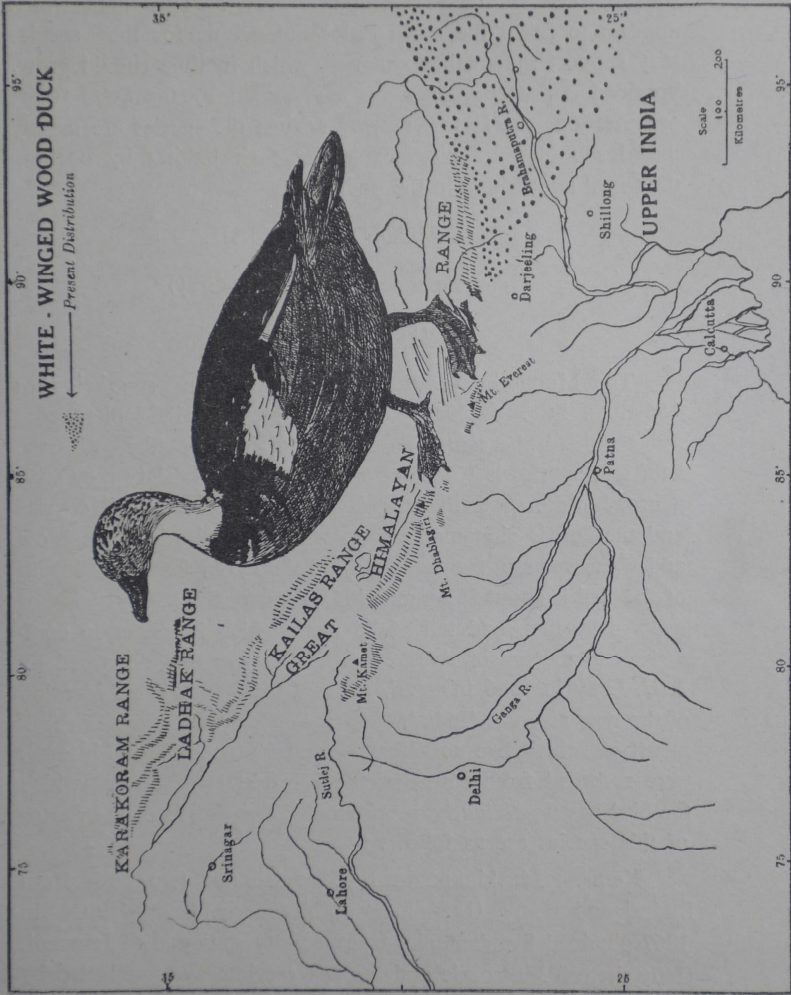
Earlier reports on this bird by Col. Graham¹ in 1881 and Stuart Baker^{2,3} in 1908 and 1929 respectively revealed that the bird was quite common in Lakhimpur district. From recent reports by several sportsmen, forest officials and professional ornithologists, it is gathered that the bird, once reported so common in the late and early parts of the 19th and 20th centuries has now become rare. Shri E. P. Gee⁴ in 1958 reported on the details of the status of the bird in Assam and has drawn the attention of the Indian Board of Wildlife and the Assam Forests to its scarcity and its occurrence in a small number

¹ Quoted from Hume & Marshall 1881. The game birds of India, Burma and Ceylon. Calcutta pp. 147-150.

² Baker, E.C.S., 1908 Indian ducks and their allies, London. pp. 32-40.

³ ———— 1929 Fauna of British India (II Ed.) : Bird, London vol. 6, pp. 387-389.

⁴ Gee, E.P., 1958 The present status of the white-winged wood-duck, *Cairina scutulata* (S. Muller) *J. Bombay Nat. Hist. Soc.* Vol. 55 pp. 569-575.



in certain pockets in Lakhimpur district. A suitable sanctuary is now under consideration which might be located in the Dibru reserve forest in the Lakhimpur district. This area which appears to fulfill the ecological requirements for the species may support the small population which in time should grow, provided a proper vigilance is maintained by the State forest organization—the factors playing against the species are mainly illegal shooting, trapping, exploiting their habitat by opening the forest and fishing in the pools etc..

THE MOUNTAIN QUAIL

Ophrysia superciliosa (J. E. Gray)

(PLATE NO. 7)

The Mountain Quail, locally known as *sanokalo-titra* (Nepali) a little oversized common grey quail, looks more akin to blood pheasants (*Ithaginis*) but is more allied with the habits of spurfowls (*Galloperdix*). The Cock is slaty grey with a broad white supercilium and spotted white undertail coverts and the hen is cinnamon brown with a small white eye brow and white spots in front and behind the eyes. The total length of the bird is about 250 mm. with a comparatively short wing of average 90 mm. and tail of 75 mm., which is longer in comparison to the tail of the grey quail. It was first described by J. E. Gray in 1846 (*Knowsl. Menag., Aves.* p. 8), the location of the type given as 'India'. Thereafter less than a dozen specimens, of which five are incorporated in the British Museum, were recorded from Mussoorie and Nainital area, after which the bird has mysteriously disappeared. The details of the record of this species are as follows :—

Kenneth Mackinnon in 1865 contributed two birds from Budraj and Benog (1824 metres), Mussoorie. Capt. Hutton in 1867 obtained five examples from a party stationed at Jerepani, (1676 metres) Mussoorie and the last specimen was collected by Major G. Carwithen in 1876 from Sherka-danda (2134 metres), Nainital. With a rumour about the existence of this species and a report¹ that a specimen has been shot in East Kumaon

¹ Based on information of Ripley, S.D. 1952. Vanishing and Extinct bird species of India. *J. Bombay Nat. Hist. Soc.* 50, p. 903.

during the last five years not far from a village called 'Lohaghat', the authenticity of the report is worth investigating.

The habit of the bird is very little known. It was stated to be uncommon and lived in coveys of 8 to 10 among tall grass patches at a height of 1500-2200 metres in the hills of Mussoorie and Nainital, that is, in the subtropical hill tracts of the Himalayas roughly bounded by the Jumna river valley in the West and Sarda river valley in the East. It was said to be a runner and a skulker, very difficult to flush and seldom took to wings except when cornered. The flight of the bird was slow and heavy with a tendency to settle down soon at some distance. It fed on fallen seeds among long grass and seldom came out into the open. When approached it sheltered in grass cover but indicated its presence by a peculiar short whistling note. Allen Hume thought that this bird was perhaps a migrant from the better forested areas of South-East Chinese Tibet. It was presumably a resident species which is supported by the fact that it had small wings which were not, adapted to undertake long flights.

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