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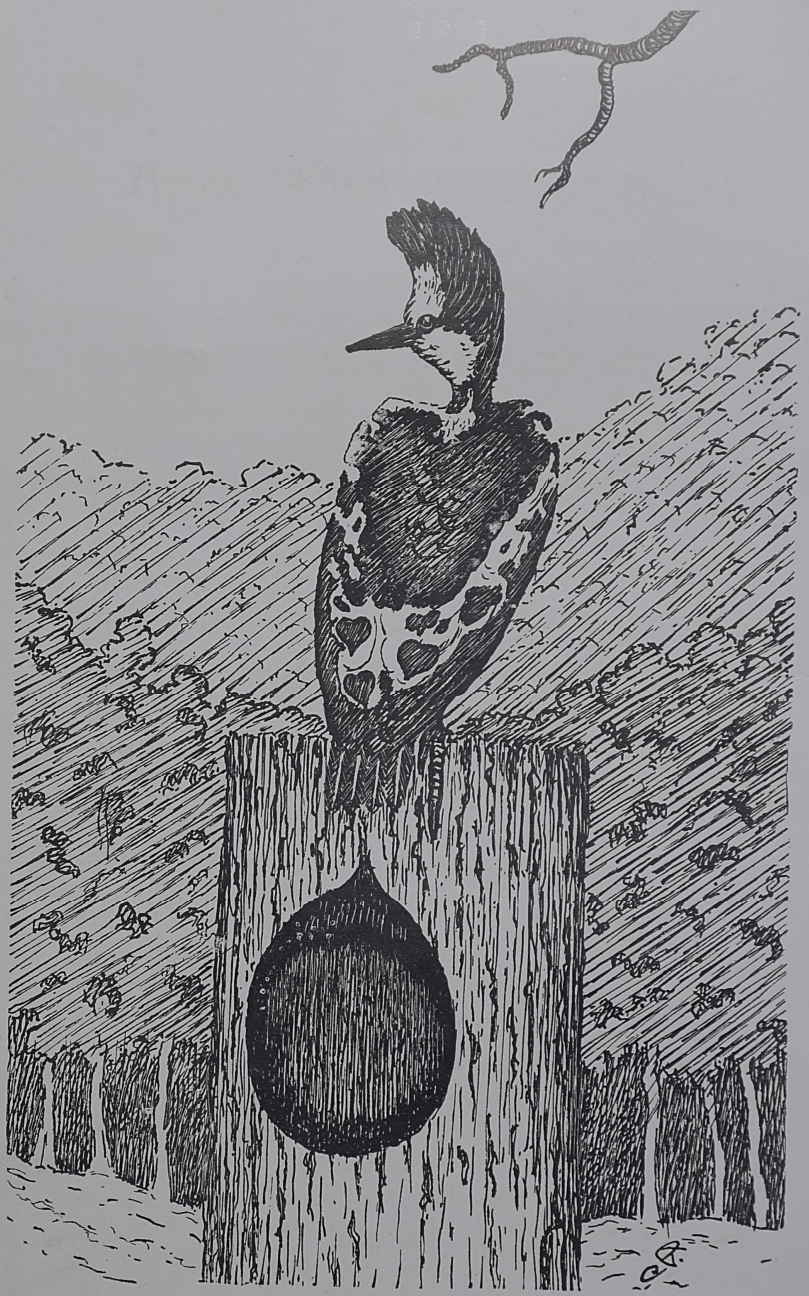


HEMICIRCUS CANENTE CORDATUS *Jerdon*
The Malabar Heart-spotted Woodpecker.

Owing to the expense of the Snake charts we are unable to give a coloured plate in this number but, instead, give Mr. C. Primrose's excellent drawing of the Malabar Heart-Spotted Woodpecker, a bird whose nidification is little known.

Editor.

JOURNAL

OF THE

DARJEELING NATURAL HISTORY SOCIETY.

Vol. XII.—No. 4.

The Nesting of the Malabar Heart-Spotted Woodpecker

Hemicircus canente cordatus, Jerdon.

(With a plate.)

The Editor.

I sent the following most interesting account of the nesting of the Malabar Heart-spotted Woodpecker, which I received from Mr. C. Primrose, to the Bombay Natural History Society. *(Journal Vol. XXXV page. 207-8).* He has now most kindly sent me an excellent drawing of this interesting bird so I am reprinting the article and reproducing the drawing. This is Mr. Primrose's account :—

"I am sending you two eggs of *Hemicircus c. cordatus* taken on November 26, and December 15, respectively. These I have little reason to doubt were laid by the same bird as the following details will show. The first nest, a shallow tunnel of some 5 inches in depth, made in a rotten fencing post, 3 feet from the ground, was taken by me and contained one fresh egg. Shortly after I noticed another nest being excavated on a similar post about 50 yards further along the line of fencing and, waiting until I judged the bird had time to lay, took this as well finding one fresh egg as before. The fence runs along a much frequented path near the jungle. Both nests were not more than 3 feet from the ground and, in shape, the entrance was much pointed at the upper end. The bird on hearing one approach climbs up and keeps a look out from just inside the hole, its creamy yellow forehead and upper breast blending well with the background of the newly worked rotten wood. It allows a close approach before leaving the nest and then only goes a

short distance away and looks anxiously at the intruder, uttering its characteristic and rather metallic note and bobbing about in a jerky manner. It returns to the nest very quickly if one conceals onself and after a look round, whilst perched at the entrance, with a final Kestrel-like bob disappears inside. I shall keep a further look-out along the many miles of fencing held up by rotten posts round this estate and see if I come across more. Incidentally the fencing posts, where these nests were taken, were within a few yards of heavy forest containing many dead trees and branches. The bird is certainly common here, usually seen in pairs, which attract one's attention by their noisiness."

Mr. Stuart Baker, when writing his account of the nidification of this bird in his *Nidification of the Birds of the Indian Empire, Vol. III p. 313,* apparently, did not notice Mr. Primrose's note. Mr. Primrose's note is specially interesting as it differs from that given by Mr. Stuart Baker. We quote the note published, in the abovementioned work, by that naturalist.

"This little Woodpecker is found only on the West coast of India from Kanara South to the whole of Travancore.

"It is, apparently, a forest bird, though not keeping very closely to dense forest. It occurs from the plains up to about 4,000 feet.

"There is nothing on record about its nidification except that Bourdillon found it breeding in South Travancore in February.

"I have two clutches of eggs taken by Stewart in that province from holes made in dead branches of high trees at great heights from the ground. Each clutch consists of three eggs, and they were taken on the 8th January and the 3rd May; the latter Stewart thought was probably an unusual date.

"Eight eggs average 23·5 18·6 mm....."

The Sunbirds of our area

By

C. M. INGLIS, F.Z.S., F.R.E.S., B.E.M.B.O.U.

(Continued from Vol. X. No. 3 page 90.)

5. The Black-breasted Sunbird.

Æthopyga saturata saturata (Hodgson).

Field identification :—The male is a very dark coloured Sun-bird with a long tail and a deep black breast. Found in various types of jungle from the plains up to 6,500 feet. Also seen about wild cherry trees when in flower.

Description :—The adult male is figured in the coloured plate and no description of it is necessary.

It measures, length about 6 inches; wing 2·15 and tail 3 inches.

Young male. A young male, moulting into adult plumage in September, has the head, upper back, chin, throat and upper breast light earthy brown with a few black feathers appearing on the sides of the head and one metallic bluish-purple one on the nape; remainder of upper plumage, with the exception of a couple of deep maroon feathers on the back, deep black; upper tail-coverts, and border to upper portion of central tail feathers, glistening metallic purplish-blue; breast mostly black, below that the dull grey-green of the adult, the central feathers only slightly produced.

Another young male, in November, is very similar to the above but with the deep crimson-maroon on the back well pronounced, more scattered metallic bluish-purple feathers on the nape and hind-neck and the central tail feathers prolonged as in the adult; the sides of the head, also have more black on them.

Ticehurst remarks. "Juvenile (unsexed) like the female but tail not so graduated and tips not so whitish; complete moult to full dress which is then retained all the year."

The female is pale green with a band of light yellow across the rump and the wings and tail brown with olive-green margins.

Length of wing 1·9 and tail 1·6 inches.

Distribution: In our area:—Found from 350 feet, plains leval, in the Duars, up to at least 6,500 feet in Darjeeling, on the hills.

Outside our area:—Stuart Baker gives the distribution, outside our area, as " Garhwal, Nepal, Assam, Cachar, Manipur, Chin Hills and Yunnan." In his *"Nidification"* he adds Kumaon.

Habits etc. :—In the summer this Sunbird ascends the Hills, at any rate, as high as 6,500 feet where we have obtained it on Birch Hill in Darjeeling. MacIntosh gives it as remaining in Darjeeling for the winter and ascending up as far as 9,000 feet in the spring. It may, possibly, remain in Darjeeling for the winter; we have secured it at Tukdah on the 19th November at 6,000 feet but 9,000 feet seems excessive, our highest specimens are from 6,500 feet and Stevens doesn't give it from above 6,000 feet and Stuart Baker only gives it to about 5,000 feet. Many remain down, at lower elevations, even breeding below 1,000 feet. We have specimens collected during nine months in the year and we give the elevations and dates.

January.—Gorumara 350 feet and Chupramari 800 feet, both in the Duars.

April.—Mangpu, 3,800 feet, in the Darjeeling District.

May.—Gangtok, 5,800 feet, in Sikkim.

June.—Darjeeling, 6,500 feet.

July.—Sureil, 5,200 feet, in the Darjeeling District.

August.—Darjeeling, 6,500 feet. This bird was breeding.

September.—Gangtok, 6,000 feet, in Sikkim, and Darjeeling, 6,500 feet.

November.—Tukdah, 6,007 feet, and Mangpu, 4,000 feet, both in the Darjeeling District.

December.—Gopaldhara, 4,720 feet, in the Darjeeling District.

It is found in various kinds of jungle, oak, mixed oak and rhododendron, dense evergreen or deciduous, scrub-jungle, open forest or bamboos. We saw numbers attracted by the flowers of *Holmskiolda sanguinea*, which is shown in our plate, they are, also, to be seen feeding from the flowers of wild cherry in November. Stevens writes :—"Generally distributed, occurs up to *an elevation of 6,000 ft.* at all events in "the rains." During "the cold weather " it keeps to the warmer bottoms of the valleys, Gopaldhara, 4,720 ft. Only a few birds are to be seen in this "Sunbirds' paradise" when the cherry trees are in blossom in November, as there is no appreciable augmentation of their numbers as is so noticeable with *Æ. ignicauda* and, in some measure, *Æ. gouldiæ* at this favourable time ; yet they frequent scattered cherry trees at lower limits to some extent with *Æ. nipalensis*. During late April, I have seen odd birds probing the flowers of the cardamom at ground level."

In habits and food they resemble the other birds of the same genus.

With regard to the nidification of this Sunbird, Stuart Baker gives the following account in his *"Nidification of Birds of the Indian Empire Vol. III"* :—"It is not a bird of high levels. In the Patkoi and other Naga ranges it breeds between 3,000 and 5,000 feet ; in Cachar it bred actually in the broken foot-hills, under 1,000 feet altitude, while in Naini Tal Whymper got many nests at 4,500 feet.

"It frequents jungle for breeding purposes but it does not seem to matter of what kind this is—forest, evergreen or deciduous, dense or open ; also scrub, secondary growth or ever bamboo, though this latter is exceptional.

"In Cachar A. M. Primrose found it breeding in ravines in the foot-hills where the forest was of great height but the undergrowth not very dense. In Margherita Coltart

and the Patkoi Nagas only obtained nests in very dense, very humid forest, where the ground was very broken. As regards Naini Tal, Whymper, in a letter to me, writes of some nests and eggs which he kindly gave me :—"The above are very interesting nests ; I saw them built, but I never found them anywhere but in that one place, a deep dark nullah with a stream down the middle and the nests, four in all, were close to it. As a matter of fact they had to be close to the stream, as the nullah was very narrow and the banks steep and close to one another. It was in forest and at an elevation of 4,500 feet."

"Whympers' nests and all the others I have seen were practically exactly alike, and a description of one suffices for all. In shape they are broad pears with a well-defined neck, sometimes slightly drawn out, with a porch over the entrance, the lower edge of which is about on a level with the bottom part of the entrance. Roughly the nests measure 5 to 6 inches in length and about $2\frac{1}{2}$ to 3 inches across, the porch projecting rather more than $\frac{1}{2}$ inch beyond the walls of the best. The cavity is about 2 inches in diameter and the same in depth. A nest taken in Cachar by Primrose was bigger measuring about 8 inches in height, with an egg-cavity 2×2 inches. They are compactly made of fibre, moos and a few grass-stems, moss being the principal material but well kept together and compacted with the other materials. Whymper does not mention silk or cob-webs, but in those I have seen in Margherita these materials were always used in some degree to tighten up the fabric. The lining is always of the finest cotton-down in great quantity.

"Nests found by Whymper were attached to thin branches of bushes or low down in creepers and nettles. Other nests have all been either in bushes or attached to ferns, climbers and bracken at any height from a few inches to four feet from the ground.

"The breeding season is May, June and July and I have eggs taken from the 12th May, to the 13th July.

"The number of eggs laid is two or three.

"Some are like the eggs of *seheriæ* but most are rather unusually coloured for Sunbirds. The ground is white, as usual, but the markings consist of specks, spots and, occasionally, blotches of inky-black with secondary ones of inky-grey. These are normally sparse over the greater part of the egg but more numerous in a ring at the larger end.

"In shape the eggs are broad ovals and in texture quite normal.

"Twenty-five eggs average 14·6 × 11·3 mm."

Primrose kindly sent me a nest which differs from Bakers' description there being practically no moss at all used in its construction, I described the nest in the *Journal of the Bombay Natural History Society Vol. XII p. 217* with Primrose's note as follows :—"I found a nest of 890 *Æ. saturata*, the Black-breasted Honeysucker, on the 11th of June, attached to a bamboo about 3 feet from the ground. It contained two fresh eggs, broadish ovals, of a white colour, freckled all over with greyish-pink or lilac, forming a zone at the thicker end. Female identified and shot off nest."

The following is my description of the nest :—

"The nest, which he kindly sent me, is of rather neat construction. It is pear shaped, and made of what seem to be black hair-like rootlets, in which are incorporated some dry bamboo leaves and a little moss. Within these rootlets is a lining of fine grass stems, again the egg cavity is lined with down. The opening is to the side, and overhung by a cornice which projects 1·4 in. above the entrance. In length it is about 8 in. ; and the circumference above the cornice is $6\frac{1}{2}$ inch that of below the entrance being 9 inch. Inside the breadth at the entrance is 2 inch ; and the egg cavity is also 2 inch deep. The entrance itself measures 1·2″ × 0·7″ and the cornice 2·7″ × 1·2″."

I made a water colour sketch of the nest and it is practically brownish-black in colour the cornice, entrance and dry bamboo leaves being all that relieves it except for the *very* small quantity of moss.

6. The Nepal Yellow-backed Sunbird.

Æthopyga nipalensis nipalensis (Hodgs.).

Field identification :—The adult males are easily recognized by their yellow breasts, deeply streated with crimson, looking like fiery orange ; the dark upper plumage, matallic green on head and neck, and deep maroon back contrested with bright yellow on the rump and the long tail of the genus. Found from below 3,000 up to 10,000 feet. One of the most familiar of Sunbirds in the hills coming into gardens freely.

Description :—Adult male.—This is figured in the coloured plate but we had better describe the upper plumage as little of it is shown. It has the sides of the head black and the whole of the rest of the head, as far as the hind-neck and chin and throat, metallic green ; sides of neck, and the back, very deep crimson-maroon, then olive green above the rump, the latter being bright yellow ; upper tail-coverts, and the greater portion of the central tail feathers, metallic green like the head and the closed wing golden-olive.

It measures, length about 6 inches ; wing 2·1 and tail 2·7 inches.

Young male.—A young male, assuming full plumage, in November, has the whole head, and from the chin to the upper-breast, light earthy-brown tinged with golden-olive on the nape and back, one or two maroon feathers appearing on the latter ; the rest of the plumage as in the adult male.

The *female* is olive-green above with brown centres to the crown and yellower on the rump ; closed wing golden-olive ; from chin to upper breast olive-grey changing to olive-yellow on the abdomen and yellow on the under tail-coverts ; the tips to the lateral tail feathers are well defined.

The wing is 2 and the tail 1·7 inches. Stuart Baker writes :—The females of this group are separated from those of the *siparaja* group by their yellow under tail-coverts and greyer chins and throats. The bill is also more strongly curved."

Ticehurst remarks :—Juvenile (unsexed) is like the female but tail not so graduated and tips not so white ; one, perhaps a male, has an orange wash on the breast which another labelled female lacks. Complete moult to full dress which is then retained all the year."

Distribution : in our area.—We have come across this bird above Buxa, in the Duars, between 2,000 and 3,000 feet, and it occurs in the Darjeeling District, and Sikkim, up to 10,000 feet, but is commoner between 4,000 and 7,500 feet.

Outside our area.—Stuart Baker gives the distribution, outside our area as :—"Eastern Nepal, Assam, North and South of the Brahmaputra, Manipur, Kauri Kachin Hills, Shan States."

It is also found in French Indo-China, Monsieur Delacour having collected ten specimens there.

Habits etc.—This is a Sunbird of both forests and gardens. It is the commonest of the Sunbirds in Darjeeling and may often be seen in our gardens or along the roads on Birch Hill and Observatory Hill. They are not shy birds and do not shun observation, feeding on the honey of the flowers and small insects which frequent them.

Osmaston found this bird breeding at Rangirun, in the Darjeeling District, at an elevation of 6,200 feet on the 14th May 1902. He describes the nest and eggs in the *Journal of the Bombay Natural History Society Vol. XIV p. 816* as follows :—The nest is oval in shape, measuring externally $5\frac{1}{2}'' \times 2\frac{1}{2}''$. It was suspended from the ends of a small *Cryptomeria* branchlet, overhanging a steep bank at a height of about 3 feet from the ground, and is composed of bright green moss with a little white vegetable down woven in, and is lined with the latter material.

"The aperture, which is 1 inch in diameter, is near the top. There is no 'projecting' roof over the entrance.

"The eggs, three in number, are white, sparingly spotted and mottled with very dark brown.

"The average of the three eggs is $\cdot 58 \times \cdot 41$."

Stuart Baker says Osmaston took other nests of this Sunbird agreeing with the above description. They were found "either in scrub-jungle or on the outskirts of jungle attached to low shrubs, 2 to 4 feet from the ground, and at elevations between 6,500 and 7,500 feet. The eggs in four other clutches taken by Osmaston are all pure white."

Jerdon described a nest of this bird, apparently found at Darjeeling, as "very neatly, though loosely, made of moss, domed at the top, with the entrance at the side, overhung by a sort of projecting roof; it contained two eggs of a dusky-greenish tinge, with numerous small dusky spots."

Stuart Baker says that Jerdon is undoubtedly wrong as "no Sunbird ever laid eggs of a dusky-greenish tinge."

According to Hodgson, as given by Hume, in "*Nests and Eggs af Indian Birds*" *Vol. II, p. 251*:—this species begins to lay in April, and builds comparatively large, oval, hanging nest (composed of moss and wool, and lined throughout with silky down,) which is attached to some leafy twig, at an elevation of from 3 to 5 feet from the ground. These birds, it is said, breed only in Nepal, in the central hill-region, frequenting groves and open forest, in which also their nests are always found. The dimensions of a nest which are given accord well with those of the figure. The nest is egg-shaped, 7·75 inches in length by 4 in breadth, and a little above the middle is an oval aperture about 1·62 by 1·0 inch. There is no portico or projection above this, and whereas in the nest of *Æ. scheriæ* dark-coloured hair-like roots seem to constitute the chief components of the nest, in the present species green moss and white wool-fibres seem to predominate. They lay two or three eggs, which are figured as moderately broad ovals 0·68 by 0·43 inch. The eggs are represented as nearly white a certain amount of reddish mottling towards the large end. They have only one brood in the year, and both birds participate in rearing the young, which are ready to fly in July."

With regard to this account Stuart Baker, says it is more possible than Jerdon's and may refer to this bird.

With regard to his own knowledge of the nesting of this bird he writes in his "*Nidification of Birds of the Indian Empire*" *Vol. III page 213*:—"A nest with young found by myself, and another brought to me with three eggs and both parents are bigger than those described by Osmaston, though similar in shape and material, except that with the moss were mixed roots, fibre and chips of leaves. The eggs, however, are not I believe those of a Sunbird, though the nest brought with the birds is correct. They may be the eggs of a *Chalcites* (Violet or Emerald Cuckoos). They are white, mottled at the larger end with reddish-brown, very sparse everywhere except in brood rings. They measure up to 16·9 × 12·7 mm. and, though the bulk is no greater than in the eggs taken by Hodgson, they seem much too big to be those of the Sunbird.

"Osmaston found two eggs only in every nest but the first, in which he found three. They are rather long, pointed ovals, close but dull texture and very fragile."

"Eleven eggs, omitting mine average 15·3 × 10·8 mm.

We shall now take the genus *Leptocoma* which differs from *Æthopyga* in having the tail of both sexes short and rounded. The males all have metallic colouring in their plumage, the females green above and yellow beneath.

Some authors prefer to use the name *Cinnyris* for this genus, the figure in our plate has been named so.

There are twelve species and subspecies in this genus only one of which occurs with us.

7. The Indian Purple Sunbird.

Leptocoma asiatica asiatica Lath.

Cinnyris asiatica asiatica on the plate.

Field identification.—A tiny plains bird occurring both in gardens, round villages and in forest. The male

resplendent in metallic black with scarlet and yellow tufts under the wings which are often visible. The hen is soberly clad in greenish-brown above and yellow below. Seen feeding from flowers.

Description.—The *adult male* in breeding plumage is shown at the top of our coloured plate and no separate description is necessary.

Length 4·5 inches, wing 2·1 inches and tail 1·5 inches.

Males. Seasonal Change.—What Stuart Baker writes in the Fauna sums up the changes in plumage so concisely that we cannot do better than quote what he says:—

"**Males in Winter** lose the metallic plumage and become greenish above and light yellow below with a broad median steak of metallic block. Finn and Ticehurst have shown that in addition to the complete Spring moult the males have a body-moult in the Autumn and the latter has in his collection specimens of the Sind race showing the new yellow feathers of the abdomen appearing among the old metallic feathers. In the Common Indian Purple Sun bird both Spring and Autumn moult must be most irregular as males in full breeding-plumage are common throughout the Winter, but with a bird having so prolonged a breeding season this is to be expected."

We have two specimens collected on the 24th and 25th November showing the undergoing of the body moult. In both there are patches of the metallic colouring of the back among the brown feathers, more metallic than brown, but the lower plumage differs considerably, in one there are only some yellow feathers on the sides of the breast, and each side of the throat, and the wing tufts are absent, whereas most of the lower plumage of the other, is yellowish below, except for the broad metallic block mediam patch from the chin to upper breast and a few feathers of the same colour scattered over the rest of the plumage; in this specimen the wing tufts are present but with the scarlet absent on one side. Another bird, shot on the latter date, is *just* as brightly coloured as others collected in March.

Young males are like the females but rather greyer below and they acquire metallic coloured upper plumage and a broad stripe from the chin to the lower breast at their first Spring moult.

The female is greenish-brown above, rather bright yellow below, brightest on the breast and the tail dark brown with the lateral feathers tipped with white.

Distribution:—In our area: Although Stuart Baker says that they bred commonly in the Himalayas up to 5,000 feet and less so up to 7,000 feet this does not apply to our birds which are *entirely* a plains species occurring all over the Duars and possibly the Terai although we have no specimens from there.

Outside our area:—Stuart Baker in his "*Nidification of Birds of the Indian Empire*" *Vol. III p. 215* gives the distribution as:—"found over the whole of India excluding Sind and the North-West Provinces and extreme Eastern Bengal and Assam. It is equally common all over the plains and on the hills of Southern India to their summits, while in Himalayas they breed commonly up to 5,000 feet and less often up to 7,000 feet."

Habits etc.—This lovely little Sunbird, in one form or another, is found all over India, from the and North-West and Sind right down to Ceylon where our race, the typical one, is found and in the damp forests of the plains across to Burma. With us it is entirely a plains species, where it is resident, never ascending the hills to our knowledge. Neither Stevens, Shaw nor ourselves have ever come across it there.

It is a bird more of civilization than of the jungles though by no means uncommon in the forests of the Duars.

They are very partial to gardens and round about villages etc. Their habits seem to differ much according to theic habitat; those which inhabit our gardens are very tame and familiar, ever to the extent of coming into our verandahs and breeding there; while, on the other hand, those which keep to the forest are very much shyer.

The male bird, besides being a gem of beauty, iridescent with purple or green according to the angle at which it is seen, is quite a good songster, even when not breeding, his song somewhat resembling that of a Canary besides also having the trill of other Sunbirds.

They are not very sociable birds, often seen alone but, in Bihar, we found it more sociable during the non-breeding season, a dozen or more being seen together.

Stuart Baker gives a charming description of this little bird. He writes :—"It is a most active and energetic little bird, ever on the move ; sometimes dodging about the branches of a flowering shrub, first hanging head downwards to peer into some flower, then dashing at a leaf to secure a tiny insect, and, anon, poised on quivering wing, it hovers in front of another bloom sucking its dinner of nectar, seasoned with small insects. Its display is very beautiful. It hovers vertically in the air, its wings beating so quickly that only a haze of feathers is seen, in front of which its pectoral plumes show like a blaze. For a few seconds this attitude is maintained then with a flick of its wings it is away, only to return in a few moments to the same spot and repeat this performance."

It does not obtain all its food, which, besides nectar, consists of small insects, from the flowers and leaves but will also pick it up from the ground or capture it on the wing.

These birds may be classed as beneficial. Mason examined the stomachs of 14 birds of this species, at Pusa, and of 43 insects, 27 were injurious, 16 neutral and none beneficial.

This little bird breeds freely in our gardens, even making its nests on creepers on the walls of a bungalow, but others again, according to Stuart Baker, "may be found breeding in forest and scrub-jungle and in the cane-brakes and swamps of the Himalayan Terai."

In Bihar we found this bird breeding from February to May, the earliest nest with eggs being on the 12th of February and the latest on the 30th of May. There are

usually two or more broods in quick succession usually in the same nest, unless this is worn out. Stuart Baker writes (*Nidification of Birds of the Indian Empire; Vol. III p. 216*), "It is difficult to say what constitutes the principal breeding season for this little bird but probably in the plains there are two main periods, March and April before the Rains break and then the end of June, after which they have broken, to the end of August. In the hills they breed from the middle of April to the end of June, those birds which have second broods laying as late as the end of July.

"In the plains, however, eggs may be found in every month of the year and most birds have two broods and many have three."

We have seen many nests in Bihar where this Sunbird is very common but Humes description (*Nests and Eggs of Indian Birds 2nd ed. Vol II p. 253*) is so excellent that we quote him:—"The nest is pendent and composed of *all kinds* of materials beautifully woven together with the silkiest fibres and cobwebs; hair, fine grass, pieces of decayed wood, lichens, rags, thorns, etc., are all pressed into the service. The body of the nest is oval, generally, with all sorts of little pendent pieces of wood, etc., hanging *below*, as ornaments apparently, while the apex of the oval is prolonged into a cone meeting the point of support. A little above the centre of the oval, the wall of the nest, which is ready some days before the eggs are laid, is pushed out or bulged out a little so as to give room for the sitting bird's tail. The bulging-out of the back of the nest is one of the last portions of the work, and the female may be seen going in and out trying the fit, over and over again. When sitting, the little head is just peeping out of the hole under the awning I remember in February 1867 seeing a nest suspended to a punkah cane which was stretched across Brook's verandah at Etawah. This nest was founded on two or three narrow strips of gun-rag, which had been left hanging across the cane, black, and smelling of gunpowder. Yet with these unpromising materials and plenty of silky grass etc., it made a pretty little pendent home.

"As regards the portico, this, though general, is not universal, and I have seen many nests in which it was entirely wanting."

The nests do not always have the ornaments hanging below them and on the whole they scarcely look like nests but more like rubbish and dead leaves caught in a spider's web.

Besides the materials mentioned by Hume, many curious materials are sometimes brought into use in the construction, or adornment, of these birds' nests. We have many times found the excreta of caterpillars hanging, by silken cobwebs, to the bottom of nests, or incorporated in the structure. Adams found the bright feathers of a Paroquet and Roller tacked on and on one occasion "on the side of the nest, stuck on like a sign-board, was a piece of a torn-up letter with 'my dear Adams' on it. Rhodes Morgan found a most extraordinary nest in an acacia tree "It was ornamented with bits of blotting-paper, twine, and old service-stamps that had been left lying about....." Stuart Baker has seen a nest "which externally was composed almost entirely of very small scraps of white calico, cotton and flannel, taken from a verandah where a native tailor sat daily at his work".

With regard to the situations, in which nests may be found in Bihar, sticks, used for the support of peas, were favourite spots on which they hung their nests. Other situations, which were fully used there, were bits of string, hanging under the eaves of houses, bamboos, creepers, thorny hedges, twigs of small bushes, pomegranate, peach, kheir and mango trees. Most of the nests were from 2 to 5 feet from the ground but one was about 20 ft. and another one 40 feet up in a mango tree. Only the female appears to build the nest and sit on the eggs and an egg is laid daily until the number is complete.

Stuart Baker has found nests in long grass and has seen a nest attached to two or three stems of Pampas-grass and has also seen, on several occasions, nests of these birds and hornets' nests within a few inches of each other on the same bush."

The number of eggs laid is two or three.

The eggs vary from greyish to greenish-white, with different shades of grey or brown blotches or freckles, sometimes forming rings or caps at the larger end; others are freckled all over with darker grey.

The average size is 0·64 by 0·46 inches. We can find little about these or any other Sunbirds in Captivity, Finn wrote that the first Purple Sunbird to reach England was one he took home in 1900 but it did not survive the journey very long. We kept another species the Purple-rumped Sunbird *(Leptocoma zeylonica)* for about six months feeding it on sugar and *satoo* mixed into a paste. This same species, according to Finn, has been successfully kept in captivity. He wrote :—"Mr. E. W. Harper sent a pair to the London Zoological Gardens, and Mr. F. Groser had two lovely full-plumaged cock birds as perfect as wild ones, which he had successfully reared from the nest, feeding them at first on small grasshoppers."

With regard to feeding Sunbirds in general Finn wrote :—In captivity they should be fed on honey slightly diluted with water and mixed with *satoo* into a thin pap, with maggots when obtainable. When this is not the case, some crumbled yolk of hard-boiled egg should be mixed up in the pap. There is no trouble in getting them to feed, and they are soon reconciled to captivity."

Dr. Law has given us most interesting notes on the keeping of Sunbirds in captivity.

(To be continued.)

Notes on Bird Collecting

By

HUGH WHISTLER, F.Z.S., M.B.O.U.

(*With 10 Diagrams*)

(*Continued from page 96.*)

Before proceeding with Mr. Whistler's paper we would like to state that the excellent illustrations accompanying it and which will be such a help to the reader, are the work of Mr. C. Primrose to whom we acknowledge our thanks.

(*Editor*).

Treatment of the freshly shot bird.

Too much stress cannot be laid on the importance of keeping a bird clean from the moment that it is shot till the moment that it reaches its final resting place in the cabinet. A bird soiled in the field or during the course of skinning can, it is true, be cleaned but such a specimen never reattains its pristine freshness of plumage and is always more liable to become dirty again. While cleaning badly carried out is apt to load the plumage with powder which often affects the satisfactory appreciation of colour tints, important to the study of subspecies. The cleaning of a skin may often take as long as the whole process of skinning.

On shooting a bird, therefore, the competent collector will direct his first care to preventing the plumage from being soiled by blood, mucous of fæces. The dead bird is picked up by the beak and all blood on the feathers is removed with butter muslin or other absorbent cloth. Heavy clots of blood, which often collect in the feathers from punctured arteries or lungs, are best removed with the blade of a knife. They may thus be taken away whole. Large shot holes should be plugged with a little cotton wool, pushed well into the wound with a small forceps, the point of a pencil or piece of fine stick and, if water is handy, fresh blood may often be washed from the feathers, particularly the wings and tail, but it is unwise to wet the feathers in the vicinity of a shot hole as it may induce subsequent soakage from internal blood clots which then stain a large area. If an eye is badly smashed a plug of wool should be inserted under the lids or it may even be removed bodily with the forceps, either by way of the lids or through a hole in the roof of the mouth, the cavity being plugged with wool.

Particular care should be taken to plug the throat and mouth, and with lage birds even the nosotrils (being careful not to damage their shape) and vent, to avoid leakage of any sort. If the bird is bleeding heavily at the mouth the throat should first be swabbed out as clean as posssible before plugging. If a bird of prey has the crop distended

with food, or a cormosant or gull has fish or offal in the gullet squeeze the contents out, through the throat if possible, otherwise they will greatly hasten the progress or decomposition.

In carrying the bird home avoid ruffling, bending and breaking the feathers, allowing it to rattle about or be unduly squeezed; this last implying almost certainly a fresh leakage of blood and mucous. The ideal treatment is to wrap each bird separately in butter muslin—to absorb any leakage—and carry each separately in a small box. This is always feasible with small and medium sized birds, a number of which can thus be carried in a haversack or basket. Large birds can be wrapped in a couple of sheets of newspaper. The resourceful collector will soon adopt the basic ideas suggested to the circumstances of his own particular case.

The preparation of a Birdskin.

The preparation of a Birdskin is essentialy a very simple matter. It consists of three stages, the removal of the body of the bird from its skin, the cleaning of the skin and the parts that are left with it and the final stuffing and making up of the skin to its original appearance. In these three stages there are certain fundamental things that have to be done. but so long as they are carried out the method of doing them to the best advantage becomes largely a matter of individual preference and craftsmanship. The collector who studies these instructions and learns to carry them out will soon find minor adaptations of treatment which best suit his individual circumstances and ideosyncracies.

Before starting to skin a bird be careful to provide yourself with the following requisites (1) tools (2) absorbents (3) preservatives and (4) stuffing materials. Although a variety of tools may be purchased, and are often quite useful, the essential tools are very simple and are already to be found in most households. They are a light knife or scalpel, a sharp pointed pair of scissors, a pointed pair of forceps and a narrow probe. They are best purchased separately in a

shop of naturalists or medical requisites and if the scalpel has a flat end to the handle this will often prove useful as an additional tool. The best scalpels have a metal handle.

Absorbents are required for soaking up blood or grease. The best are undoubtedly magnesium pond. (obtainable at any chemist) or fine sawdust (of any wood that does not contain turpentine or will not stain), but coarse plastor of paris, fine corn-meal. wood ash or similar material will do provided that it is clean and absorbent in character and does not become sticky when wet.

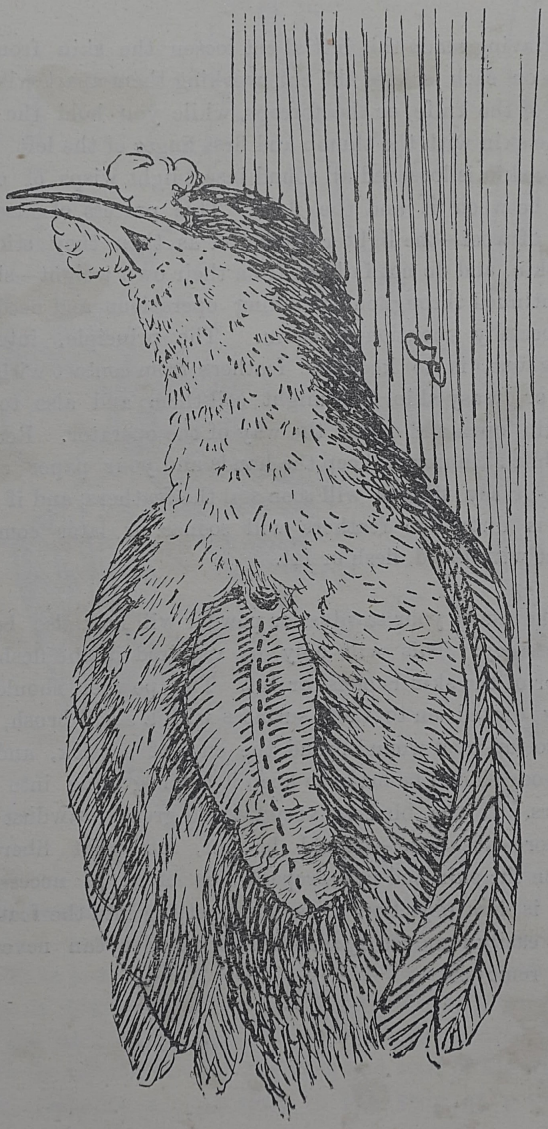
The best preservative for the amateur is undoubtedly arsenical soap, obtainable from any chemist, but care should be taken that it contains no turpentine or other ingredient which may affect the colour of the feathers. The more experienced collector will probably prefer a dry preservative composed of powdered arsenic mixed with powdered burnt alum or boracic powder. The use of alum is, however, best confined to the skull, wings and legs of the larger birds.

Stuffing materials comprise cotton wool and tow. The cotton wool need not be expensive, or antiseptic in quality, so long as it is uniform in texture and not lumpy. Freshly teased raw cotton is excellent, where available, but some sheet cotton wool is always desirable and the cheap unbleached variety, used by tailors for the padding of coats, is as satisfactory as any. Some pieces of stick, or wire, are also needed, as well as needle and cotton, both coarse and fine. The tow should be fine in quality, unless large birds are expected, when coarser tow will save bulk and money. Wood wool is useful for very large birds.

With these requisites beside him the beginner is ready to learn to skin a bird. The first attempts should be made on a bird with strong skin, harsh strongly attached plumage and of a moderate size. A starling, waterhen or crow is admirable for the purpose.

The first stage is the removal of the body from the skin. Lay the bird on a sheet of paper on the table in

front of you on its back with the beak pointing to the right, and stretch out the wings open. *Part the feathers of the breast with the point of the knife and then make a straight incision in the skin from the point where the merry thought joins*



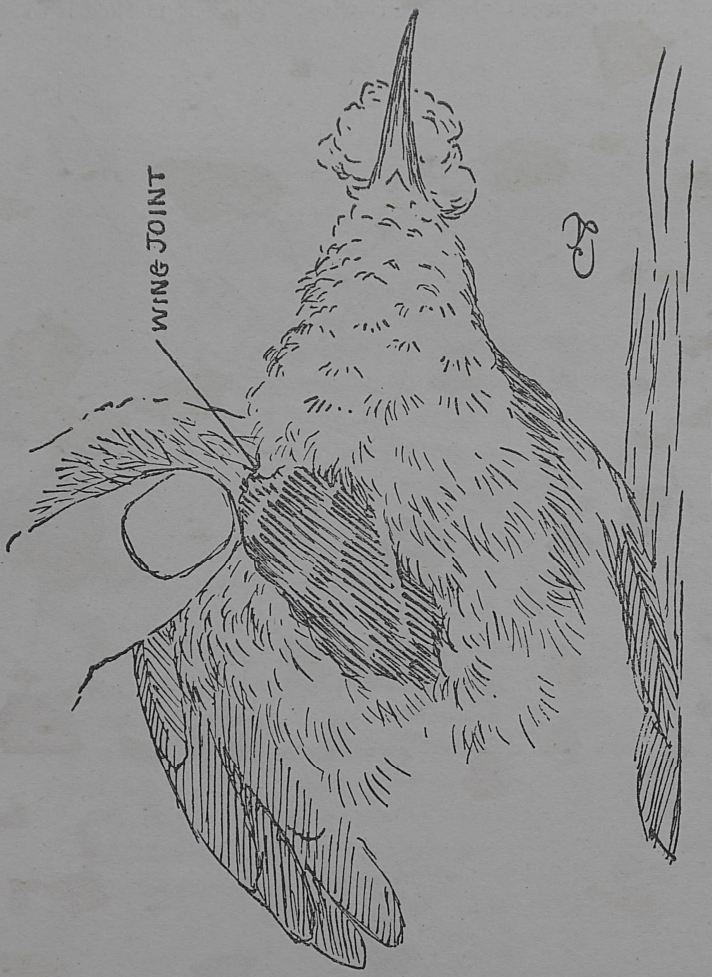
DOTTED LINE SHOWING INCISION.

the breast-bone, along the breast-bone to a point on the abdomen about half way between the breast-bone and the vent. In making this incision take great care not to cut the wall of the abdomen with a resulting liberation of the intestines.

Having made this initial cut loosen the skin from the flesh, on each side of the cut, working them apart with the point of the knife, or the forceps, while you hold the edge of the skin with the thumb and first finger of the left hand. As the skin is loosened all round insert light wisps of cotton wool between it and the flesh. This process of inserting wisps of wool—the lighter the better as then they stick to the skin and do not fall out from their own weight—should be continued throughout skinning operations and need not be specially mentioned again. The principle, intended throughout, is to keep the feathers from contact with raw flesh, or greasy skin, that might soil them and also to hold the skin open and out of the way of the operator. Remember while skinning to keep the hands and your paper clean. Dirty greasy fingers will soon soil the feathers, and if your paper is dirty the feathers will sooner or later come in contact with blood, flesh or fat.

The use of your sawdust or powder will now also begin, if necessary. This will only be required if the flesh and interior of the skin is moist or fat. The powder should be lightly dusted on to those surfaces with a small brush, or a little cotton-wool wound round the end of a stick, and an endeavour should be made to keep it from getting into the feathers. If the bird is very fat and greasy, sawdust—as far more absorbent—should be put, somewhat liberally, between the skin and flesh, repeated as often as necessary. There is less objection to sawdust getting into the feathers as it is easily removed again whereas powder can never be wholly removed.

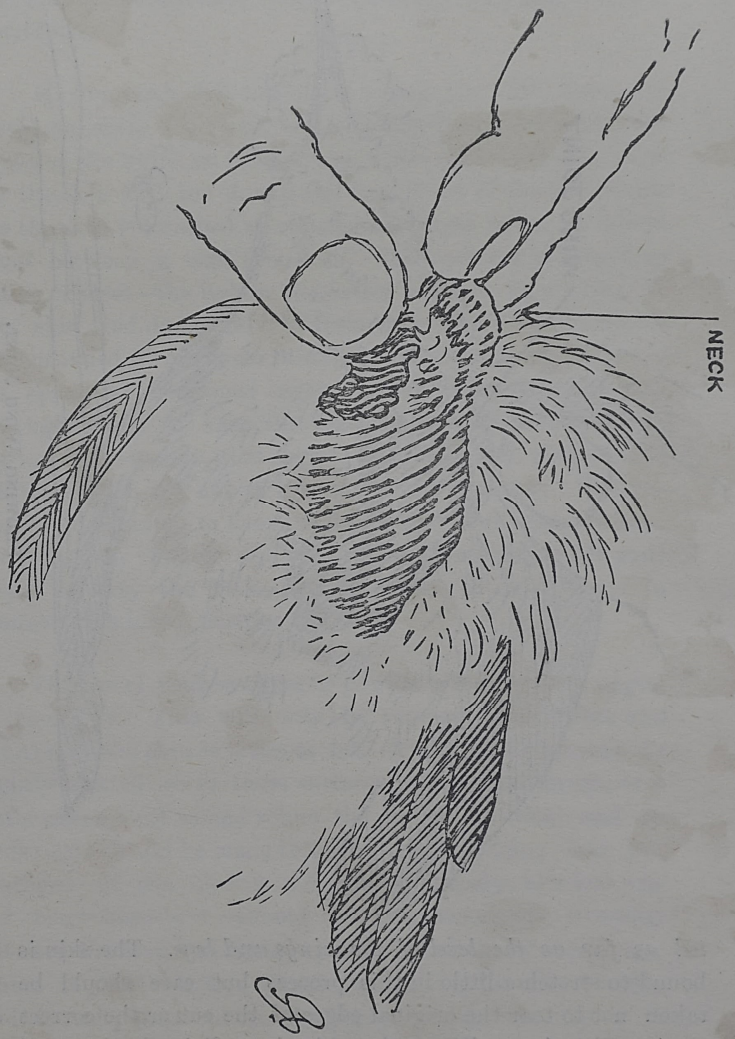
The process of loosening the skin must be continued gradually round the cut *until the skin and flesh are separa-*



Showing Wing Joint.

ted as far as the level of the wings and legs. The skin is bound to stretch a little in this process but care should be taken not to tear the original edges of the cut or the correct shape will be lost. When the skin is sufficiently loosened to make it possible to insert the fingers within, proceed to detach the neck and wings. This requires same care. The intention is to cut through the flesh and bone of the wings and neck inside the skin, as close to the body as possible

detaching wings and neck from the carcase and leaving them with the skin. Start with one wing, *then go to the neck* and then to the other wing. The best method is to



SHOWING NECK.

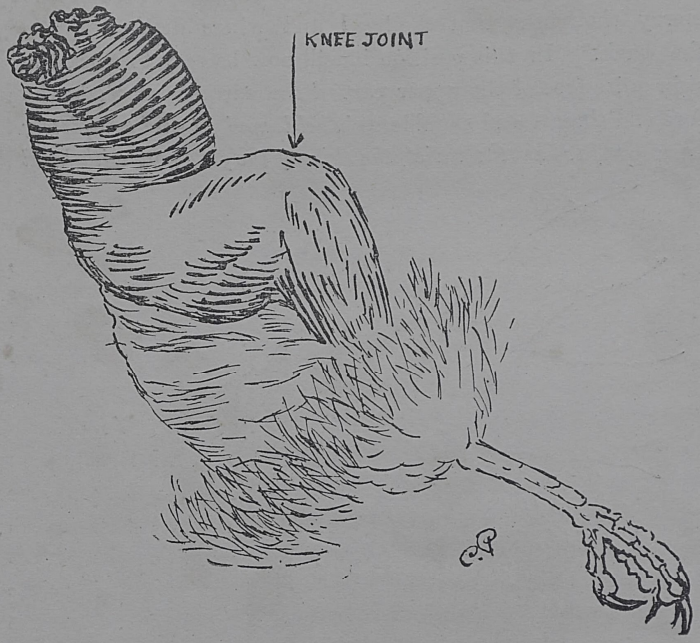
hold the bird in the air in the left hand, with the first two fingers inside the skin, by the wing, between the skin and the carcase, while the thumb is outside pressing on the feathers at the back of the bird.

A little manipulation of the two fingers inside the skin, assisted by the thumb behind which presses up the wing bone into position from behind, will soon enable the scissors, in the right hand, to cut through the bone, with its flesh and tendons, without damaging the neighbouring skin. This process is then repeated for the neck and the other wing. Now hold the carcase in the left hand, with the neck end uppermost, and the first finger within the fork of the merry thought so that the head and wings droop towards the back.* In this position it will now be easy to work the skin quite free of the upper part of the carcase so that the fore end (breast and shoulders) is *held upright and completely bare as far as the waist, the skin of the fore end with head*

SKINNED TO LEGS.

*If the bird is a large and heavy one it may now be suspended by means of a hook on a chain, the hook being inserted somewhere near the neckend in order to mantain the upright position. This has the further advantage of freeing both hands for the work of seperating the skin from the body.

and wings hanging backwards over the rump. From here it is easy—still holding the carcase upright in the left hands—to separate the skin from the body downwards towards the tail, though it must be remembered that the skin along the backbone is very tender and firmly attached in some species. When *the body has been skinned nearly to the tail, the legs must be cut through at the knee-joint.* This, too, is very easily

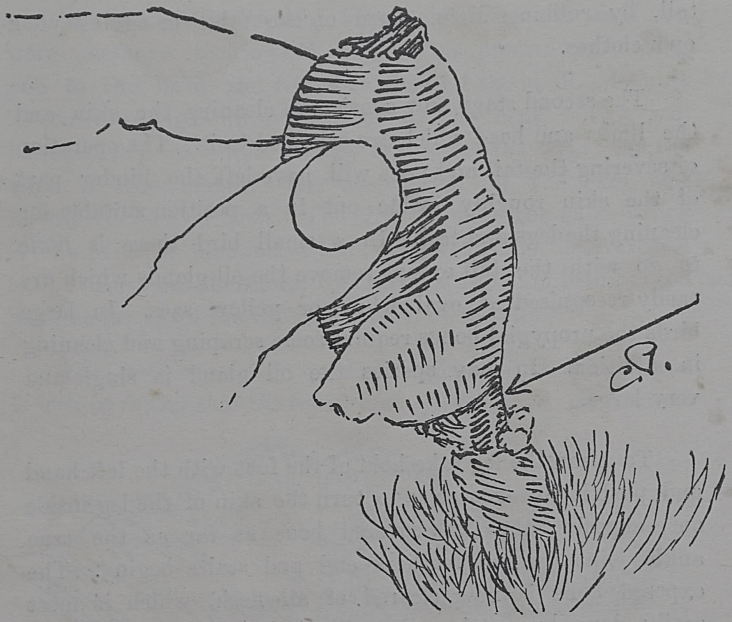


SHOWING KNEE-JOINT.

done, as by now the thighs are well exposed and it is only necessary to loosen the surrounding skin to lay the knee-joint bare to the scissors. After the knee-joint is cut through the legs remain with the skin and will be dealt with later. When both legs have been cut through a little more separation of the skin from the body brings one to the tail and vent and the position now should be that the bare carcase is held upright in the left hand, the whole of the skin, with head wings and legs hanging from it, attached only round the tail. The separation of the skin and flesh should have reached the pygostyle (or parson's nose of the

table chicken) with its uropygial oil glands visible at the back. The final separation of skin and carcase is now to be made and this is an operation requiring considerable care.

The operation is really a double one, implying the cutting through of first the tail and the vent. *The tail must be cut through just above the pygostyle so that the latter and*



Point of severance of Tail.

its componant bones, to which the tail feathers are attached, remain with the skin as a support for the tail. This cut is best made with the scissors, the point of one blade being run through just under the vertebræ and the cut through the vertebræ made clearly upwards. Do not attempt to cut tail and vent in one or a serious mess is likely to result. When the tail is cut through work the skin off towards the vent until the vent is left as the sole point of attachment between the carcase and skin. The vent can then be severed with one clean cut by the scissors, a little on the inner side to avoid all risk of injury to the skin. The carcase should be set aside for later examination and stage one of our work is completed.

Many bird stuffers keep the bird lying on the table throughout the greater part of stage one in order to free the left hand but this greatly increases the risk of soiling and bruising the plumage and the beginner is advised to adopt the method of holding up the carcase in the left hand if possible. In either case remember in your preoccupation with skinning not to ruin the feathers, and particularly the tail, by rubbing them hard on the table or against your own clothes.

The second stage now consists in cleaning the skin and the limbs and head which are attached to it. The operation of severing the tail and vent will have left the hinder part of the skin roughly inside out in a position suitable for cleaning the legs and tail. In a small bird there is little to do with the tail except remove the oil glands which are easily recognised as oval white or yellow sacs. In large birds the uropygial bones require some scraping and cleaning in addition. In may species the oil gland is single and very large.

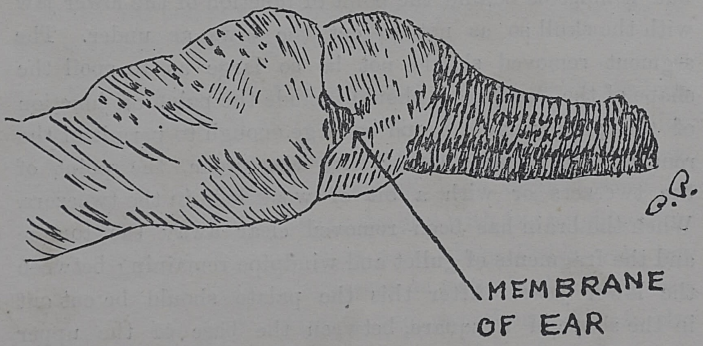
To clean the leg take hold of the foot with the left hand and push it inwards so as to turn the skin of the leg inside out, exposing the flesh-covered bone as far as the true ankle joint (where feathers end and scales begin). The exposed bone is now cleared of all flesh, which is most easily done by cutting through the tenders at the lower end and stripping them upwards towards the knee-joint. When the bone is clean cotton wool—or in large birds tow—must be wrapped tightly round the bone to replace the flesh removed and the bone, so wrapped, is the pushed back into the skin into its original position. When both legs have been done turn the hinder part of the skin back from its inside-out position to its correct shape and place some wool temporarily within the cavity.

Next proceed to clean the head, but before doing this make certain that the mouth is well plugged with fresh cotton wool and if the eyes appear to have been damaged plug them also. You are about to turn the head inside out

and if the eyes, mouth or nostrils leak blood, or mucous, in the process the feathers of the head and neck will be terribly soiled.

To turn the head inside out take hold, with the left hand, of the end of the neck (where you severed it from the body) and work the skin off it with the right hand so that you are gradually turning the neck inside out as if you were peeling a stocking off a leg. This process will bring you to the head and reveal the base of the skull. It must be continued right up to the base of the beak but it will be obstacled at three points, the ears, the eyes and the gape of the mouth. The obstruction of the ears and mouth will be over come. The obstruction of the gape, which is the point of junction of the two jaws, cannot be overcome and, at the sides therefore, will prevent the skin being taken back as far as on the top and bottom of the skull.

The ears consist of a small orifice behind each eye and it will be found that the true skin of the head is attached



Showing Membrane of Ear.

to the ear by a fine membrance inserted in the orifice. This membrance is easily pulled out of the ear in small birds or cut in large ones, but cure must be taken to avoid cutting or tearing the external ear hole. After each ear deal with the corresponding eye which will be found a little more difficult. The skin must be stripped forward until at least half the eye-ball is revealed. Then insert the point of the knife or forceps in the membrane which encloses the eye

in the bony socket, making the incision on the hinder edge of the socket, against the bone, so as to run no risk of cutting the eye. From the point of insertion carry the incision round the edges of the eye socket until it is possible to push the tweezers in behind the eye, break the big white optic nerve, which connects the back of the eye with the brain through a passage in the back of the eye socket, and lever the whole eye out of the socket. It will then be found attached to the eyelids by membrances which must be cut through again, as in the case of the ear, taking care not to damage the external shape of the eyelids. Take the greatest care not to puncture the eye or a grievous mess will result. When the skin has been separated from the bones as far as the base of the skull it is time to cut the base of the skull.

The object of this operation is to remove the neck and to expose the brains. A small segment of the base of the skull must be cut clean off with the knife or the scissors. The cut should be at right angles to the line of the jaws but it must be behind the point of junction of the lower jaw with the skull so as not to cut the jaws as under. The segment removed should not be so large as to spoil the shape of the skull but it should include the point of junction of the neck vertebræ and be large enough to permit of the removal of the brains, either with the probe, the point of the tweezers or with a bit of wool held in the tweezers. When the brain has been removed clear away the tongue and the fragments of gullet and windpipe remaining between the lower jaws. After this the palate should be cut out in the shape of a square, between the base of the upper mandibles, care again being taken not to disturb the attachment of the lower mandibles with the skull. After this clean off any flesh that still adheres to the skull.

The skull is now ready to be pushed back into the skin so that the skin of the head and neck, which have been inside out, will be restored to its proper position, when this is done make sure that no creases or wrinkles remain in the skin but that every part of it is drawn back into its original position so that the feathers lie neatly and smoothly.

Then fill the eye sockets with cottonwool, inserted through the mouth, *via* the hole in the palate, and pushed evenly into position, rounding out the eyelid's as in life. If, in the process, the wool picks up blood, or loose membranes, repeat the operation two or three times until two clean cotton wool eyes result, filling out the facial skin in its proper position.

Now proceed to clean each wing in turn. Hold the end of the wing bone, where it was cut off from the body, and work it out of the skin as far as the elbow joint. It will then be found that this operation brings into view the flesh that lies between the ulna and the radius, parting the skin along this area. With some manipulation it will be possible not any to clean the humerous but also the ulna and the radius, without interfering with the attachment of the primaries to the underside of the ulna. Now replace the flesh, taken from between the ulna and the radius, with a little cotton wool and in large, or particularly oily birds, bind a little wool tow round the humerus. Finally tie a piece of strong thread—whose purpose will presently appear —to the cut end of the humerus and pull back the bones of the wing into their original position.

The completion of this second stage is now attained with the cleaning of all fat, grease or flesh from the inside of the skin. In many birds no such cleaning is necessary. In other cases the wise skinner will have cleaned most of the skin as he goes along, dealing with the neighbouring areas as he turns the neck, legs and wings inside out, but in very fat birds, such as migrants or water fowl, a good deal of work will still be necessary and, sometimes, this is the worst part of the whole of the preservation of a bird. It is best done by scraping the inside of the skin with a knife, using sawdust or powder freely to absorb the grease and dry the skin. This job cannot be shirked, a little flesh may be left on the bones in the confidence that it will dry thoroughly and do no harm. Fat, on the other hand, will never dry but continue to dissolve into grease and discolour the feathers ultimately causing the skin to rot completely away.

The final stage consists of stuffing and making up the skin and to do this well requires a good deal of practice. First of all paint the inside of the skin, and such of the bones as remain, with the arsenical soap, applying it with a small paint brush in the form of a paste. The experienced skinner will probably make a habit of painting the skull and other parts as he cleans them out, so that merely the main inner surface of the skin remains to be done at the end.

The skin is now laid on its back on the table and arranged in a symmetrical manner, the head, body and tail in one straight line the two wings and the two legs extended evenly at the sides. The empty cavity of the body should be pulled into a natural rounded shape with the fingers. Then take hold of the thread, which was attached to the severed humerus bone of each wing, and tie these two threads together so as to draw the two wings into a natural position, with reference to each other, and to keep them the right distance apart. This is done to take up the slack of the extra skin which in the unskinned bird goes up into the hollow armpits under the wings. If it is not done the stuffed skin becomes too wide for the covering feather tracts and ugly creases in the feathers appear on the sides of the back. Do not tie the threads so tightly that the bones touch ; do no tie them so loosely that the wings are wider apart than they were in life. When the knot is tied and the wings are arranged to lie level with each other at the sides of the empty skin place a thin pad of wool inside the skin, covering the area of the back and holding the knot in place. Now prepare a skewer of wood to become the basis of your artificial body. The skewer should be long enough to reach from the brain to the vent of the bird when it is stretched out straight on the table. It should not be too thick and heavy. For a large bird the proportions of this skewer should be those of a butcher's wooden skewer. For a small bird a wooden toothpick, cock tail stick or a large wooden match are all admirable. If there is any doubt adout the correct length of stick err on the side of shortness ; a short skin looks better than an elougated one and also takes up less room in the cabinet.

The skewer will now be sharpened at one and cotton wool (or tow for large birds) will be wound tightly on to it until the whole diameter is rather less than that of the bird's original neck. Insert the skewer inside the skin, directing the pointed end up the neck until it reaches the base of the skull where it is inserted into the hole by which the brains were removed. Hold the bird's head in your left hand and the skewer in your right and press the point well home into the skull, fixing it firmly in the bony walls which lie between the eye and brain cavities or even if necessary through them into the base of the beak. The direction will be more easily found if it is remembered that a bird skin should be all in one plane, the beak continuing the line of the body and neck. The other end of the skewer should touch the bones of the pygostyle, being held in place by a piece of cotton wool placed in the hollow around it.

Now proceed to fill in the skin with cotton, wool, packing the wool lightly and evenly and not compressing it into a heavy mass or hard lumps. A light touch is essential so that as the skin dries and shrinks it may find its natural shape and compress the wool accordingly. Particularly care must be taken in filling the throat and neck as on this the appearance of the skin will largely depend. With small birds these parts are best filled in one piece, a carefully selected wisp of cotton wool being held between the blades of the forceps and inserted from the breast to the throat, the tweezers being withdrawn when it is in place. When the stuffing is complete—and do not make the bird too fat—draw the edges of the skin together so that the feathers fall together over the original incision and conceal it. The experienced bird-stuffer will not require to sew up the incision in small and many medium sized birds. The beginner is, however, advised to sew up the bird, being careful to use a running stitch which can be drawn tight with the thread at the end. This is done by making each stitch at the extreme edge sf the skin, taking the cotton alternately from side to side and in every case passing the needle from the inside of the skin outwards, care being taken not to let feathers, down or cotton wool be drawn up into the stitches.

FINISHED SPECIMEN

The stuffed skin must now be arranged to dry lying on its back. The wings are set carefully against the sides, the legs are crossed and tied and all the plumage smoothed and arranged in a natural manner. The beak must be shut and secured with a pin or thread. Small birds should be wrapped in a piece of muslin, lint or the "skin" of sheet cotton wool. Large birds may be held in position between cartridge boxes, or books, for a day or two, before being wrapped up. It, is, however, essential that in a few hours and again next day the wrapping should be undone to make certain that the bird is drying with all its parts in satisfactory positions. It is often found that in the wrapping a tuft of feathers has been disarranged, a wing unevenly set or that there is some other mischance which, if uncorrected in time, will spoil the whole appearance of the finished and dried skin.

In very large birds it will be found advisable to increase the amount of wool on the stick and make a more or less hard core for the body round it. In birds with long necks a galvanised wire may be used instead of stick so that—for considerations of space—the head and neck may be bent back to lie alongside the body or down the breast.

The time that a skin takes to dry varies according to size, temperature and humidity. It must be thoroughly dry before removal to the store-box or cabinet.

A few supplementary instructions are necessary.

1. With very large birds (size of a goose) the wings and legs will require opecial treatment. The ulna and radius cannot be satisfactorly cleaned from the inside of the skin but must be exposed with a cut made along their length on the under side of the wing, after the under wing coverts have been carefully parted. In very large birds the final joint will need similar treatment.

The tarsus may require to be cut open down the back in order to allow of the extraction of the tendons and fatty matter. This should always be done when the tarsus is feathered. It is often sufficient however to make an incision on the sole of the foot and draw the tendons through this hole.

Remember that both wings and legs require in these cases to be treated with the preservative.

2. Some birds, like woodpeckers and ducks, have large heads and slender necks and it proves impossible to turn the head and neck completely inside out in the manner described above. In such cases the neck should be turned inside out as far as possible and cut off as close as may be to the base of the skull. The skin is then turned back to its original position and the head will be treated from the outside. The feathers of the nape and crown are parted and a cut is made along the central line of the back of the head and neck, starting from the level of the eyes and continuing a short distance beyond the base of the skull. The skin is loosened on both sides of the cut until it is possible to work the skull backwards through the cut, gradually turning the skin inside out from this position. The skull will then be cleaned and treated in the normal way and finally pushed back throug the cut into its normal position. The cut will require to be sewn up.

3. Those who prefer it may reverse the order of skinning described and start with the legs and tail and work forwards to the wings and neck. In this case the original incision should start about the centre of the breast bone and go nearly to the vent. The legs will first be cut through and then the tail, and after the tail end of the carcase has been extricated from the skin the carcase will be held tail upwards in the left hand.

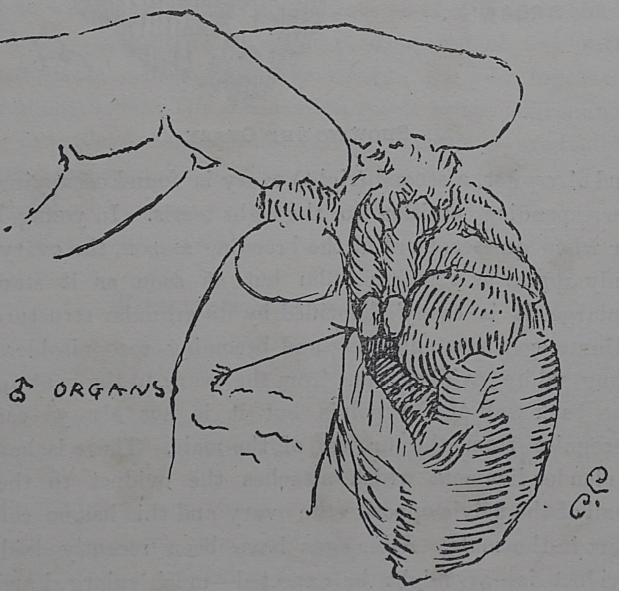
When the student has thoroughly mastered the principles of skinning a bird he may prefer, in some cases, to make his incision under the wing. This is often done with greasey birds like grebes and ducks to avoid soiling the breast. It is not, however, a very desirable practice.*

4. In spite of the utmost care some birds will be soiled with blood and require washing. This should be done with cold water and, except in extremce cases, should be confined to the actual feathers which are bloodstained. A small brush, piece of cloth or wad of cotton wool may be used. The feathers must be dried in such a way that they are fluffed out in the process and not allowed to remain matted. This may be done with an electric hair-drier or with repeated applications of dry sawdust worked thoroughly into the

*We have also seen specimens skinned through an incision in the back in cases like grebes, but there seems to be no advantage in this. *Editor.*

feathers and beaten out again with a dry goose-quill. A very greasey skin may require complete immersion in petrol or benzine even after the fat has been thoroughly scraped away. This will be dried by first leaving it buried in a heap of sawdust for a four hours and then by drying and beating it out in the manner described. These cleaning operations should normally take place at the end of stage two and immediately before the stuffing and making up of the skin.

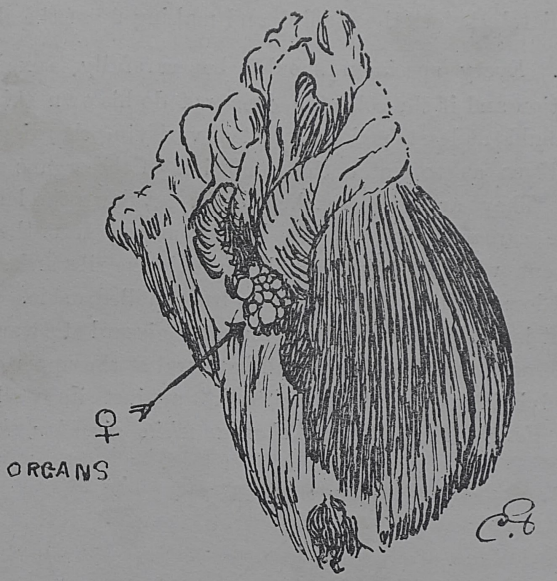
5. Every specimen should be carefully sexed by dissection and if the collector does not do his own skinning he should at least make a point of verifying the dissection himself so as to enter the condition of the organs on the label. They are best reached by a cut down the left side of the carcase, after it has been removed from the skin. This cut will be longitudinal through the ribs and side of the abdomen after the left leg has been pulled aside. After the cut is made push the intestines and gizzard forward out of the way and the organs will be found at the upper end of the pelvis in "the small of the back" against its wall. *In the male the two testes will show as white circular, kidney*



SHOWING THE TESTES.

shaped or oval bodies, sometimes very minute, at other times greatly enlarged. The two often differ in size and sometimes in shape. They may sometimes be yellowish or suffused with blood.

In the female the ovary will be found in the same position as the left testis. In a few genera, such as *Astur*



SHOWING THE OVARY.

and *Accepiter*, a second (right) ovary is found occupying the corresponding position to the right testis. In young birds, or when quiescent out of the breeding season, the ovary may only appear as a whitish film but as soon as it starts to enlarge it is easily identified by its granular structure, the minute eggs soon enlarging and becoming recognisable. The long white oviduct runs from the ovary to the vent against the back wall of the pelvis but it is not always easy to recognise from the ureters of the male. There is however a slender ligament which attaches the oviduct to the left wall of the pelvis opposite the ovary and this has no counterpart in the male. After eggs have been recently laid, the oviduct is—as might be expected—much enlarged and convoluted but it soon shrink's again.

The position, and appearance, of the organs is easily learnt in the breeding season when they are much enlarged and conspicuous. Experience, and practice, are however necessary before they can always be identified at other seasons. The expert skinner can sex a newly hatched chick. It must, however, be remembered that the organs are one of the first parts of the bird to decompose and they are often obliterated by shot wounds. If unrecognisable the fact should be noted on the label, "organs destroyed by shot", "organs decomposed", for the sex of the bird should only be entered on the label if definibly ascertained. If it is only recognised, or guessed at, from the plumage, all mention of it should be omitted from the label.

6. In passerine birds attention should always be paid to the condition of the skull and a note made on the label if the ossification is not complete. This means that the bird is under six months old, an important piece of data for plumage studies. In the adult bird with a fully ossified skull the upper wall of the brain cavity (*i.e.* top of the skull) is opaque with a granulated appearance as of minute bubbles in the bone. In nestlings this part is composed of two soft layers of tissue which gradually ossify and join together to form the bone. The ossification starts at the edges, and works inwards, so that a frame of bone encloses a gradually lessening transparent window of unossified tissue. The presence of this window, however small, shows that the bird is under six months old.

Preservation of Nestlings.

As hinted earlier in this paper nestling birds are badly required for purposes of description and plumage studies, the presence, or absence, of down and the destribution of the downy tracts being of importance for taxonomic studies.

The chicks of large species and of nidifugous species with a complete down plumage should, if possible, be skinned, stuffed, dried and labelled in the ordinary way the stuffing and preservation following as far as possible the methods described above for adult birds.

Smaller chicks should be preserved in spirit. Any fairly strong spirit may be used and many chicks may be placed in one bottle. It is however essential that each chick should have tied to it a label on which is described in *pencil* (for ink would vanish in spirit) the date, locality and name of the species which must be identified with certainty. It is best, if possible, to enclose chick and label in a little bag of butter-muslin to prevent the tender down being rubbed off through the specimens jolting against each other in the bottle.

Egg collectors are reminded that their hardset eggs which cannot be blown contain fully grown chicks complete with down. If these eggs are enclosed in butter muslin, with appropriate labels, and placed in spirit they will be nearly as good as hatched chicks for the study of down plumages.

Observations on the Tiger and its Shikar.

By

Lieut. Col. H. S. WOOD, I.M.S.

(Continued from page 105.)

Shikar of the Tiger and some experiences.

The Tiger is bagged in various ways :—

1. By driving it with beaters. This method is rather expensive, unfair to the beaters, and a simple matter to the sportsman. It does not entail much danger, swank, or knowledge of woodcraft to the shikari. Only once have I attended a beat for Tiger, and all that came out was a Mouse-deer.

2. With Elephants in line. This is the sport of the Maharajas and man with a long purse. The Tiger is generally hemmed in by the ring of Elephants and shot.

3. With a single shikari Elephant. This is more exciting.

4. Sitting up in a *machan* over a "kill" by the Tiger, or over a live bait. I must own here that the latter is rather cruel. Many times I have felt sorry for the beast on the ground whilst one is perched in a safe *machan*. But, in many cases, the beast can be saved by shooting the Tiger before he makes his spring. Of my 17 Tigers, two have been shot from the back of a single Elephant ; two on foot and the remainder from a *machan*, sitting up over a dead or live animal. I will, therefore, deal in detail with *machan* shooting.

Machan Shooting.

Some years ago, a noble Lord, at the Annual Dinner of the Shikar Club, London, made a speech, and took objection to big game hunting by means of search lights, projected from a motor car. In *machan* shooting, at night, some sort of artificial light is necessary, and I presume he included *machan* shooting. He says, "That the people sit up all night, always in *absolute* safety, and when they penetrate the darkness with their flash lights and turn them on the prey, the animals become bewildered, before they are shot". I agree with him in deprecating shooting from a motor car, but is there not more sport and danger in this than fox hunting, coursing after and stag hunting, where the animal is panic stricken, and bewildered for hours on end ? Then what about shooting pheasants that have been reared by a keeper ? To my mind, nothing can be called *Sport*, unless one swanks, runs risks and, also, tries to get his game by his own efforts, by a knowledge of its habits and woodcraft. As regards the safety of a *machan*, I disagree. In case of a Panther, there is the possibility of the brute coming up the tree after you ! Also one risks the chance of a snake bite, of contracting malaria and other diseases. Apart from these there is the night long vigil, when other people are snoozing comfortably in their beds, tortures to be endured from mosquitoes, gnats, ants and leeches ! No, *machan* shooting is not all "Beer and Skittles" ; There is much toughness of fibre, forethought and patience needed. Regarding the bewilderment of the animal, it is, no doubt, bewildered with the

powerful head lights of a motor, but not with the simple apparatus attached to one's rifle for night shooting. In my experience, the Tiger always springs to the side, and lies down as soon as the light is flashed on him.

To make *machan* shooting a success, make a decision to sit up over every kill you hear of, wet or fine ; the proportion of successes is very small, as so many untoward circumstances may arise ; but there is an element of luck. Some men get a Tiger the first night spent in a *machan*, others will sit up night after night and never bag one. In this form of shooting, one must depend on *khubber* from the natives, unless one ties several buff up in the hopes of a kill, which is an expensive business. Therefore secure the goodwill and confidence of all natives around you, treat them fairly and properly as human beings, and you will never regret it. I have found the average native very obliging and helpful, and many a fine trophy have I obtained from information supplied by my subordinates, simply because I treated them fairly and well. Never lose your temper, if you meet with no success. Several natives have told me that they would not do anything for a particular *Sahib*, because if he did not get anything, he abused and even kicked them, After all they are human, like all of us, and deserve fair treatment and kindness, combined with strength and firmness. One has to depend on the Indian for putting up the *machan* and procuring buffaloes, so it is bad policy, if nothing else, to be on unfriendly terms with them.

The Machan.—Many men depend on the shikari, or villagers, to put up *machans* of bamboo or sticks, but this is a mistake as the cutting creates a lot of noise and disturbs the Tiger ; also the time taken to rig one up is long and, where one cannot supervise arrangements, the *machan* is unsuitably placed, and much too large and conspicious, besides being uncomfortable. Remember the Tiger is not very far away, and probably watching the whole process for his destruction. To avoid all this, I used a permanent *machan*. It was just like a small chair, minus the legs, with the seat just broad enough to sit on and the bottom made of

newar, a kind of broad country tape, which can be tightened if it should get slack ; fore and aft, where the legs should be, four very strong iron rings are fixed ; these are to hold the hooks of your rope ladder and also for securing the *machan* with rope to the tree. A loop of rope fixed to the front for resting the feet is advisable, otherwise, one is apt to get cramp, also a cushion over the *newar* is good. The advantage of such a *machan* is, that as soon as you get *khubber* you can go out with it, select your tree, and put it up in a short time ; this operation should be carried out with the minimum of noise. The ladder for mounting your perch is important. The native, usually, makes one of bamboo which is fixed to the machan, this, of course, attracts attention. I had a rope ladder, made of strong hemp with wooden rungs, every eighteen inches or so. At the end are two strong hooks, which are inserted into the rings of the "Machan". The ladder should be about 22 feet long. This ladder can be obtained from Messrs. Manton & Co., Calcutta. The native ascends the tree, he can climb anything, and hitches the hooks ; a man holds on to the other end and up you go. When you are comfortably settled, unhitch the hooks, and your men hide the ladder some distance away. Take other things with you, as described in the article on the Panther. Sometimes, when your men fail to come to you, there is nothing except to descend the tree as best you can.

There is something fascinating in night shooting, because you are probably, miles away from any habitation, your brain and every sense is active, and there is the expectation of the Tiger turning up at any moment. On a moonlight night, the senses run riot, you see all sorts of forms of animals in the forest that do not exist. A Bat, or a Nightjar swishes past you, you hear the hoot of an Owl or the *hoo hoo* of the Crow-pheasant. When the latter call the cry is repeated by others for miles around ; they seem to call every two hours or so. Then the *tucktoo*, or giant Gecko, has a very sonorous and pleasant sound. All these are comforting to the lone watcher and other wonderful sights are seen, which I shall describe later. I must say that sitting

up on a dark rainy night is very irksome, but must stick it out sometimes.

The Bait—The best is a young buff but do not get palmed off with a measly thin one, as the Tiger, unless hard pressed for food, won't look at it. Such a buff, in Assam, costs from Rs. 12 to 15. Have it tied, if possible, in a path where it shows up in the moonlight and not too close to the *machan*, say about 15 yards away from it. The haltar must not be put round the neck because. 1. The Tiger will be suspicious. 2. The rope tightening may strangle the animal. 3. At the crucial moment, in its struggles, it may uproot the peg and everything is finished. I always tied my buff, in the following way :—One short rope was fastened round the fetlock to the near foreleg, and another to the off hind, the other ends fastened to stout pegs, well driven into the earth, and rammed down hard ; to make them secure it is a good plan to put stones around the peg, with the earth, before ramming. Supply the bait with grass, which keeps it quite happy. It's behaviour, when the Tiger is approaching, varies, some will sit quite still, others will, if sitting, rise up suddenly and look in the direction of the danger, with ears pointed forward. I have never seen a buff stamp its feet like a goat. It is a good thing to rub the rope over with some liquid so as to remove all human odour. In my experience, a Tiger will generally turn up between 7 and 10 P.M. If he does not put in an appearance during this time, he will come between 4 and 6 A.M. in winter, and between 3 and 5 in Summer. On a moonlight night it is wonderful how the Tiger will take advantage of all shadows and nullahs, when approaching, and very often he will spring, when a cloud temporarily obscures the moon.

A Tiger, when shot, will sometimes speak with a *woof* but, if mortally wounded, is silent. I have shot two Tigers, who on receiving the bullet, raised themselves on their hind legs in the air, and made clawing movements but I have never seen one bite at the wound, like a Panther will do.

When your men are leaving you tell them to talk, as if the animal is within ear shot or watching, it thinks the coast

is clear. A Tiger, or a Panther, that has not been fired at, will rarely look up but I have seen this done by a very cunning Tiger, which I sat up for many times, and never bagged. The reflection from a Tiger's eyes, with the *Everready* apparatus, is green and looks wonderful at night. When he makes his side leap he generally crouches. A Tiger, when approaching a kill or bait, comes along very slowly, every now and then halting to take in the situation, sometimes, sitting up on his haunches; every now and then he lowers hit head and sniffs. On getting within ten yards of the kill or bait he makes a spring, sometimes, with a growl, sometimes, not. A cub generally comes up quite close to the bait and sniffs at it before springing on it.

The Tiger eats liver, lungs and spleen of a kill but leaves the paunch, this is generally the tit bit of a Wild Boar. Once, when tracking up a *kill*, I came across an old solitary Boar within a few yards of me, munching the paunch and I promptly shot him. As a rule Tigers will not eat a corpse that is high, though sometimes they will eat decomposing flesh if hard pressed for food. A cunning Tiger will kill, have a meal off it, and never return. Some Tigers become very bold and have been shot in the heart of a town. They enter buffalo sheds to kill, and have been known to drag a *mahout* off the back of an Elephant whilst he was watering it; the beast which did that was a Man-eating Tigress.

The behaviour of various animals and birds will often indicate the presence of a Tiger.

1. Monkeys get very excited, chatter make a noise like a grunt, and very often an old male will sway from side to side grunt and scold.

2. The scream of a Peafoul.

3. A Barking deer barking.

4. Bulbuls are very clever as, on two occasions, I spotted the place where the Tiger was lying by the behaviour of these birds. They sat on the bush where he was lying, flicking their wings and tail rapidly, and making a curious rattling scolding sound. Once when posted, on

foot, in a *Nullah*, there were three of us, I saw one of these birds behaving in this manner and told the D.C., who was next to me, that the Tiger was there but, unfortunately, when the beaters were coming up he refused to budge, and, as a bomb was flung in, he dashed out and mortally mauled a man.

5. A Jungle Fowl constantly cackling is also a sign.

6. When a herd of cows, quietly feeding, all of a sudden stampede.

7. A horse behaves in a curious way. He takes short gallops, then turns round with head high, tail curved, nostrils dilated and emits loud snorts. It was by observing this, that I secured the biggest Tiger I have ever shot.

Never have your *machan* placed on a slope as the Tiger might easily spring down on you. Once I was seated in an awkward *machan* placed on a slope; I heard the sun grass behind me rustle and the Tiger passed under me actually shaking the *machan*, when he passed under, as it was supported by bamboo posts; owing to my position, I could not fire and the Tiger never approached the kill, which was lying below me on the bank of the Brahmaputra.

I forgot to mention another way for sitting up for Tiger, and this is waiting in a hole, or trench, dug in the ground. The Gurkha uses this method and, at Lanka, there was an old Sikh mistree who had bagged several Tigers in this way. I have only tried this method twice; once, in Tezpur, the Tiger came behind me, and had he chosen to spring, I could not have turned in the trench. Another time, at Haflong, I sat up in a trench, unfortunately dug on a slope within 5 feet of the kill, I sat up with a herdsman. Logs, tied together, were placed over us leaving a space between them and the parapet to shoot through. It rained like blazes during the night and it was a pitch dark night too. My night light got out of order and when the Tiger came, I had a shot at where I thought he should be and missed. We were so well concealed that, just before night fall, a harmless Jackal came up to the kill and, after his meal, he actually came

up to our trench and smelt the barrel of my rifle! On discovering us, he shot off like a bolt. That was the most miserable night I ever spent; we stood in liquid mud up to our knees and the smell, from that herdsman, was one that I shall always remember, a mixture of sour milk, onions and sweat! Besides that, every now and then, the odour of the defunct cow was wafted to my nostrils. At daybreak the men never came to remove the logs so, with great trouble, we removed one and crawled out. The wet clay had dried on the herdsman's face, and he looked, for all the world, like a white kaffir. Never again did I try the trench dodge and I would not recommend it

One of the most splendid sights my wife and I ever saw, in wild life, was at Gohpur in the Tezpur district. We were on a pad Elephant and I had got off to stalk some geese that had settled in a pool of water; the rest of the *Bheel* was covered with *dhoob* grass and there was neither a bush nor a tree in it. My wife shouted to me that a Tiger was chasing some wild Buffalo and, looking in the direction, I saw a Tiger dashing after about five Buffalo it was woofing and making huge springs and the Buffalo were going hard, with their tails held straight out. On looking carefully at the spot, where the animal had come out, about 150 yards away, I saw a Tiger's head peering above the grass. I did a stalk on foot, but lost sight of him. On getting on the Elephant we proceeded and then heard the most piteous sounds, proceeding from the jungle, like the *baa* of a sheep, only much louder, and found a young Baffalo dragging itself along. It had fang marks in its back, causing paralysis of the hind legs so we terminated its sufferings. There was no tree to sit up and we were miles from Camp. I think there were two Tigers, one kept off the herd, leaving the other to finish off the calf. The picture would have been a splendid subject for the cinematograph.

(To be continued).

The Snakes of Northern Bengal and Sikkim.

By

G. E. SHAW, E. O. SHEBBEARÉ and P. E. BARKER.

PART II.

In the descriptions of snakes which follow we have used as few technical terms as possible and all those necessary for our keys have already been explained. The names of the head-shields are given in the diagram below for reference.

EXPLANATION OF PLATE IV.

P = parietals	SO = supraorbitals	R = rostral
F = frontal	A B, = preorbitals	M = mental
PF = prefrontals	C = suborbital	N = nasals
IN = internasals	D, E – postorbitals	T = temporals

L = loreals, *i.e*, shields between orbit and nostril but touching neither.

SL = sublinguals, *i.e.*, shields below the tongue touching the infralabials.

1, 2, 3 etc. = infralabials or lower labials.

I, II, III, IV etc. = supralabials or upper labials.

In our keys the count of the rows of scales (costals) has always been taken at mid-body. In our descriptions the count is given at three places *viz* :—(1) two headlengths behind the head, (2) at mid-body and (3) two headlengths in front of the vent. If the three numbers are given without comment they are given in that order, from head to tail.

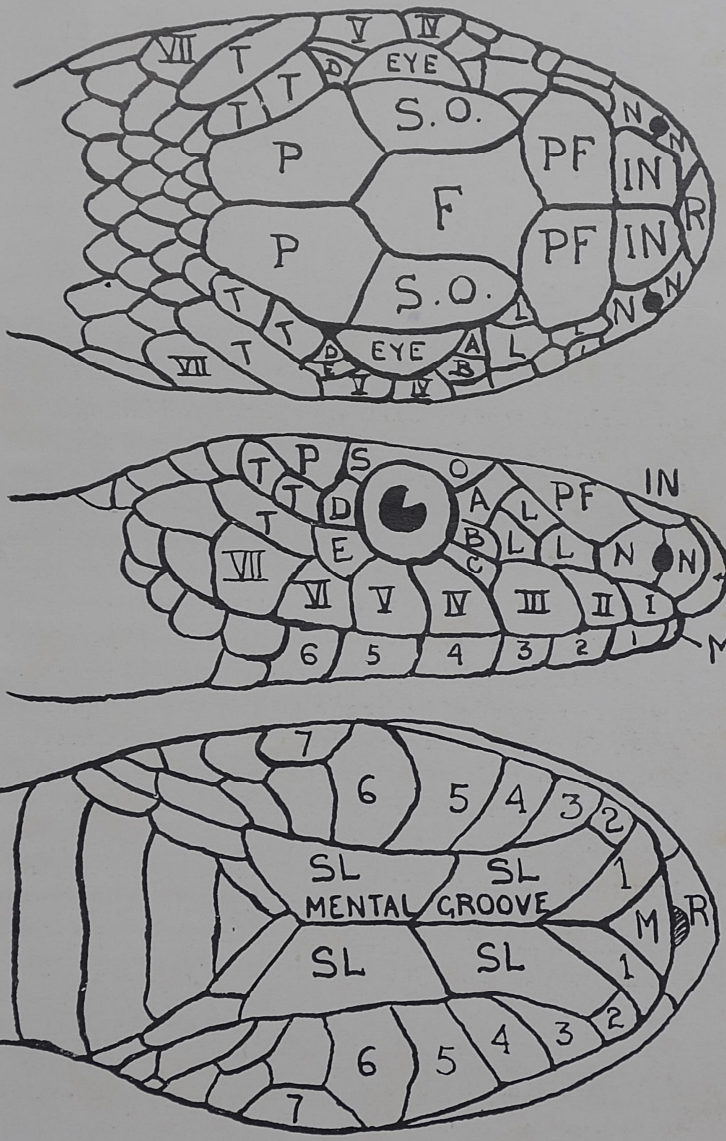
Before putting a freshly killed snake into preservative press the body just in front of the vent firmly between the forefinger and thumb. If the snake is a mature male this will cause a pair of fungus-like organs to emerge from the corners of the vent. It is advisable to shut your eyes while doing this.

Classification of snakes.

The snakes of the world are divided into nine families all of which are represented in India but only five of them in our area ; they are :—

1. *Typhlopidæ*.—The so-called blind snakes ; small brownish creatures, never exceeding eighteen inches in

PLATE IV



NOTE: IN THESE TABLES COLOURS ARE THOSE OF FRESH SNAKES; IN SPIRIT OR FORMALIN YELLOWS (& SO ON PINKS) FADE TO DIRTY WHITE.

SCALES ALL ROUND THE BODY, NO VENTRAL SHIELDS.

1. FEW-SCALED BLIND-SNAKE --- 16 ROWS OF SCALES AT MIDBODY; NO SPINE AT THE END OF THE TAIL, NASALS MEET BEHIND ROSTRAL.
   TYPHLOPS OLIGOLEPIS
2. STOLICZKA'S BLIND-SNAKE --- 18 ROWS; --- SUTURE ABOVE NOSTRIL INCOMPLETE.
   TYPHLOPS PORRECTUS
5. COMMON BLIND-SNAKE ----- 20 ROWS; --- SUTURE BELOW NOSTRIL REACHES PREOCULAR.
   TYPHLOPS BRAMINUS
3. JERDON'S BLIND-SNAKE ---- 20-22 ROWS; --- SUTURE BELOW NOSTRIL REACHES 2ND LABIAL WHICH DOES NOT TOUCH PREOCULAR.
   TYPHLOPS JERDONI
4. BURMESE BLIND-SNAKE ---- 24-26 ROWS; --- SUTURE ABOVE NOSTRIL INCOMPLETE.
   TYPHLOPS DIARDI

SCALES ABOVE, VENTRAL SHIELDS BENEATH (SEE PLATE I)

13 ROWS AT MIDBODY

100 | | | | 150 | | | | 200 | | | | 250 NO. OF VENTRALS.

19. YELLOW-BELLIED ROUGHSIDE --- A [125-141] IRRIDESCENT BLACK, BELLY YELLOW.
    TRACHISCHIUM TENUICEPS
18. ROSE-BELLIED ROUGHSIDE --- A [132-164] DITTO; BELLY PINK OR RED.
    TRACHISCHIUM GUENTHERI
17. BLACK-BELLIED ROUGHSIDE --- A [150-169] DITTO; BELLY DARK GREY
    TRACHISCHIUM FUSCUM

THESE THREE SNAKES HAVE NO DISTINCT NECKS AND SHORT TAILS (SUBCAUDIALS ONLY 31-42); SCALES SMOOTH OR SOME, NEAR THE VENT, MAYBE FEEBLY KEELED, MOSTLY IN MALES.

27. SLENDER DHAMAN --- A OR HIND END FEEBLY B [260-289] DISTINCT NECK, TAIL LONG (SUBCAUDIALS 124-151); FRONT HALF ALMOST UNIFORM OLIVE, (REAR HALF WITH EACH SCALE BROWN MARGINED BLACK.
    PTYAS KORROS
36. GORE'S BRONZEBACK --- E [187-199] VERY SLENDER, TAIL LONG (SUBCAUDALS 139-153); BRONZE ABOVE, BLUISH GREEN BENEATH.
    DENDRELAPHIS GOREI
70. McCLELLAND'S CORAL-SNAKE * --- PLATE III F A [182-244] TAIL SHORT (SUBCAUDALS 20-36; CHERRY RED, BELLY PINKISH YELLOW WITH (A BLACK BAND ABOUT EVERY INCH NOT MEETING OVER BACK; HEAD BLACK AND WHITE.
    CALLIOPHIS MACCLELLANDI

100 | | | | 150 | | | | 200 | | | | 250 NO. OF VENTRALS.

* POISONOUS

16 (OR 14) ROWS AT MIDBODY.

100 | | | | 150 | | | | 200 | | | | 250 NO. OF VENTRALS.

25. DHAMAN — PTYAS MUCOSUS — A, B TOWARDS TAIL — 180—213 — BROWN OR GREENISH SOMETIMES BARRED WITH BLACK; 2-5 LOREAL SHIELDS, (SEE FIGURE BELOW.)

26. BLACK-BORDERED RAT-SNAKE — ZAOCYS NIGROMARGINATUS — DITTO — 189-205 — GREEN, EACH SCALE BLACK-EDGED; ONLY ONE LOREAL SHIELD (SEE ABOVE).

17 ROWS AT MIDBODY.

57. MOCK VIPER — PSAMMODYNASTES PULVERENTULUS — A — 166—178 — VIPERISH APPEARANCE; BROWN WITH FAINT LONGITUDINAL PATTERN IN BUFF.

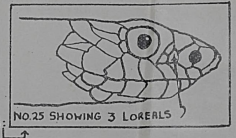
16. MOCK COBRA — PSEUDOXENODON ANGUSTICEPS — B — 157—185 — CAN EXTEND A SMALL HOOD; "DOMINO MARKS" (SEE PL. I B), COLOUR VARIABLE.

42. CORAL-BELLIED KUKRI-SNAKE — OLIGODON ERYTHROGASTER — A — 163—186 — BELLY PINK, GREY WITH BEAUTIFUL MINUTE PATTERN ABOVE, HEAD PATTERN AS PL. III J.

20. TWIN-SPOTTED WOLF-SNAKE — LYCODON JARA — A — 168-186 — BLACK SPECKLED WITH YELLOW DOTS IN PAIRS.

7. COLLARED POLYODONT — SIBYNOPHIS COLLARIS — A — 168-188 — BROWN, BROAD BLACK & NARROW YELLOW COLLAR.

41. COMMON KUKRI-SNAKE — OLIGODON ARNENSIS — A — 164—202 — BROWN OR ORANGE, BLACK, OR BLACK & WHITE BARS.



25. DHAMAN — PTYAS MUCOSUS — A, B TOWARDS TAIL — 180—213 — BROWN OR GREENISH, SOMETIMES BARRED BLACK; SEE FIG.

21. COMMON WOLF-SNAKE — LYCODON AULICUS — A — 186—216 — CHOCOLATE TO GREY WITH WHITE TRANSVERSE PATTERN MORE DISTINCT IN FRONT; (YOUNG BANDED YELLOW.

64. COMMON KRAIT * — BUNGARUS CAERULEUS — (SEE PL. E) — C — 195-218 — BLACK, NARROW WHITE BARS LESS DISTINCT IN FRONT; SUBCAUDALS SINGLE, SEE PL. I E.

24. WHITE-BANDED WOLF-SNAKE — DINODON SEPTENTRIONALIS — A — 207-217 — BLACK, SHARP, NARROW PURE WHITE BARS (27 ON BODY, 13 ON TAIL); DISTINGUISHED (FROM No. 64 BY SUBCAUDALS.

22. ANDERSON'S WOLF-SNAKE — LYCODON FASCIATUS — B — 201—223 — BANDED BLACK AND REDDISH (OR GREENISH) YELLOW (WHICH FADES WHITE IN SPIRIT).

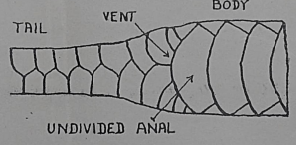
61. GOLDEN TREE-SNAKE — CHRYSOPELEA ORNATA — SLENDER — E — 200—238 — VENTRAL KEELS VERY MARKED (SEE PL. II E); PATTERN VARIABLE AND BEAUTIFUL, (HEAD ALWAYS BLACK WITH YELLOW CROSS BARS.

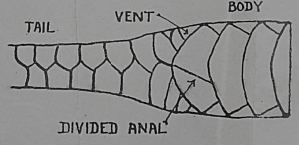
* POISONOUS

100 | | | | 150 | | | | 200 | | | | 250 NO. OF VENTRALS.

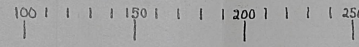
NOTE:

IN THIS TABLE THE ANAL SHIELD, (UNDIVIDED IN NOS. 57, 64, 24, & 22, DIVIDED IN ALL THE REST) IS A USEFUL POINT. SEE FIGURE:





15 ROWS AT MID-BODY



47. GUENTHER'S SMOOTH SNAKE — LIOPELTIS CALAMARIA — A — 126—163 — SUBCAUDALS 53-76, NO DISTINCT NECK, PALE BROWN.

46. STOLICZKA'S SMOOTH SNAKE — LIOPELTIS STOLICZKAE — A — 148-154 — SUBCAUDALS 116-134, A DISTINCT NECK, VERY SLENDER, PUTTY-(COLOURED

40. BLUE-BELLIED KUKRI-SNAKE — OLIGODON MELANEUS — A — 154-159 — SUBCAUDALS 40-42, NO DISTINCT NECK, BACK BLACK, FLANKS GREY, (BELLY BLUE-GREY.

27. SLENDER DHAMAN — PTYAS KORROS — A, OR FEEBLY B TOWARDS TAIL — 160-187 — A LARGE SNAKE, BUFF-CENTRED, DARK-MARGINED SCALES ON AFTER (PARTS GIVE NETWORK EFFECT, FORE PART OF BELLY YELLOW.

48. RAPP'S SMOOTH SNAKE — LIOPELTIS RAPPI — A — 178-197 — NO DISTINCT NECK. BLACKISH WITH DARKER COLLARS.

39. INDIAN BRONZEBACK — DENDRELAPHIS TRISTIS — E — 163—205 — A FAINT DARK FLANK STRIPE, SPECKS ON PARIETALS (SEE PL. III D)

38. DIBRUGAHR BRONZEBACK — DENDROPHIS PROARCHUS — E — 181—196 — A DISTINCT DARK FLANK STRIPE, NO SPECKS ON PARIETALS

37. EASTERN BRONZEBACK — DENDROPHIS PICTUS — E — 173 — 211 — NO FLANK STRIPE, NO SPECKS ON PARIETALS.

THESE THREE SNAKES ARE SLENDER LIKE WHIP-SNAKES BUT PUPIL IS ROUND; BRONZE ABOVE BLUISH-GREEN BELOW.

71. COMMON SLUG-SNAKE — AMBLYCEPHALUS MONTICOLA — PUPIL VERTICALLY OVAL — A — 181-198 — BODY VERTICALLY FLATTENED, PINKISH BROWN TO DULL ORANGE (WITH SMUDGY BLACK CROSS-BARS.

58. GUENTHER'S WHIP-SNAKE — DRYOPHIS FRONTICINCTUS — D — 168—196 — SEE PLATE III C, BUFF IN COLOUR.

60. COMMON GREEN WHIP-SNAKE — DRYOPHIS MYCTERIZANS — D — 168—206 — SEE PLATE III A, PALE, VERDANT GREEN, AN APPENDAGE ON THE SNOUT.

59. MALAYAN WHIP-SNAKE — DRYOPHIS PRASINUS — D — 194—235 — SEE PL. III B, PALE VERDANT GREEN TO GREENISH GREY.

THESE THREE SNAKES ARE SLENDER WITH SHARP SNOUTS; PUPIL HORIZONTALLY OVAL.

62. INDIAN EGG-EATING SNAKE — ELACHISTODON WESTERMANNI — PUPIL VERTICALLY OVAL — D — 208-211 — 19 ROWS OF SCALES 2 HEAD-LENGTHS BEHIND HEAD, BROWNISH-(BLACK, WITH LIGHTER VERTEBRAL STRIPE

64. COMMON KRAIT* — BUNGARUS CAERULIUS — C — 195-218 — BLACK, MANY WHITE ARCHES IN PAIRS.

65. LESSER BLACK KRAIT* — BUNGARUS LIVIDUS — C — 209-227 — SUBCAUDALS 35-42, BLACK OR BROWNISH BLACK, BELLY GREY, (VERTEBRAL ROW NOT MUCH ENLARGED

66. GREATER BLACK KRAIT* — BUNGARUS NIGER — C — 216-231 — SUBCAUDALS 45-52. BLACK WITH A WHITE BELLY

63. BANDED KRAIT* — BUNGARUS FASCIATUS — C — 200-236 — DORSAL RIDGE PROMINENT, TAIL BLUNT. BANDED BLACK AND (YELLOW.

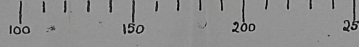
THESE FOUR SNAKES HAVE ALL SUB-CAUDALS SINGLE (PL. I, E & F)

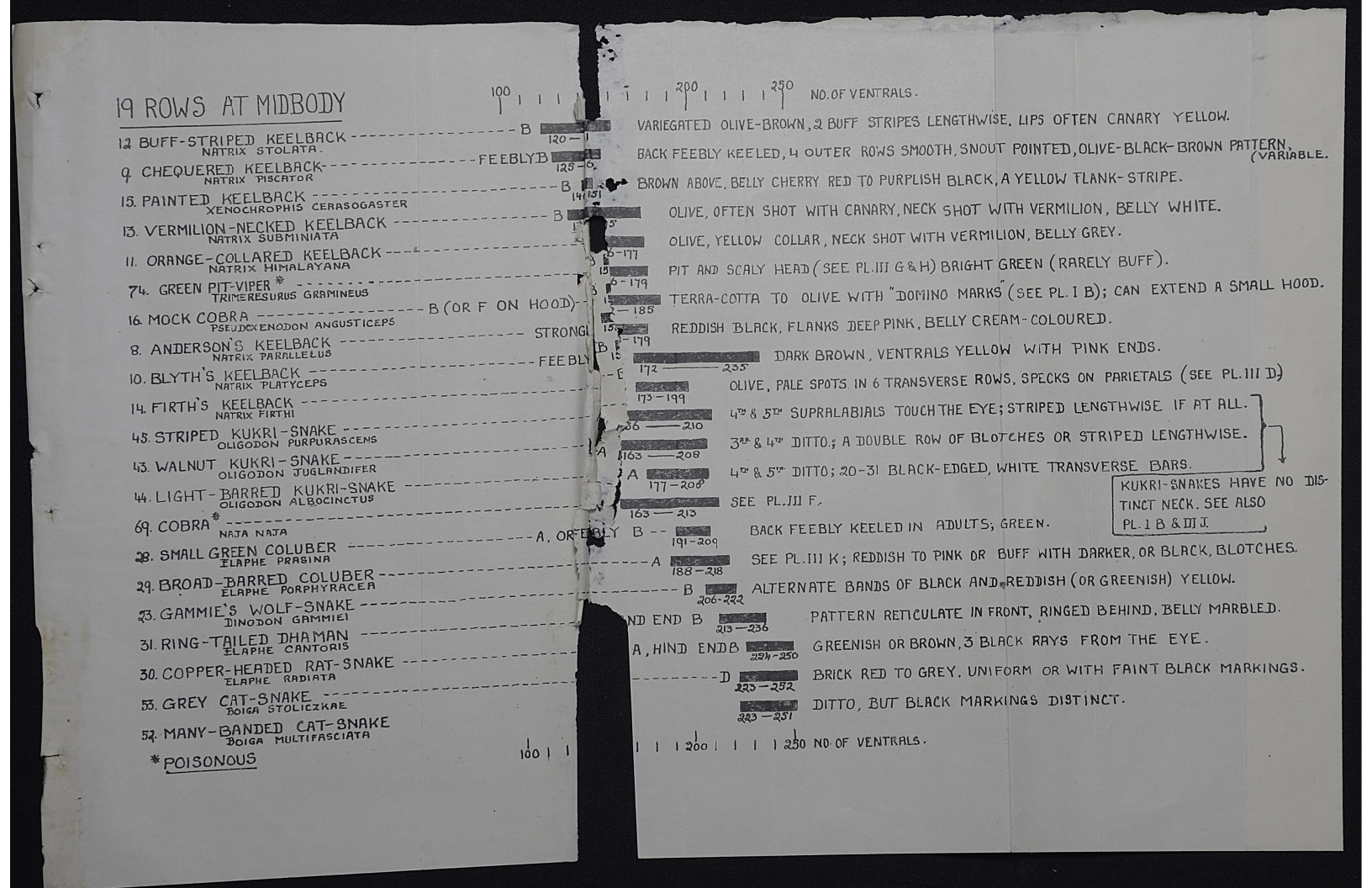
67. NORTH-EASTERN HILL KRAIT* — BUNGARUS BUNGAROIDES — C — 220-238 — BLACK WITH EQUIDISTANT WHITE CHEVRONS.

68. KING COBRA* — NAJA HANNA — A, F NEAR HOOD — 215 —— 270 — SEE PL. III F. BROWN WITH FAINT LIGHT CROSS-BARS, (YOUNG SHINING BLACK AND ORANGE.

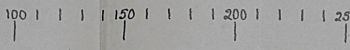
THESE TWO SNAKES SOMETIMES HAVE THE FIRST FEW SUB-CAUDALS SINGLE. (PL. I, G)

* POISONOUS.




19 ROWS AT MIDBODY
100
200
250
NO. OF VENTRALS.
12. BUFF-STRIPED KEELBACK
NATRIX STOLATA.
B
120 —
VARIEGATED OLIVE-BROWN, 2 BUFF STRIPES LENGTHWISE, LIPS OFTEN CANARY YELLOW.
9. CHEQUERED KEELBACK
NATRIX PISCATOR
FEEBLY B
125 — 6.
BACK FEEBLY KEELED, 4 OUTER ROWS SMOOTH, SNOUT POINTED, OLIVE-BLACK-BROWN PATTERN, (VARIABLE.
15. PAINTED KEELBACK
XENOCHROPHIS CERASOGASTER
B
141 151
BROWN ABOVE, BELLY CHERRY RED TO PURPLISH BLACK, A YELLOW FLANK-STRIPE.
13. VERMILION-NECKED KEELBACK
NATRIX SUBMINIATA
B
OLIVE, OFTEN SHOT WITH CANARY, NECK SHOT WITH VERMILION, BELLY WHITE.
11. ORANGE-COLLARED KEELBACK
NATRIX HIMALAYANA
OLIVE, YELLOW COLLAR, NECK SHOT WITH VERMILION, BELLY GREY.
74. GREEN PIT-VIPER *
TRIMERESURUS GRAMINEUS
PIT AND SCALY HEAD (SEE PL. III G & H) BRIGHT GREEN (RARELY BUFF).
16. MOCK COBRA
PSEUDOXENODON ANGUSTICEPS
B (OR F ON HOOD)
TERRA-COTTA TO OLIVE WITH "DOMINO MARKS" (SEE PL. I B); CAN EXTEND A SMALL HOOD.
8. ANDERSON'S KEELBACK
NATRIX PARALLELUS
STRONGL
REDDISH BLACK, FLANKS DEEP PINK, BELLY CREAM-COLOURED.
10. BLYTH'S KEELBACK
NATRIX PLATYCEPS
FEEBLY
172 — 235
DARK BROWN, VENTRALS YELLOW WITH PINK ENDS.
14. FIRTH'S KEELBACK
NATRIX FIRTHI
175 — 199
OLIVE, PALE SPOTS IN 6 TRANSVERSE ROWS, SPECKS ON PARIETALS (SEE PL. III D)
45. STRIPED KUKRI-SNAKE
OLIGODON PURPURASCENS
206 — 210
4TH & 5TH SUPRALABIALS TOUCH THE EYE; STRIPED LENGTHWISE IF AT ALL.
43. WALNUT KUKRI-SNAKE
OLIGODON JUGLANDIFER
A
163 — 208
3RD & 4TH DITTO; A DOUBLE ROW OF BLOTCHES OR STRIPED LENGTHWISE.
44. LIGHT-BARRED KUKRI-SNAKE
OLIGODON ALBOCINCTUS
A
177 — 208
4TH & 5TH DITTO; 20-31 BLACK-EDGED, WHITE TRANSVERSE BARS.
KUKRI-SNAKES HAVE NO DISTINCT NECK. SEE ALSO PL. I B & III J.
69. COBRA *
NAJA NAJA
163 — 213
SEE PL. III F.
28. SMALL GREEN COLUBER
ELAPHE PRASINA
A, OR FEEBLY B
191 — 209
BACK FEEBLY KEELED IN ADULTS; GREEN.
29. BROAD-BARRED COLUBER
ELAPHE PORPHYRACEA
A
188 — 218
SEE PL. III K; REDDISH TO PINK OR BUFF WITH DARKER, OR BLACK, BLOTCHES.
23. GAMMIE'S WOLF-SNAKE
DINODON GAMMIEI
B
206 — 222
ALTERNATE BANDS OF BLACK AND REDDISH (OR GREENISH) YELLOW.
31. RING-TAILED DHAMAN
ELAPHE CANTORIS
ND END B
213 — 236
PATTERN RETICULATE IN FRONT, RINGED BEHIND, BELLY MARBLED.
30. COPPER-HEADED RAT-SNAKE
ELAPHE RADIATA
A, HIND END B
224 — 250
GREENISH OR BROWN, 3 BLACK RAYS FROM THE EYE.
55. GREY CAT-SNAKE
BOIGA STOLICZKAE
D
225 — 252
BRICK RED TO GREY. UNIFORM OR WITH FAINT BLACK MARKINGS.
52. MANY-BANDED CAT-SNAKE
BOIGA MULTIFASCIATA
223 — 251
DITTO, BUT BLACK MARKINGS DISTINCT.
* POISONOUS
100
200
250
NO. OF VENTRALS.

21 (OR 20) ROWS AT MIDBODY.



75. LARGE-SPOTTED PIT-VIPER* — TRIMERESURUS MONTICOLUS — B (OR A) 132–158 — A PIT & SCALY HEAD (PL. III G & H), STOUT BODY, VERTICAL PUPIL; BROWN WITH DARKER MOTTLINGS.

73. HIMALAYAN PIT-VIPER* — AGKISTRODON HIMALAYANUS — BACK STRONGLY K 143–175 — A PIT (PL. III G) BUT SHIELDED HEAD, STOUT BODY, VERTICAL PUPIL, BROWN WITH COARSE DARKER (BLOTCHES.

13. VERMILION-NECKED KEELBACK — NATRIX SUBMINIATA — B 132–175 — OLIVE, OFTEN SHOT WITH CANARY, NECK SHOT WITH VERMILION, BELLY WHITE.

49. SCHNEIDER'S WATER-SNAKE — ENHYDRIS ENHYDRIS — A 150–177 — NASALS MEET BEHIND ROSTRAL; OLIVE, BELLY WHITISH, A BLACK LINE ON EDGE OF VENTRALS.

74. GREEN PIT-VIPER* — TRIMERESURUS GRAMINEUS — B 156–179 — A PIT & SCALY HEAD (PL. III G & H) PUPIL A VERTICAL SLIT; BRIGHT OR DARK GREEN (RARELY BUFF), USUALLY A (FLANK-STRIPE OF WHITE, RED, OR BOTH.

45. STRIPED KUKRI-SNAKE — OLIGODON PURPURASCENS — A 156 — 210 — NO DISTINCT NECK; "DOMINO MARKS" (PL. I B), PALE BROWN TO GREYISH WITH A (LONGITUDINAL PATTERN IF ANY.

69. COBRA* — NAJA NAJA — F 163 — 213 — SEE PLATE III F.

44. LIGHT-BARRED KUKRI-SNAKE — OLIGODON ALBOCINCTUS — A 177–208 — BERRY RED TO BROWNISH GREY WITH 20 TO 31 BLACK-EDGED WHITE CROSS-BARS.

31. RING-TAILED DHAMAN — ELAPHE CANTORIS — A, HIND END FEEBLY B 213–236 — PATTERN RETICULATE IN FRONT, RINGED BEHIND, BELLY MARBLED.

50. ARROW-BACKED CAT-SNAKE — BOIGA GOKOOL — (87–101) — D 224–232. — VERTEBRALS ALMOST AS BROAD AS LONG; YELLOWISH BROWN, A ROW OF Y-SHAPED (DARK MARKS ON EACH SIDE OF THE BACK.

51. COMMON CAT-SNAKE — BOIGA TRIGONATA — (75–96) D 206 — 256 — VERTEBRALS (PL. I C) ONLY SLIGHTLY ENLARGED; COLOUR MUCH AS NO. 50.

52. MANY-BANDED CAT-SNAKE — BOIGA MULTIFASCIATA — NO. OF SUBCAUDALS IN BRACKETS. — (96–116) — D 223–251 — BROWN TO GREY, WELL-MARKED IRREGULAR BLACK CROSS-BARS EVERY ½ INCH.

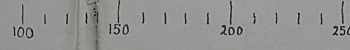
53. GREY CAT-SNAKE — BOIGA STOLICZKAE — (94–119) — D 223–252 — REDDISH TO YELLOWISH BROWN (RARELY GREY) UNIFORM OR WITH FAINT CROSS (BARS, BELLY WHITE.

54. GREEN CAT-SNAKE — BOIGA CYANEA — (124–134) — D 237–257 — UNIFORM BLUISH GREEN TO GRASS GREEN.

30. COPPER-HEADED RAT-SNAKE — ELAPHE RADIATA — A, HIND END B 224–250 — SINGLE ANAL SHIELD; LIGHT BROWN OR GREENISH, 3 BLACK RAYS FROM EYE.

32. HODGSON'S RAT-SNAKE — ELAPHE HODGSONI — FEEBLY B 233–247 — DIVIDED ANAL SHIELD; BROWNISH OLIVE, MOST SCALES BLACK-EDGED, BELLY (YELLOW; YOUNG WITH BLACKISH CROSS-BANDS.

* POISONOUS.



NOTE — BOTH CAT-SNAKES AN PIT-VIPERS HAVE VERTICAL PUPILS; THE REST HAVE ROUND CAT-SNAKES HAVE LITERALLY COMPRESSED BODIES & FIGURE-OF-8 STRIKING POISE LIKE SOME VIPERS.

23 TO 31 ROWS AT MIDBODY.

		ROWS AT MIDBODY	
73.	LARGE-SPOTTED PIT-VIPER * TRIMERESURUS MONTICOLA		B OR A
72.	RUSSEL'S VIPER * VIPERA RUSSELLI		VERY STOU
74.	GREEN PIT-VIPER * TRIMERESURUS GRAMINEUS	23	
76.	GREY'S PIT-VIPER * TRIMERESURUS PURPUREOMACULATUS	23—27	
69.	COBRA * NAJA NAJA	23—25	
51.	COMMON CAT-SNAKE BOIGA TRIGONATA	23	
32.	HODGSON'S RAT-SNAKE ELAPHE HODGSONI	23	
35.	TRINKET SNAKE ELAPHE HELENA	23—27	
33.	STRIPE-TAILED RAT-SNAKE ELAPHE TAENIURA	23	
34.	BOIE'S RAT-SNAKE ELAPHE OXYCEPHALA	23—25	
55.	BLACK-BARRED CAT-SNAKE BOIGA CYNODON	23—25	
56.	FORSTEN'S CAT-SNAKE BOIGA FORSTENI	27—31	

60 TO 75 ROWS AT MIDBODY.

6.	INDIAN PYTHON PYTHON MOLURUS	

* POISONOUS

100 200 250 NO. OF VENTRALS.

23-25 ROWS AT MIDBODY; A PIT. SCALY HEAD; BROWN WITH DARKER MOTTLINGS

153-180 NO PIT BUT SCALY HEAD, VERY STOUT; BROWN WITH A TRIPLE ROW OF BLACK CIRCLES

156-179 A PIT, SCALY HEAD; BRIGHT OR DARK GREEN (RARELY BUFF), USUALLY A FLANK-STRIPE OF (WHITE, RED, OR BOTH.

160 — 205 DITTO; PURPLISH BROWN VARIEGATED WITH PALE GREEN; LESS COMMONLY COLOURED AS (NO. 74.

165 — 213 SEE PLATE III F.

206 — 256 YELLOWISH BROWN, A ROW OF Y-SHAPED DARK MARKS ON EACH SIDE OF THE (BACK.

233-247 BROWNISH OLIVE, MOST SCALES BLACK-EDGED, BELLY YELLOW; YOUNG WITH (BLACKISH CROSS-BANDS.

217 — 265 DITTO. — A VERY HANDSOME PATTERN. MAINLY IN BROWNS & BLACK.

230-259 VERY LIGHT BROWN TO OLIVE, A LONGITUDINAL PATTERN OF DARKER (STRIPES ESPECIALLY STRIKING ON THE TAIL

233-263 BRIGHT GREEN, SCALES USUALLY EDGED WITH BLACK.

249-277 PUPIL VERTICAL; LIGHT BROWN WITH BLACK CROSS-BARS.

254-275 PUPIL VERTICAL; BROWN WITH 3 LONGITUDINAL ROWS OF BLACK (SPOTS.

242-265

100 200 250 NO. OF VENTRALS.

NOTE: FOR "PIT" ... "SCALY HEAD" SEE PLAT... AND H

length, which live mainly underground and look almost like worms, but are covered with scales. These scales cover the belly also, there are no ventral shields, and this feature serves to distinguish snakes of this family from all others in our area.

There are five species in our list—all are harmless.

2. *Boidæ*—Pythons and boas. The Indian Python is the only representative in our area. The best external characters by which to distinguish it from other snakes (apart from its great size) are the large number of costal rows (60 to 75 at mid-body) and the fact that, though it has ventral shields, they do not extend the whole width of the belly so that, when laid on its back, some of the costal rows are visible from above.

None of the snakes in this family are poisonous.

3. *Colubridæ*.—This is much the largest family of snakes in the world, as well as in our area; 64 out of the 75 species in our list belong to it and it may be said to include all "ordinary" snakes. It contains both harmless and poisonous members (cobras, kraits and coral snakes).

4. *Amblycephalidæ*.—This family is represented, in our area, by a single snake (*Amblycephalus monticola*, the Common Slug-snake) which looks much like one of the *Colubridæ*. The best external character by which to distinguish this family is the arrangement of shields under the chin. In all other snakes these are paired on either side of a central (longitudinal) line called the mental groove (see Plate IV). In this family there is no straight mental groove and some of the shields cross the centre line of the chin. These snakes are harmless.

5. *Viperidæ*.—These are the Vipers or Adders, easily recognized because all members in our area have either a "pit" or a scaly head or both (see Plate III, G. and H.) Those with a pit are called Pit-vipers, a sub-family. All are poisonous but the Pit-vipers are not deadly to man or large animals.

(To be continued).