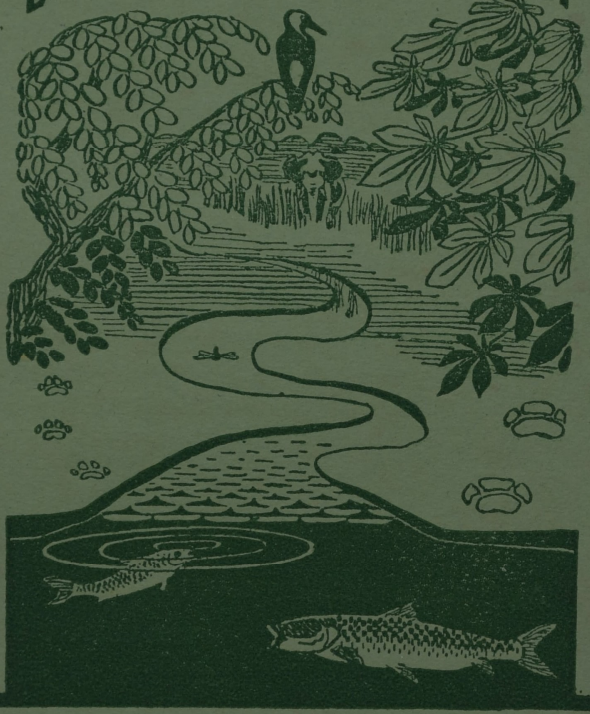
THE JOURNAL OF THE DARJEELING NATURAL HISTORY SOCIETY



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

DARJEELING NATURAL HISTORY SOCIETY.

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

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THE CURATOR,

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EDITED BY

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

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ALPHABETICAL LIST OF CONTRIBUTORS.

VOL. VIII.

John Bale, Sons & Danielsson, Ltd. London.

COCHOA PURPUREA Hodgson.

The Purple Thrush

Male, female and nestling. 2/5 Nat. size.

JOURNAL

OF THE

DARJEELING NATURAL HISTORY SOCIETY.

Vol. VIII. No. 4.

Game birds of Sikkim, including the Darjeeling District, and of the Jalpaiguri District, Bengal.

BY

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

(Continued from page 97).

Our next genus is *Arborophila* which contains the Hill-Partridges. They differ both in habits and anatomically from the true Partridges; their legs are comparatively longer and their claws long and straight. The tail is composed of 14 soft feathers. Nine species and subspecies are found in the Indian Empire but only three of these occur in our area. As their name implies they are all hill birds.

38. The Common Hill-Partridge.

Arborophila torqueola torqueola (Valenc).

In the cock the crown is bright and the ear coverts paler chestnut; the lores, cheek, and a broad streak over the eyes are black, the latter mixed with white near the crown and at the nape. The chin, throat and sides of the neck are black, the latter edged with white; there is a white moustachial streak and a white band below the white

throat. The upper plumage is golden olive-brown barred with black and the upper tail coverts with large triangular black spots instead of bars; the wings are widely margined with chestnut and blotched with black on the coverts. The breast is slatey-grey shading into white on the abdomen; the flanks are grey, edged with chestnut and with central elongated white spots; the under tail-coverts are black with white tips.

The bill is black, the iris red-brown; the bare skin round the eyes crimson and the legs fleshy-grey.

The cock measures from 10 to 12 inches with a wing about 6 inches. A fat cock, weighed by Hume, scaled 13·6 ozs.

The young cock is "like the adult but with the supercilia obsolete or entirely wanting; there is no chestnut on the flanks and but little on the scapulars and coverts; the whole of the lower surface is covered with white drops from breast to vent." *(Stuart Baker).*

The hen differs from the cock in having the crown and nape brown streaked with black; the sides of the head, neck and throat are rufous spotted with black, there is a rufous band below the spotted throat; the breast is brownish and the white spots on the flanks are larger and generally extend to the lower breast. The upper plumage is more broadly barred with black.

The bill is black or sometimes with brown on the upper mandible; the iris is brown; the skin round the eyes is dull purplish-pink and the legs are as in the cock.

The hen is rather smaller than the cock. The weight of a small hen, according to Hume, was 8 ozs.

The young hen has "a white spot as the extremity of the feathers of the chest as well as the underparts, and the

outer webs and tips of the primaries and secondaries are mottled with rufous buff. (*Cat. Brit. Mus. Vol. XXII*).

There is a very poor illustration of the chick in *Hume and Marshall's Game Birds* but I can find no description. I describe a specimen in my private collection.

The upper plumage is deep rufous-brown with a patch of rufous-fawn from above the eye to the nape broadening out behind; the sides of the head, the chin and throat are rufous-fawn, with a deep rufous brown streak from the nostril and over the eye, and another of the same colour below the eye and above the ear-coverts; the ear-coverts and a moustachial streak deep rufous-brown. The wings are light rufous stippled with brown. The lower plumage is rufous-fawn with a band of deep rufous-brown below the throat.

The bill is dull red; the iris brown and the legs brownish-orange.

The distribution, according to Stuart Baker, is:—"Garhwal and Kumaon to the extreme East of Assam, North of the Brahmapootra and to Tibet, etc. South of this river it is found rarely in the higher ranges of the Naga Hills and the Barail Range and other high ranges North of Cachar and Manipur. Rothschild attributes to this race three specimens obtained by Forrest in Yunnan." Stevens writes about our area;—Recorded "commonest between 5,000′ and 8,000′ or 9,000′, occasionally found at 14,000′." This partridge is, in my experience, much *more plentiful on the Outer Ranges* than it is in the interior, yet occurring at similar altitudes. It may possibly reach this recorded lower limit of 5,000′ in the interior, which is however erroneous for the outer ranges, as there is no overlapping in the zonal distribution of this species and *A rufogularis* where they meet. Neither do they move to any extent during the winter. A fine series secured in the Mai 'Khola'

in East Nepal at elevations of from *7,000′ – 10,000′ during March and April*, and obtained in the Lachung Valley at 8,000′."

We have seen it at Tonglu and Phalut at about 10,000 ft. in April and July. It is a bird of higher elevations than the next species. Stuart Baker writes :—"In the Darjeeling District it may wander down below 5,000 feet, but is most common between 7,000 and 9,000 feet." It is very doubtful if it ever descends as low.

These Hill-Partridges are forest loving birds especially where the hill-sides are broken up into ravines with streams running down them. We found them amongst rhododendrons which were fairly free of under cover. Those we saw were in small coveys of about half a dozen birds ; once, in early July, we came across the parents with three chicks. They were very tame and allowed one to observe them as long as one remained quiet. They ran about quickly every now and then stopping to pick up a seed or other small morsel. They are very round little birds, their back highly arched, in fact, when at rest with their heads tucked in, the whole of the back down to the tip of the tail is one curve with tip of the tail pointing slightly inwards and downwards. They perch freely on trees but those we saw were on the ground.

I, once, watched a cock calling ; it did so from the ground but they do not invariably do so as they have been many times noticed doing so from a stump or other elevated position.

The bird threw its head back and uttered a monotonous whistle of a single note ; it then walked on for a couple of paces and whistled again ; sometimes it whistled twice without moving and sometimes picked something off the ground between calls. The notes were all uttered while under a bush ; when it came into open spaces it ceased calling. It

has another call, which was not heard as often as the single note, this sounds like *wha-whoi, wha-whoi,* there is sometimes a third *wha-whoi.* It is uttered in the same manner as the single note.

Bailey has heard a captive bird answered by a wild one in the forest. He heard his bird whistle in March and April and we heard it continually during May. We have also seen a shikari call up these birds with ease.

Stuart Baker writing about this Partridge says :--"They were nearly always in small covies of from 5 to 10 birds, almost certainly just a pair of old birds with their last family.

"They are quick yet deliberate in their movements, and scratch about here and there, turning over the leaves, picking up a seed or two and then dashing away a few paces to a more tempting patch. Perhaps some of the party will then sit down for a seista, and for this they love a tiny patch of sunshine, where they can bask with wing outstretched, first on one side and then on the other ; but unless it is getting late in the morning, within a few minutes they are once more on the move, and busy with the important occupation of feeding."

"They look like little balls of feathers as they sedately walk about, very neat, yet very soft, their little tails, tucked in tightly, held pointing almost straight to the ground, their wings held not too close to their bodies and often quivering as they ran, but never extended".

With regard of their call the same author writes :— "They are very conversational birds and keep up a constant succession of soft low whistling notes intermixed with notes which may be best described as like very soft coos of a dove. Their call note during the breeding season is quite different, a loud, though melodious double whistle which carries a very great way even in dense forest. This note is only used

during the breeding season, and then only in the mornings and evenings, and generally, I think, from some elevated position, preferably a branch about 20 feet up in a biggish tree".

The note is also uttered from the ground as we have already described.

These birds are, like all Hill-Partridges, great runners and prefer to use their legs to their wings but they can, when driven to it, fly at a good place.

Their food consists of seeds, insects, roots, etc. I have seen captive birds eat grain readily.

Hume mentions that "in some parts of the hills, the shepherds do not like your killing these birds; their call is precisely like the whistle by which the shepherds call their flocks, and these worthies will, in place, gravely maintain that the birds are animated by the souls of their (the shepherds) deceased *confrères*".

These Partridges breed throughout their range from April to June. The nest is just a depression in the ground scratched by the bird and, according to Stuart Baker, it will, sometimes, make a real nest "of grass, leaves and weeds, matting them well together, and raising the sides so that the whole affair becomes a very deep cup".

They lay from 4 to 8 eggs, pointed ovals in shape and glossy white in colour. They measure about $1{\cdot}8 \times 1{\cdot}2$ inches.

The flesh of these Hill-Partridges, though dry, is quite good but Hume considered them "very good eating when you can get nothing better"!

They do quite well in captivity, even in the climate of Calcutta, specimens in the Alipur Zoo lived upwards of six years. Bailey found they did better at Gangtok, than the next species. We have seen the cock feeding the hen and those in Bailey's aviary were very fond of maize.

(39) Blyth's or The Rufous-throated Hill-Partridge.

Arborophila rufogularis rufogularis (Blyth.)

The crown is olive-brown spotted with black ; a broad eye-brow and sides of face greyish-white speckled with black ; the upper plumage is olive-brown, the feathers of the rump and upper tail-coverts with central black triangular marks ; the wing-coverts are chestnut marked with olive-grey and broad black tips ; the sides of the neck, and chin to foreneck are rufous, the chin and throat spotted with black ; the breast and flanks are deep grey paler on the abdomen ; the grey breast is divided from the rufous foreneck by a black band and the flanks are marked with deep chestnut, each feather with a white spot in the centre.

The sexes are nearly alike. The bill is black ; the iris brown ; the bare skin round the eyes lake-red to bright red and the legs pale pinky-red to salmon-red, "coral red" (*Shaw.*)

Hume's measurements for cocks are :—Length 10 to 11 inches and wing 5·12 to 5·37 inches. Weight 7 to 10·5 ozs.

His measurements for hens are :—Length 9 to 10·5 inches and wing 4·9 to 5·2 inches. Weight 7 to 10 ozs.

Young cock :—"Throat immaculate rufous-brown, much paler than in the adult ; underparts smoky-slate with numerous white spots all over breast, abdomen and flanks." (*Stuart Baker.*)

Chick :—A chick presented to us by Mr. Shaw and obtained by him on the 26th May is as follows :—Whole upper plumage chestnut, with rufous-fawn forehead, an eye-brow the same colour but lighter and a dark streak from nostrils, over the eye to back of ear-coverts where it is broader ; chin, throat and abdomen fawn, remainder of lower plumage rich rufous-fawn ; quill feathers brown.

The distribution according to Stuart Baker is "Kumaon and Garhwal to the extreme East of Assam."

With regard to the distribution in our area Stevens writes :—"Recorded from the base of the hills up to 6,000′ which is substantially correct for these hills. I have no definite information of its lowest limits, but it is fairly plentiful in forest around Gopaldhara at from 5,000′—6,000′ where I have obtained many during December to February.

It appears to have a somewhat higher zonal distribution in the Tista Valley where it apparently does not come into competition with *A torqueola*, as Mr. G. E. Shaw reports it at elevations of from 3,000′—8,400′ below and above Mangpu." Our specimens were all collected in these hills between 3,000 and 6,300 feet. We found it common above Buxa, in the Duars, at 3,000 feet.

They are essentially forest birds living in those that are evergreen but also may be found in scrub, bamboos, etc. They also come into tea cultivation where nests were found by the late Mr. A. M. Primrose.

Their call is a loud far-reaching whistle, described well by Stuart Baker as "a sound like *Wheea-whu* repeated constantly and slightly ascending in scale with each repetition." They are more vociferous during the breeding season. Stevens writes :—"This partridge is often to be heard calling before and after rain when I have known this to happen after a thunder-storm as late as the 20th of July. Towards the breeding season they commence to call in the foot-hills around 2,000′ as early as the 21st of January. The chick soon after hatching actually gives utterance to the identical call of the adult." This call is easily imitated and the birds can be called up. They fly well but give difficult shots owing to the nature of the country they inhabit and often fly into trees. They go about in small coveys of about 6 to 12 either two parents and chicks or two parties of these.

Beavan wrote to Hume that "This species is more abundant than *A. torqueolus* in Sikkim, and near Darjeeling inhabits a lower zone than the preceding, of from 4,000 to 8,000 feet. It is found generally in coveys and numbers are captured by the Lepchas by calling them within shot and taken into the station of Darjeeling for sale. These birds inhabit such dense cover that shooting them in any other way is almost out of the question." The Lepchas may perhaps capture numbers of them but certainly now-a-days numbers are not brought in for sale.

Godwin-Austen gives an account of how these birds are snared in the Daphla Hills. He wrote : –"The Daphlas, like the other hill tribes, are clever at this art, and the mode of capturing Pheasants and Partridges is simple and worth describing. As it is the habit of these birds to get down low at night into the warmer ravines, and feed upwards along the crests of the spurs, they stop the progress of the covey by a zig-zag barrier about two to three feet high, made up of twigs and short pieces of bamboo stuck into the ground, which is rapidly formed and extended a short distance down hill on either side. A narrow opening is left here and there, generally at the re-entering angles, and in this the noose is set, just above the cross sticks and in the same plane, at exactly the height of the bird's breast. The noose string is made of a thin slip peeled off the outside of a bamboo, and tied to the end of a pliant stick, drawn down like a spring, and hitched into a saw nick in a bamboo peg, into which the flat form of the string forming the noose fits close and accurately. All the materials grow on the spot, and in a few hours hundreds of barriers and snares can be made and set. The birds are often caught alive by the legs."

With regard to its nidification, it is said to breed up to 8,000 feet where Masson said he found a nest which he describes as having been well-made of grass partly domed and densely lined with grass ; but other observers describe the

nest as a mere depression in the ground well lined with grass, which is more likely. The nest is situated in various kinds of jungle, generally in forest but alse in scrub jungle, tea, bamboos and grassland. Stevens found them breeding "in evergreen forest in rocky broken ground, with an under growth of moss, ferns and bracken." This is their usual habitat.

They breed from April to June or early July, earlier in the lower and later in the higher parts of their habitat. They usually lay from 3 to 5 eggs but 8 have been recorded; Stevens mentions 7. In colour they are china-white and very smooth. According to Stuart Baker they average 39·9 × 30·2 mm.

There seems little on record about these birds in captivity. Bailey didn't find them do as well at Gangtok as the Common Hill-Partridge. Sanyal doesn't mention them as having been tried in the Alipur Zoo. Flower, quoting C. Barnly Smith, gives 8 years as the duration of their life. (*Contributions to our Knowledge of the Duration of Life in Vertebrate Annimals—Proceedings of the Zoological Society of London, 1925, page 1408.*

(To be continued).

The Purple Thrush.

Cochoa purpurea Hodgson.

(With a coloured plate.)

By

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

Our personal knowledge of this fine Thrush is very limited indeed and this short article consists of quotations from the writings of those naturalists who have been more fortunate than we have. The cock and hen have been

recently figured in *Les Oiseaux de L'Indochine Française Vol. III plate XXXII*, but we don't think the nestling has been figured before.

It is not necessary to give a description of this bird as the coloured plate depicts both sexes and the nestling, the male on the left with the female behind it and the nestling on the right. They were painted from fresh specimens collected at Rungirun and are shown in a thicket of wild yellow raspberry.

The Purple Thrush is, with us, a very rare and extremely local bird. Stevens apparently never came across it although he collected very thoroughly and, until the end of July 1932, the only specimen we posessed was that of a male kindly presented by Mr. Shaw, who collected it at Mangpu at an elevation of 5,000 ft. on the 13th May 1920. Neither Mr. Shaws' nor our collectors nor ourselves could locate this bird again. On the 29th July and 3rd and 4th August 1932, we were at last sucessful and collected two adult males, one adult female and one nestling at Rangirun in the Darjeeling District at an elevation of 6,300 feet. Mr. H. V. O'Donel has also obtained a female at Ramam (8,000 ft.) in thick ringal bamboos on the 19th May 1933.

With regard to its status in our area Stevens remarks in his "*Notes on the Birds of the Sikkim Himalayas*" :—

"Recorded without doubt as a permanent resident up to 8,000′ at least. I have no hesitation in stating this information to be misleading as apart from its rarity, there is little likelihood of meeting it in "the cold weather" when collecting is not so restricted as it is in "the rains," and though odd birds might remain in the bottoms of the deep valleys, only systematic searching during April to May onwards will reveal its status, when it is certain to visit its breeding grounds in common with numerous other species of Ground-Thrushes. Once obtained above Mangpu at an elevation of 5,000′, male 13.5.20. (G. E. Shaw.) Blanford obtained one

specimen on the Cho La Range Kaphu ? (Kapup) at 10,000′, 28.8.70. Represented in the Tring Museum, male, female June, *ex* Elwes collection. In the British Museum series there are seven adults, April to August, three juveniles, Augnst aud September and a single immature male January 1876."

The distribution, as given by Stuart Baker, is :—"Himalayas from Simla to Eastern Assam, North and South of the Brahmaputra ; Manipur, Chin and Kachin Hills, Hills of Central and South Burma to Tenasserim."

The birds we were fortunate enough to secure were all from the same patch of forest. The Purple Thrush is essentially a forest bird and, with us, usually keeps to those which are humid and evergreen but Mr. O. Donel secured one in heavy ringal bamboos. In Shillong, however, Stuart Baker found it "in the pine-forests where there was undergrowth and a mixture of other trees in the ravines." The little we were able to observe of this bird concides with what this naturalist writes :—

"It is a shy bird and in spite of its brilliant colouring by no means conspicuous until it strikes a patch of sunlight, when it is transformed at once into a most beautiful object. It is a very quiet bird and beyond a low chuckle I have heard no note. It feeds largely on fruit and berries and to a less extent on insects".

Jerdon wrote about it :—"I found it very rare near Darjeeling, and only obtained one specimen, which was shot at a considerable elevation above 8,000 feet. Hodgson says "They are common to all three regions of Nepal. They are shy in their manners, adhere exclusively to the woods, live solitarily or in pairs, breed and moult but once a year, nidificate on trees, and feed almost equally on the ground and on trees. I have taken from their stomachs several sorts of stoney berries, small univalve mollusca, and sundry kinds of aquatic insects".

With regard to their nidification Stuart Baker writes as follows:—"This beautiful Thrush breeds in May, June and July at heights between 3,500 and 6,000 feet and possibly up to 8,000 feet.. It makes a rather loosely put together shallow cup-shaped nest of living green moss lined with black fern and moss roots and rachides. It is very untidy outwardly, scraps of moss sticking out in every direction but the inner cup of roots is more firm and compact. It is usually placed on a small tree, 6 to 20 feet from the ground, standing in evergreen forest but it sometimes breeds in pine forest. The eggs number two or three, very rarely four, and are typically Thrush-like in character but very handsome and richly coloured. They range from eggs like the English Blackbird, though brighter and redder, to eggs with a bright pale sea-green ground richly: blotched with reddish. The texture is fine and close but not glossy as in *citrina* eggs, and many are practically indistinguishable from the eggs of *Zoothera*, though generally longer ovals in shape. Fifty eggs average 31·3 × 21·6 mm".

BEARS AND THEIR SHIKAR.

By

Colonel H. S. Wood, I.M.S.

(*Continued from page 110*)

The fat of the Bear is in great demand for all sorts of rheumatic pains and swellings and our camp. after shooting one, used to reek of the smell of its being melted down in kerosene tins. Everything seemed to smell and taste of Bears' fat. The bile is supposed, by the Kukis, to be a panacea for every ailment under the sun even including small-pox.

The droppings of the Bear are very like those of a human being and fruit stones will be found in the mass.

Tigers will sometimes devour the carcass of a Bear, I will refer to one instance which occurred in my wanderings when dealing with Tiger. The Bear has a distinctive odour of its own and as regards the meat all I can say is that it is rank and coarse. I tried it once and never again. I notice that it sometimes figures in the menus of certain fashionable restaurants in our country and abroad. I daresay in the hand of a clever and capable *chef* it may be made palatable. It is generally best to keep away while a Bear is being skinned as they swarm with ticks.

The various ways of shikaring Bears are :

1. Tracking them up.
2. By beating them out of heavy jungle.
3. By sitting up for them over crops of *makai* or some favourite fruit tree.
4. Going over burnt jungle, in the very early morning or in the evening, on an elephant when Bruin is on the move.

However, I think most sportsmen have come on them unexpectedly whilst after other game ; all my Bears were shot in this manner.

The first method is hopeless owing to the nature of the ground and after miles of tracking probably one will find the beast has taken refuge in a cave. From this the animal may certainly be drawn out by means of smoke. N. of my regiment, was very successful with this method in the Khasia Hills, but one day he had a nasty accident and nearly blew his foot off by firing too soon and vertically at the Bear as it came out of the cave. He was sitting on a rock above the cave with his legs dangling down when the accident occurred.

The second method is I believe adopted by the tea planters in the Darjeeling district and I think in the cold weather shoots some have been bagged in this way.

The third method is very unsatisfactory, uncertain, unhealthy and disappointing.

The fourth method is the best and in the Nowgong district of Assam, burnt jungle visited at the proper time is a certain find for the prowling *Bhalu*.

A fifth method, which I have never seen mentioned in any shikar book, is to bomb them out of caves. This seems to be rather a mean and unsporting method but what else can one do when they will lie up in these deep recesses. B, a shikari well known in Assam, was the first to tell me of this method and he had considerable success. Once while he and his wife were ready at the mouth of a cave, whilst bombing operations were in progress, no less than three Bears came out, he only bagged one. Whilst on tour with my Magistrate we made up our minds to try this method. I knew of a place near the hot springs called Kopili that had some caves and which, in former years, held so many Bears that no native could be induced to go near the spot. This place was called the Koorung, an isolated range of thickly clad sandstone hills. Along one side ran a murky, dank, sluggish stream choked here and there with the debris of ages. From the banks the sandstone cliffs went sheer up 20 or 30 feet and it was in these that the caves were situated. Beyond the range there were miles upon miles of grassy plain, on my first visit to this place the grass jungle was full of tracks leading to and from the hills. It was a most eerie spot. On that first visit a dreadful tragedy took place resulting in the death of one of the best shikari servants I've ever had in India, which I will relate in detail when writing on Bison.

I procured about twenty native bombs, such as one sees hanging up in bazaars. They look like turnips and are constructed of rope and hemp drawn tight over the powder; a hollow bamboo full of powder runs into the

interior and a bit projecting outside acts as a fuse. We lashed several lengths of bamboo together and placed a tuft of grass on the end of this, the bomb being placed on the grass. When all was ready the grass was lit and the whole bamboo thrust rapidly into the cave. The report was terrific and shook the ground on which we stood. We drew blank. Had there been any Bears they must have come out. Alas! since my first visit, all game, including the Bears, had left this paradise owing to the authorities allowing villagers to settle close by. However the experiment was interesting and we got a good deal of fun out of it.

In my shikar after Bears two occasions were red letter days and these I describe.

When I was stationed in Manipur the Medical Officer of a regiment that had been sent up from Bombay to construct the Manipur—Kohima road, died suddenly and I was told off on temporary duty with them, I was very pleased at the idea as the camp was situated in grand shikar country. The Regimental Officers were very keen on shikar but absolute greenhorns. The C. O. opened the ball by shooting a tame *Mithun* close to the camp. He was terribly pleased, taking it to be a real wild Bison and the skin was pegged out in front of his tent so as to be admired by everyone. I *knew* it was a tame *Mithun* but said nothing for fear of hurting his feelings. Next day, the owner, who happened to be one of my Kuki trappers came to the camp and demanded compensation. The C. O. was adamant so the owner went to the Political Officer in Manipur who made the C. O. pay the owner Rs. 80. How we all laughed !! Shortly afterwards one of the officers shot a tame buffalo just below our camp, of course, under the impression that that it was a wild one. Another officer took leave and went to Golaghat and managed to get his hired elephant badly gored by a wild buffalo and had to disgorge many

rupees. All round their experience of big game shooting was not much of a success.

After this digression I will proceed. T. suggested that he and I should take ten days leave and do some shikar on the Kowbruh slopes. He said he would make the *bandobust* which meant No tents!! No camp beds!! We constructed "lean to's" to sleep in and, worst of all, before our ten days were over all the servants, including the cook, went down with malaria and our stores ran out. I remember our last meal consisted of some venison and tree fungi. It rained hard during the night prior to our return, every thing was soaked and T. and I both got fever.

Well we went along together, each with a tracker, T. leading down the hillside. Suddenly I saw T's tracker point vigorously to our left. T. being short-sighted and wearing glasses apparently could not spot the animal so I went down beside him and saw an enormous bear facing us, not 20 yards away. T. spotted the Bear at the same moment and our rifles rang out. I was using a 12 bore rifle and T. had a ·500 Express. At the shots the Bear went off and we followed in hot haste. It was bleeding profusely so tracking was easy but what ground that beast led us over—belts of nettles three feet high, rocky and steep nullahs crammed with all kinds of creepers and thorns, etc. The Bear crossed a stream, with a big pool, and the water was quite red. Bruin had apparently stopped for a bath before proceeding. After about an hour I spotted him going slowly up a slope; I fired and he spoke and disappeared over a ridge. We topped the ridge, and about half way down I heard a rustle of branches and leaves above me and the next instant my *sola topee* and rifle were knocked from me. I realized that another Bear had almost dropped on to the top of me. It then stood about six yards away from me trying to make up its mind whether to charge me or not. I was powerless so shouted to T. who was not far

behind me and he hurried up and fired but missed the brute. I was not hurt except for a sprained ankle. It was lucky that the mass of 400 lbs. did not catch me full otherwise my neck would have been dislocated and the base of my skull fractured.

I could not go on tracking the wounded Bear so told T. to carry on and that I would return slowly to camp which was about 7 miles away. Before T. left he said "Would you mind lending my tracker your shot gun and some cartridges?" I did so. On the way to camp I, unfortunately, ran into a bee's nest, which hung from a branch, and got badly stung on the face. My tracker darted off and brought the root of the wild ginger, sliced it, and applied it to the stings, it certainly relieved the pain, probably the alkaline juice of the plant neutralizing the formic acid of the poison.

Before leaving the spot where the Bear dropped on me I examined the tree and saw, high up, one of the *machans* of which I have spoken. To this day I cannot make out whether that Bear intended to attack me or whether it got frightened and tumbled down. From the fact that it stood after the fall I think mischief was meant and I was very fortunate to have escaped so lightly.

T. had arrived in camp before me and told me what happened after we parted. After about two hours tracking the wounded Bear was found lying up in some sungrass. There was a rock not far off which overlooked the spot so T. stood on this and sent the tracker in to the grass to stir Bruin up with my shot gun. The Kuki fired about three shots, there was a rush and out darted the tracker, dropping my shot gun. The Bear get hold of it and reduced the thin part of the stock to matchwood and the locks and trigger guard were beyond repair. I was terribly disgusted, as in an isolated place like Manipur, it would take weeks to replace

my gun and, at that time, I was not overburdened with wealth. Shortly after mauling my gun the Bear rushed out and T. gave it the *coup de grace.* Next day 17 men were sent to bring it in. It was a huge brute taping 6 ft. 7 inches from nose to tail and very fat and heavy, and with a splendid coat.

It was marvellous the distance the brute travelled after the first two shots. The two bullets had entered its chest close together ; T's had flattened in the shoulder but mine had come out at the lower part of the chest cavity producing a huge wound and after this it took two more shots to kill him. My opinion is that the Bear is a tough beast and will carry a lot of lead unless the first shot clean bowls him over.

The fat lay 6 to 8 inches on the loins and back and masses of it round the kidneys and in the omentum of the intestine, so my men were very happy and Bear's fat was boiled down for days.

After all the exposure and privation I went down with an attack of cerebral malaria with a temperature of 105°. My unfeeling temporary C. O. would not let me return to Cantonments so, against all regulations, I went direct to my boss in Shillong and was removed in a *dhooli* to Manipur. My *pucca* C. O. kindly met me on the way and gave me half a pint of champagne which put new life into me and with careful nursing I was soon myself again. The Adjutant of my regiment lent me his shot gun until a new one arrived so I forgot all my troubles and loss.

My second exciting encounter with a Bear happened at Kopili when I was after Bison. One evening my tracker and myself went out to look for a solitary Bison whose tracks we had seen on the previous day. We were on the top of a hill and I was scanning the jungle, which had been fired, with my glasses for the beast. About a mile away we spotted a large black animal moving about and, with my glasses,

I made it out to be a huge Bear eating the roasted grubs it found in the round nests of the black tree ant. About three quarters of an hour remained before the sun set so both of us rushed down the hill towards the object. Where the beast was feeding was undulating ground and my shikari funked it and remained behind in a tree. I went on alone and had topped several ridges when I suddenly came on the Bear digging and almost half way down a pyramidal hole. I could only see his vast posterior and part of his back. I let drive with a soft nose from my ·450 H. V. which raked him from stern to stern and, with only a tremor, he fell dead in the hole. I was delighted and returned to camp in the darkness. Next morning my wife with 15 men accompanied me and we brought the Bear into camp. He was the biggect I have ever seen taping 6 ft. 8 inches from nose to tail and his coat was perfect A rather amusing thing happened to the skull which I had cleaned and hung up in the cook shed. When we were leaving camp in was missing and the cook told me that a half witted coolie of ours had made soup out of it. On the day we brought the Bear in a fearful tragedy befell our servants which transformed our camp into one of sorrow and sadness.

The "Paharis" of Mussoorie believe that the Bear thrusts grass and leaves into its wounds to stop the flow of blood! This is not credible. Probably owing to the fearful jungle it goes through, parts get thrust into the wounds and so have given rise to this belief.

[Pocock *(Journ. Bomb. Nat. History Soc. Vol. XXXVI. No. 1 pp. 108—131)* gives 6 subspecies of this Black Bear and one provisional one. Of these either one or two are found in our area. Those mentioned by Pocock are ; *Selenarctos thibetanus thibetanns,* G. Cuv.

Distribution. "Assam west-wards apparently to the Nepal Terai and eastwards through Burma to Siam, Annam and possibly Southern China."

Selenarctos thibetanus laniger, Pocock.

Distribution :—"Kashmir and probably at relatively high elevations elsewhere in the Himalayas." Under this subspecies he gives as a synonym ? *Ursus torquatus* var. *arboreus*, Gray. with the type locality "Darjiling."

Selenarctos thibetanus gedrosianus, Blanford.

Distribution :—"Baluchistan." This race he only admits provisionally.

Selenarctos thibetanus mupinensis, Heude.

Distribution :—"Western China : Moupin, Shenai, Szechuen."

Selenarctos thibetanus ursuricus Heude.

Distribution :—"North China, Manchuria, Amurland and possibly Kamschatka."

Selenarctos thibetanus japonicus Schlegel.

Distribution :—"Mountainous parts of the Japanese Archipelago (Temminck)."

Selenarctos thibetanus formosanus Swinhoe.

Distribution :—"Formosa and possibly S. China."

The only two that interest us are *Selenarctos t. thibetanus* and *Selenarctos t. laniger*.

With regard to the former, which is the typical race, he says it "may be distinguished from the more northern races by its comparatively short, coarse, coat without underwool." With regard to Sikkim skins he writes :—From Sikkim I have seen two skins. One collected by Mandelli and presented to the Museum by Blanford. The coat is thicker than in the skins from Nepal and Assam I have examined but has no appreciable underwool ; it is of medium length, about $1\frac{1}{2}$ to 2 ins. on the body and from $4\frac{1}{2}$ to 5 ins. on the sides of the neck. The muzzle is brown, not dark, above, tan at the sides, the chin is white and the collar, about 13 or 14 ins. from point to point, very narrow and passing a long way back over the sternum, is buffy white.

The second, a cub 2 ft. 9 ins. long, from Lachung, 9,000 ft. (C. H. Dracott), kindly lent to me by the Bombay Natural History Society, has the coat long, thick and soft, with a good deal of brown underwool, the hair on the sides of the neck being 3·2 ins., on the back 2·1 ins, on the flanks 3 ins. The muzzle is brown, but not dark, the whole of the chin is buff black to the corners of the mouth, the buff extending to a point along the fore part of the throat; the collar is the same tint, broad and Y-shaped, the posterior branch shorter than the arms; the paws are brown along the margins and round the digital pads. In the quality and length of its fur and in its well developed underwool, the skin closely approaches the races from Kashmir and Szechuen and perhaps belongs to the latter. It certainly differs from typical short-coated Assamese examples of *S. thibetanus*.

Selenarctos t. laniger is according to Pocock "Distinguishable from the typical form, represented by the Assamese skins, by its longer, softer and altogether more luxuriant coat which carries a very appreciable quantity of underwool, especially on the neck in winter." Further on he remarks. "This race of *S. thibetanus* is probably rather 'environmental' than 'local'. It is linked with the typical race found at lower levels in Assam by the Sikkim specimens recorded above; and it is probable that wherever *S. thibetanus* occurs at tolerably high altitudes in the Himalayas and elsewhere it aquires a longer coat with underwool, especially in winter."

Rowland Ward gives the record for the Himalayan Black Bear as, length of *skin* 8 ft. 5 in. the record measured from nose to tip of tail as 6 ft. 9 in. The weight of one from Nepal is given as 700 lbs.

It would be interesting to know from members who have shot Bears in these hills to which of these two types their trophies belong.

Colonel Wood mentions these Bears sometimes eating carrion but says nothing about its being carnivorous which is well known. Blanford wrote :—"It is the most carnivorous of the Indian bears, and not only kills sheep, goats and even cattle and ponies, but occasionally feeds on carrion." With regard to hybernation the same author remarks :—"Some observers state that black bears hybernate, whilst Adams declares they do not. The fact is doubtless, as stated by Kinloch, that they do not hybernate completely as *U. arctus* does, but that they remain in a state of semitorpor, often in a hollow tree, during the cold months, moving about and feeding a little on milder days." What is the experience of our shikaris ? *(Editor)*].

(To be continued).

Sambo, the Malayan Bear.

His mother had met with a fatal accident so I brought him home. His eyes had evidently only opened a few days previously, as even then they were not full open, and very red and beary they looked. His nose, mouth, and, in fact, the whole snout were hairless and very pink, ridiculously like a young pig's. Two or three teeth, including the canines, were just showing. His head was quite unlike the flat one of the Sloth Bear, being round with a domed forehead, and rather prominent compared to the rest of his body ; his ears were very small. His coat was more furry than hairy, and of an even texture, though rough of course. It was markedly unlike the scraggy, unkempt coat of the Sloth Bear. His whole body was a compact mass of bone and muscle, with very bandy fore-legs, ending in large paws armed with terrific long claws, even at that age. He was unable to walk much, and appeared to be too young to be either frightened or fierce.

His thirteen year old mistress christened him Sambo, and took up her duties as foster-mother very seriously. After some experimenting, a bit of rag, screwed up into a long cigarette, was found the most satisfactory means by which he could draw up his principal source of nourishment, cow's milk diluted with a little water. He showed his cheerful appreciation of the rag-cigarette by enthusiastically absorbing very large quantities of milk, and looking more like an inflated furry ball than ever before.

In about fifteen days, he was big and strong enough to scurry about the house, and there was hardly a corner which he had not swept clean of cobwebs with his face, and not a single chair up which he had not climbed and toppled off. In a month he knew, and was on terms of friendship with, every member of the house, including Sandy, the Mroong dog (a very near relation of the Red Wild Dog) and Billy, the Goat. He knew his sleeping basket and promptly, at dusk, started to croon himself to sleep, shoving a fore-paw into his mouth, and sucking it with much vigour and splashing, was a regular accompaniment to the lullaby, and each break in his placid slumber was punctuated with his gurgling croon. His growth was rapid, and his teeth had all appeared in a short time, and a very business-like set they were. His diet was now bread and milk, all kinds of fruit, with a goodly supply of sweets, which his foster-mother carefully set apart for him. He knew the latter wonderfully well, and was never so happy and frolicsome as when with her. In his manners he was the gentleman beyond reproach and never a cross word, look, or bite did he give anyone.

Restless, and full of fun though he was, he had his contemplative moods too, and of an evening, while his foster-mother and grandmother, and the Old Un sat on a bench overlooking the Karnafuli River down below, enjoying the view and the evening breeze, Sambo would sit, very much

at ease, on somebody's lap, and look up at the large white clouds sailing along the sky. Now and then, as a particularly large one came along, he would stop cuddling his toes with his fore-paws, and would screw up his snout in a strained and long twitch waving an alarmingly long and prehensile tongue, while he put his fore-paws out as far, and as high, as he could, obviously in a manful effort to get hold of a piece of the tempting white cloud. He never appeared to tire of this ruminative performance, and there could be little doubt that, in his small eyes, it seemed that wonderful sheets of succulent cream eluded his paws and tongue, and sailed past in most unaccountable manner.

In intelligence, Sambo was far ahead of any of the varied wild pets that have, from time to time, honoured us with their company. In almost a few days he had learnt his name, and no matter how busy he was in chewing "Immediate" files, a call of Sambo from any of us, and specially from his foster-mother and grandmother immediately brought him to the bears stance of "Tention", and he would drop his fore-paws, rise on his hindlegs and look round to see what was wanted. A second call, and he would come at full gallop, rising up as he came to the caller. Very intelligent too was he in discovering that the big, leather-bound volumes on the open bookshelves fell, with a most delightful clap, when hooked with his long claws and jerked out. Quickly too he found that retribution generally followed the performance, in the shape of a cuff from the Old'Un, and, as soon as he heard foot steps, during a book-toppling seance, he promptly scurried off, and, unfailing, took refuge under a secretariat table, where, with the wall to protect his back from all attack from the rear, he sat on his tail, spread out his legs in front and held the fort against all comers, boxing off all efforts to get a grip on him, and, only surrendering when the Old'Un came and unsportingly picked him up bodily. Another wonderful game, all the more enjoyable and thrilling because a sound cuffing was the declared punishment,

was the stealthy climbing of a bath-room window from outside, the dip into the big tub of cool water, with lovely spluttering somersaults in it, if time and solitude permitted, to be followed by a dripping climb into one of the delightfully soft, clean beds, and a delicious roll in it, with the coverlet, sheets, and pillows in one gorgeous confusion with wet Bear!

In about six months, Sambo became the size of a large spaniel, and weighed the best part of fifty pounds. Finding that there was nothing left to explore inside the bungalow, he discovered that the cliff over the river, was a fine place for exploration and retreat at all times, with a large stock of not to be sneezed at edibles, in the various fruit trees and ant heaps. Besides, climbing up and down the steep cliff was a fine game, and then again to climb up a tree on the cliff-face, sit in a convenient fork, after a good lunch, and watch the dug-outs in the river down below, and the sailing clouds up above, was undoubtedly, more soul satisfying than to be with unappreciative men-folk, who pored and worried so unnecessarily over sheets of tasteless paper tied with red tape, or disrespectful women-folk who sat with funny little baskets out of which they took lovely little reels of coloured stuff, which were put back again carefully after a short piece, like a long hair, had been worked into a tiny, thin, shiny thing, that was far sharper and more prickly than any thorn in the jungle on the cliff. One could almost hear him soliloquising. "Funny folks these humans. Not without their good points, of course, but hardly up to the Malayan Bear standard!"

Gradually it came to be quite the recognized thing for Sambo to be told to 'go' after breakfast, and off he went to the cliff, and disappeared from general view. Now and then he would be seen going along from branch to branch of a tree or on the ground, busily investigating grubs and beetles far down the cliff. A call of 'Sambo' brought him up, in less

than a minute, for lunch, and then off again till about 4 P.M. when he would climb up and come on the family, at tea, on the lawn near the cliff. The gift of a biscuit, or a bit of cake, was acknowledged with about a dozen rapid somersaults, and some real, instinct-taught dancing, executed with all the manner of pirouettes and capers, all on the hind-legs, the forepaws clutched at the back of the head. Then followed the best game of the day and, for about an hour, Sambo, Sandy, the Dog, and Billy the Goat, held the lawn, romping, boxing, butting and galloping madly, while we humans looked on, overcome with laughter at the antics of the three strange friends. In all the biffing and butting and tweaking, there was never a growl or snarl or bite or kick No game in the world could have been more sporting, or played in better spirit. And so to bed.

There were variations of course. There was the afternoon when, coming up for the usual biscuit and dance and romp, a bewildered Sambo walked into a tea-party, with a Big man and a Kind Lady seated in the midst. Some of the more timid folk were feeling just a trifle scared when Big Man came along, and, introduced to Sambo, who not to be out done in politeness, immediately put out a very clawy paw to be shaken. Later in the evening, at the request of Kind Lady, a very sleepy Sambo was taken out of his basket and brought in to a lit up room, where he promptly clutched Kind Lady's finger with his paw, and, using the other one as a slobbery soother, noisily crooned himself to sleep again cuddling up at Kind Lady's feet.

After over a year's stay with us, Sambo travelled down to Calcutta making many friends on the steamer. In Calcutta he went to live with some of his own folk at the Zoo, where he was welcomed by the authorities as the only one of his family there, and given a large room all to himself, with bars all round. To a knowledgeable bear, very useful these bars were for climbing and looking over to the Tiger

house, and calling the inmates of that house names. Next door to him was a cousin of his about his own age, of the Sloth family, so there was plenty of opportunity for chat and back chat.

Every few months a call of 'Sambo' brought him out with a rush, to welcome the Old'un or Foster-Mother and Grand-Mother. Their visits were marked with much mutual rejoicing and indulgence in barley-sugar, with a hand-in-hand walk outside the house. He never failed to recognize them and his long and loud wails, when they had to leave and he was put back into his room, are sad memories.

At the Zoo we must leave him, and perhaps some of you may meet him some day. He is 'At Home' from 6 A.M. to 6 P.M. and a handful of sweets will be much appreciated.

S. K. GHOSH, I.C.S.

FISHING IN INDIA AND IN EUROPE.

By

COLONEL H. S. WOOD, I.M.S.

(*Continued from page 120*)

A year later I was fortunate to accompany a punitive expedition to Chussand also in independant territory, but further south than Somrah. We were to punish Thongu the Kuki chief for some raids into Manipur territory. The marches were very strenuous and difficult. Thongu surrendered a number of guns but I fancy the choicest ones were hidden in the jungle. As I knew Manipuri very well I acted as interpreter and made great friends with the chief. He was a great hunter and his hut was covered with trophies of the chase, Bison, Rhino, Tsine, Deer, etc. He offered me his pipe but I only had one pull at it as it was green tobacco with a nasty odour. We had *Zu* to drink, a kind of beer made from some sort of

millet. We had a long chat about Natural History and shikar. Afterwards he said *Aiga* (Manipuri for "My Lord") you and I are fond of hunting, come and live here and marry my daughter. The damsel, very coy, was introduced, she was quite a nice looking girl. However I was not prepared to resign my commission and settle down to jungle life and become a Kuki so I had to decline the honour. I I liked the Kuki chief very much and was sorry to say good bye. I gave him a pocket knife as a souvenir.

The Kukis make their own gunpowder; with the exception of the charcoal it is all made from human ordure and urine, this supplying the sulphur and saltpetre. It is in grains very much lighter than owr gunpowder as it is not polished with graphite ; it burns slowly and is not strong but they use enormous charges in their crude gune. The Kukis are nomadic and do immense harm to the forests by their system of *jhooming*. They are inveterate trappers and hunters and after a time all animate things disappear in the neighburhood of a Kuki village. They keep herds of very fine *Gayal*, the milk of which they do not drink as they look upon it as an excrement. They are very superstitious and do innumerable *pujahs* to the gods, *i.e.*, rivers, forests, thunder, etc. As trackers I defy even a Bhil or a Sonthal to compete with them and their knowledge of the jungle with all its denizens, trees and flora is as complete as it can be. I always had Kuki trackers during the seven and a half years I spent in Manipur.

The Kukis like some other Nagas are nicotine drinkers and below their pipes is a receptacle which collects the nicotiue mixed with saliva. The women also smoke and collect their nicotine for their men folk. I was told the reason they took it was because it warded off hunger and gave them energy when tired; also that it kept off malaria. I can quite believe this as the quantity of nicotine that must circulate in their blood must be deadly to the

malarial parasite. The nicotine is kept in little bamboo bottles. My trackers used to frequently take it. This nicotine drinking seems to have no detecrorating effect on the system except that it pigments the skin, the skin of an addict to nicotine drinking having a complexion approaching the colour of a good, old, seasoned meerschaum.

Two interesting incidents, connected with fishing, occured while I was in Assam. The first one was when McCabe, the D. C. of the Garo Hills, was fishing from a steep bank of the Sumasri river. He heard a sound behind him and, to his horror, saw a rogue Elephant standing over him. Before he could do anything the rogue hurled him over the bank. Fortunetaly for McCabe he, stuck in some jungle and on search being made he was extracted with many bruises and a few ribs broken. He said "well nothing but an earthquake will kill me", his presentiment came true as he was killed in one in Shillong. He was a splendid fellow one of the old school, a thorough saheb, sportsman and administrator.

The other incident was when F. was fishing the Sona Rupa in Tezpur. He heard a noise to his right and a little behind him ; on looking round he was astonished to see a Black Panther squatting on its haunches. F. had no rifle so went on fishing and the Panther then strolled slowly to the river, swam across it, sprang on to the opposite bank, gave himself a shake and and walked slowly in to the forest. F. said it was a lovely sight and he only wished he had had his rifle instead of his rod. The Panther held its head high in the water shaking it vigorously to prevent the water getting into its eyes, the same as a Tiger does.

Curiously enough on the eve of despatching an article on Indian Fishing for the Journal, I saw a letter from Mr. A. S. MacDonald asking for information under this head, so I am writing further on the points not dealt with.

Transport.—As will be gathered from my account the place *par excellence* is the Hurry river and its tributary the Rowai. These rivers are in the N. E. portion of the district of Sylhet, very near the Khasia Hills' boundary. Sylhet is easily reached from Calcutta by train to Goalundo and then by steamer to Chandpur ; then from Chandpur to Sylhet by train. From Sylhet send kit and servants by boat to Kalagool Tea Estate and yourself proceed by motor or gharry to Salutikar, which is about 5 miles from Sylhet. Ask the Manager of the Jafflong Tea Estate to kindly send his motor boat for you to Salutikar and this will take you up to Kalagool in a few hours. The Manager of the Kalagool Tea Estate should be asked to arrange for boats to take you to the Hurry—Rowai junction. Pitch your camp on the hill on the right bank of the Hurry and the Mauzadar of a village called Pesadooar, which is about a mile up, will arrange for boats and men for daily fishing. It would be advisable to get a *perwana* from the D. C. of Sylhet and also to call on the Forest Officer. In these days, thanks to some missionaries, transport is difficult and one must make one's own *bandobust* but cigarettes, tobacco, rum, and opium, if procurable, go a long way to help in these matters and the Khasias will be found good fellows.

There is any amount of big and small game in these parts and at Burghat there are many Serow but this needs fitness and dangerous and difficult climbing. One can move camp, providing the water has not fallen much, to the higher reaches of the Rowai to tap virgin water. For this a folding boat of some sort is necessary, I found a Ford very good. The camp should be pitched at Mauprang, as there are grand pools above this full of Mahseer. The Rowai and Hurry localities are very healthy and the scenery is magnificent. Above Burghat there are grand places but very difficult to get at owing to the precipitous cliffs on either side. Here I have seen huge Mahseer lying under the large boulders.

The Ponatite is the next best place. This is also in the Sylhet district lying in the N. Western portion of the Sunamganj sub-division. Proceed by steamer to Sunamganj. In the earlier part of the winter, before the water in the *Khals* has dropped, it is possible to take boats right up to the Ponatite ; but a better way is to arrange for elephants at Sunamganj to take you and your kit etc. cross country. In my day the Zemindars were most obliging but it may perhaps be different now. The sub-divisional officer of Sunamganj afforded me the greatest help so it would be well to write to him. The *Bheels* and marshy ground between Sunamganj and the Ponatite swarm with duck, snipe and golden plover so a gun is very useful. Dng-outs will have to be arranged for at the Ponatite. A very comfortable way of reaching this river from Sunamganj is to get the loan or hire a budgerow from some Zemindar. In this case no tent, bed, etc. are necessary as one can live in it quite comfortably ; the servants living in *bashas* on the bank and a small boat can be towed behind for fishing.

The Ponatite is very unhealthy and every time I got back I got a dose of malaria in spite of taking quinine. For preference I should go to the Hurry, but for monsters then the Ponatite as it holds 40 and 57 pounders in the large pool also very large *Seetul*. There is no shootiEg actually at the Ponatite but with an elephant one can get Buffalo, Tiger, Pig, Hog-deer, Sambhur and Swamp Partridge in the Tangour Hoar not very far away.

To get to the Borelli in the Tezpur district one proceeds by rail to Gauhati and then by steamer to Tezpur and then by the Balipara Railway to Balipara. The manager of the Chandwar Tea Estate will, no doubt, be glad to help anyone to get to his Estate which is almost on the bank of the river and also supply boats. In my day a dear old man Uncle Curtis was the manager. He put me up, as all planters do, and gave me much enjoyable fishing. Possibly there is now a

rest-house at Chandwar where one could put up, or, with the permision of the Forest Officer, one could stay at the Forest Bungalow, but this is some distance from the river. There are ideal camping places on the river and one could shift there to get higher up. There used to be Buffalo, Rhino and Bison shooting all round the Borelli, all this may have changed since my day but I expect the Mahseer fishing is as good as it was from 1910 to 1912. The locality is very healthy and the scenery beautiful.

Mr. MacDonald is welcome to quote from my article, with the consent of the Editor. I, myself, hope to publish a book some day in which this article will be included.

The Dragonfly Fauna of the Darjeeling and Jalpaiguri Districts and Sikkim.

BY

LT.-COL. F. C. FRASER. I.M.S., F.R.E.S.

PART 1.

The cradel of insect life, and indeed of all organisms, was probably pitched somewhere in the region comprising Bengal, Assam and Upper Burma. In no part of the world at the present day do we find such an intense fauna, so great a variety of insect life and such vast colonies of insects as in these districts. Sikkim and Darjeeling have long been noted for their glorious butterflies and these are equalled by many other orders, not least among which are the *Odonata* or what are commonly known as "Dragonflies".

Most people are able to recognize a dragonfly on sight but it is possible to confuse them with other nearly related insects. Thus I am frequently sent specimens of ant-lions and may-flies in mistake for their near relations dragonflies. In the former insects, the antennae are very noticeable objects, being often clubbed like those of the butterfly; in the dragonfly, the antennae are so small as to be seen with difficulty and then only by means of a hand-lens.

Apart from these insects there are few others which are at all likely to be confused with dragonflies. This brings us to the question—"What is a dragonfly"? and it is desirable to define it as concisely as possible.

A Dragonfly is an amphibious insect spending its early life, which may run to as long as three years, in a watery element. The more archaic species, which are usually the rarest, breed for the most part in jungly streams, whilst the more modern once have adapted themselves to civilized conditions and breed mostly in paddy fields or irrigation tanks apart from natural lakes.

The adult insect emerges directly from the larva, there being no resting stage comparable to the pupa or chrysalis

of a butterfly. Its body is made up of a large head consisting mainly of two very large compound eyes which may be in contact or considerably separated. The head is pivoted on the thorax which is in two sections, a prothorax which does duty as the neck of the insect and carries the head and the anterior pair of legs, and the main or synthorax which carries four wings and the two posterior pairs of legs.

The wings in the suborder *Zygoptera* are held close together, erect over the back when at rest; they are never folded up in any way. In the other suborder *Anisoptera*, they are held horizontally out when at rest or they may be held with a strong downward slope. In the former suborder there are a few exceptions to the rule, thus in the genus *Philoganga*, the wings are held horizontally open as in the *Anisoptera*, whilst in many species of the *Lestidae*, they are held partially open when the insects are at rest.

The legs are made up of two basal segments, the coxa and trochanter, and three terminal ones, the femur or thigh, the tibia or shin, and the tarsus or foot, the latter of which terminates by two strong claws. The body of the dragonfly terminates by a ten segmented abdomen and this portion of the insect's anatomy is subject to many variable shapes. It may be of extraordinary slimness and length, or it may be thick, broad and short. It may be cylindrical, triquetral, fusiform, flattened or compressed or may be expanded in parts. The sexual organs are carried on the abdomen, those of the male being situated beneath the 2nd segment, whilst those of the female lie below the 8th to 10th segments. When depositing eggs, the female may merely drop her eggs into water or she may insert them into the tissues of water plants by means of a robust ovipositor. A few drop their eggs in dry earth, in dried up nullahs where the first freshet will wash them down into adjacent tanks or streams. Lastly a few species lay their eggs on foliage overhanging water, where the newly hatched larvae drop plumb into their watery element.

The wings are membranous organs built up on a framework of nervures or veins which have been given names or numbers as shown in the accompanying figures. These nervures are analagous to those found in other insects; the membrane is quite naked however and quite innocent of scales such as are found in butterflies and moths, thus they may be handled with impunity without fear of rubbing off the colours. Although in most dragonflies the membrane of the wing is colourless, yet in some it is tinted with the most magnificent hues and shades, some of the Darjeeling species being among the most beautiful insects found in the world. Lastly, before closing this short description, it is necessary to say that dragonflies are very variable in size, some being not more than an inch long or in expanse, whilst others may be measured in many inches and take a place amongst the giants of the insect world.

Dragonflies are not difficult to identify by means of suitable keys and in order to facilitate this work I have given below, first, a glossary of terms used, which, in working the keys that follow, must be constantly referred to until the terms used are mastered. Secondly a few figures which will serve to explain the nervures of the wings, etc., and lastly the keys themselves.

The keys are divided into four parts which deal respectively with the suborders, families, subfamilies and genera and species. The two latter are combined, as in many cases the genera are monotypic or represented in the areas under discussion by a single species only. In places where it has been thought to be helpful, a few extra notes have been added in parenthesis after individual species.

The keys contain only those species which are found within the Darjeeling and Jalpaiguri districts—so that any which may be found not to fall within these, will probably be new additions to the fauna of the districts.

Explanation of Text figures.

FIG. A. Wings of an Anisopterous dragonfly.

A. The arc. *Aban*. Accessory basal antenodal nervure. *An*. Antenodal nervures. *Br*. The Bridge. *Bs*. Basal space. *C*. Costal nervure. Costa or Costal border of wings. *Cn*. Cubital nervures. *Cs*. Cubital space. *Cuii*. One of the main longitudinal nervures. *Dc*. Discoidal cell. *Df*. Discoidal field, the area enclosed by the nervures *MA*, *Cuii* and the outer border of the discoidal cell, *IRiii*. One of the intercalated or accessory longitudinal nervures. *IA*. One of the main nervures, the one lying nearest the base of wings. *M*. Membrane. *MA*. One of the main nervures. *Mn*. Median nervures. *Pn*. Postnodal nervures. *Pt*. The pterostigma. *Ri,Rii,Riii,Riv+v*. Main longitudinal nervures of the wing, the first known as the *Radius*. *Sa*. The sectors of arc. *Sc*. The subcostal nervure. *St*. Supertriangle. *N*. The Node. *Al*. The Anal loop, found in the hindwing only and in the present figure made up of eight cells. It is the area enclosed by the nervures *Cuii,IA* and a nervure descending from the discoidal cell.

FIG. B. Wing of a Zygopterous dragonfly, belonging to the *Coenagriidae*.

Ab. The anal bridge. *Ac*. The anal crossing, a short nervure running to the posterior border of wing or to *Ab*. *Arc*. The arc or arculus. *Dc*. The discoidal cell (shown shaded). *IA*. The most basal of the main longitudinal nervures. *MA*. One of the main nervures. *N*. The Node. *Pns*. Postnodal nervures. *Pt*, The Pterostigma. *Ans*. Antenodal nervures. (Only two in number in this subfamily.) *Ri*, *Rii*,

Riv+v. Main nervures of the wing, the first known as the *Radius. Sc.* Subcostal nervure. *Cuii.* One of the main nervures. *IRiii.* An intercalated or accessory longitudinal nervure. *C.* The Costal nervure or border, or the Costa.

FIG C. Wing of a Zygopterous dragonfly, belonging to the *Agriidae.*

Ab. The anal bridge. *Ac.* The anal crossing. This short transverse nervure sometimes meets the posterior border of the wing instead of *Ab. Ans* Antenodal nervures. *Arc.* The arc or arculus. *Bs.* Basal space sometimes traversed by nervures known as the median nervures. *C.* Costa or costal border of wing. *Csp.* Costal space. *Cuii.* One of the main nervures of wing. *Dc.* Discoidal cell (shown shaded). *Df.* Discoidal field. *IA.* One of the main nervures of wing; it is a continuation of *Ab. IRii.* An intercalated nervure, which are usually numerous in the *Agriidae. MA.* Another main nervure of the wing. *N.* The Node. *Pns.* Postnodal nervures. *Pt.* The pterostigma. *Ri.* The Radius. *Rii,Riii,Riv+v* and *R+M.* Main nervures of the wing. *Sn.* Subnode. *Sc.* Subcostal nervure.

FIG. *a.* Head of a Zygopterous dragonfly. Note that the eyes are set wide apart. On their inner side are the so-called *postocular spots* found in many of the smaller dragonflies.

a. Antennae. *c.* Clypeus. *f.* The frons. *e.* The eyes *l.* The labrum, or upper lip. Between the antennae are three small accessory eyes known as *ocelli.*

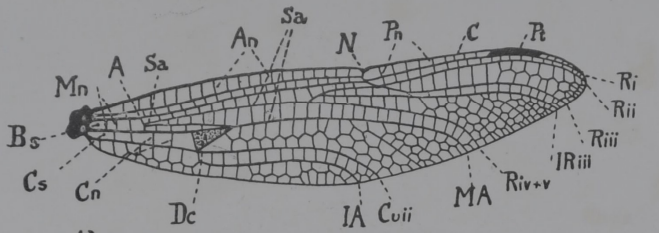
FIG. *b.* Head of a Gomphine dragonfly. Note that the eyes are set rather wide apart although not nearly

so much so as in the Zygoptera. The head is seen from the front and above.

a. Antennae. *c*. The clypeus. *e*. The eyes. *f*. The frons. *l*. The labrum or upper lip. *o*. The occiput.

FIG. *c*. Head of an Anisopterous dragonfly. Note that the eyes are here broadly contiguous and that the occiput is correspondingly small. The head is seen from the front and above.

a. The antennae. *c*. The clypeus. *e*. The eyes. *f*. The frons. *l*. The labrum. *o*. The occiput.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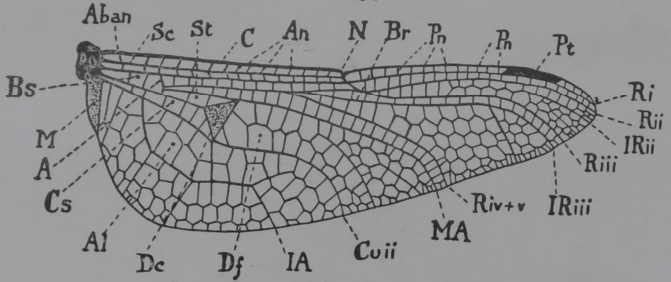
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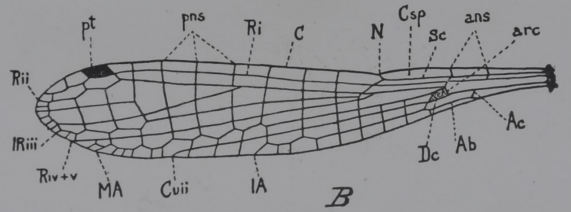
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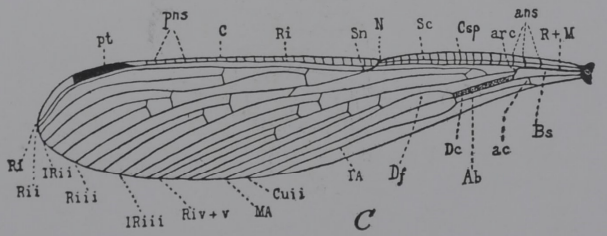
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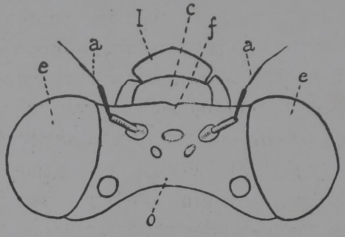

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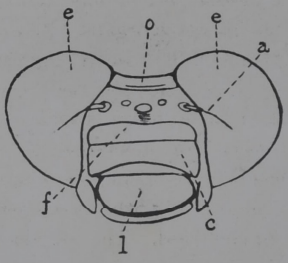

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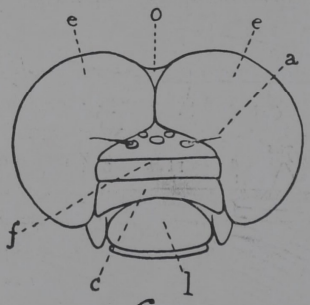

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Glossary.

Ab. The *Anal Bridge*, a nervure running from the posterior border of the wings in the Zygoptera and continued on as the nervure *IA*. It is rudimentary in genus *Drepanosticta* where it ends by joining the underside of the discoidal cell, and it is quite absent in the genus *Protosticta*. It is usually met by the short nervure *Ac*, either at the wing border or shortly after its origin, in which case the nervure *Ac* joins it instead of the hinder border of wing. (See *Ac.*)

Abdomen. The hinder part of the body of a dragonfly which contains the digestive organs. In dragonflies it is made up of ten segments. The second segment contains the genital organs of the male, the 8th to 10th those of the female. Segment 2 usually bears special markings on its dorsum which are useful for identification; segment 7, in the males, often has a prominent marking on its dorsum known as a "recognition mark", whilst segment 10 ends by carrying the anal appendages. The segments nearest the thorax or trunk of the insect are known as the "basal segments", whilst those at the opposite end or end of abdomen are known as the "anal" or "distal" segments.

Ac. The *Anal Crossing;* a short transverse nervure near the base of the wings which meets the nervure *Ab* at the wing border or shortly after the origin of the former. In the Anisoptera it constitutes one of the cubital nervures, or nervures crossing the cubital space. In the genera *Drepanosticta* and *Protosticta* there is an accessory *Ac* found very close to the base of the wing proximal to the usual *Ac.* (See *Ab.*)

Anal Loop. Found only in the Anisoptera. It is a collection of cells bounded by well-defined nervures situated

at the base of the hindwings bounded in front by the nervure *Cuii*. It is absent in many genera but very prominent in all the *Libellulidæ*, *Aeschnidæ*, *Cordulegasteridæ* and many of the *Gomphidæ*. It is shaped like a stocking in most of the *Libellulidæ* but more compact and quadrate in the other families. In the former it is made up of two rows of cells with a prominent midrib but may be of three or more rows in the other families. In the genera *Tholymis* and *Zyxomma* the sides of the loop are continued to the posterior border of the wing, a condition known as an "open loop."

Antehumeral stripe. A coloured stripe on the dorsum or back of thorax situated near to the middle suture of the thorax or internal to the shoulders of the thorax. (See *humeral.*)

Antenodal nervures. The transverse nervures running from the costal or anterior border of wing to the nervure *Ri* or Radius internal to the *node*. In the *Coenagriidæ* there are only two of these, which are known as the "primary nervures" and which are found in many of the higher forms as specially thickened nervures, quite easily distinguishable from the others (Note the wing of one of the *Gomphidæ*, etc.) In the other families they are numerous, ranging from six in *Libellago* to an enormous number in *Neurobasis*, etc. The anterior half of each nervure usually coincides with the posterior half traversing the costal and subcostal spaces respectively. In the Zygoptera the antenodal nervures invariably coincide and the same applies to the Libellulidæ but in all other Anisopterous genera they fail to coincide.

Apical. The tip of the wing or abdomen or the end of each abdominial segment nearest the tip of the abdomen.

Apex of wing. The tip of the wing.

Arc. A short, oblique transverse nervure at base of wings extending from *Ri* to *Cuii* and forming the outer boundary of the basal space.

Basal incomplete antenodal nervure. An antenodal nervure found in a few species of dragonfly of which the anterior half in the costal space is missing. This nervure is always nearest to the body of the insect when it is present. In the genus *Philoganga* there are usually two present. It is an important specific character.

Basal segments. Those abdominal segments situated nearest the body of dragonfly.

Basal space. A space at the extreme base of the wing lying internal to the arc which forms its outer boundary. It is bounded by *Cuii* behind and *Ri* in front. Usually it is entirely free from nervures but in some genera, such as *Neurobasis* and *Chlorogomphus*, it is traversed by one or more nervures.

Base of wing. The part lying nearest to the body of the insect.

Bicolorous. Two coloured.

Borders of wing. The dragonfly wing is triangular, the anterior or costal border, the posterior border and the base which lies nearest the body.

Bridge. A longitudinal nervure lying just posterior to the node which forms the inner portion of the nervure *IRiii* and is limited externally by a short oblique nervure in continuation of the node. In the keys it represents the triangular space bounded by *IRiii* behind, the base of *Rii*

and nervure descending from the node in front. In the *Anisoptera* this space is usually traversed by a single nervure but in some genera it is traversed by several, an important generic character. It should not be confused with the nervure *Ab* or *Anal Bridge*, which see above.

Cells of wing. The reticulation or areolets forming the network of the wing. These may be four, five or even six-sided.

Compressed. Flattened from side to side.

Costal border. The anterior border of the wing.

Costal nervure. The nervure forming the anterior border of the wings.

Costal space. The anterior space of the wing internal to the node, bounded by the costal nervure in front and the subcostal nervure behind.

Cubital nervure. Transverse nervures traversing the cubital space. In the Coenagriines and in many of the Anisoptera there is only one, the nervure *Ac.* In others they are usually multiple.

Cubital space. The space at the extreme base of the wing lying immediately internal to the discoidal cell. It is traversed by one or more nervures.

Discoidal cell. In the Anisoptera this is a triangle situated near the base of the wing and lies between the cubital space and the discoidal field. The triangle, which is easily picked out from the surrounding nervures, may be similar in shape or entirely dissimilar in fore—and hind-wings. In the Zygoptera it is four-sided, elongated and

squared or pointed outwardly. This space may be free or traversed by one or more nervures. Its base lies nearest the trunk of the insect and may be in line with the arc or situated more or less far to its outer side.

Discoidal field. The area of the wing external to the discoidal cell, which is bounded by this cell internally, the nervure *MA* anteriorly, the nervure *Cuii* posteriorly and the border of the wing externally. This field begins with one or more rows of cells in the Anisoptera and its sides are parallel or divergent or convergent at the border of the wing.

Distal. The part farthest removed from the body ; the end of a limb.

Divaricate. Spreading outwardly so that the apices of any organ are more far apart than the bases.

Dorsum. The back or upper side.

Entire. Not divided up by nervures. A space in the wing is entire when not traversed by any nervures.

Eyes. The eyes of a dragonfly are large and compound and two in number. They are separated in the *Zygoptera* and *Gomphidae* but more or less confluent over the top of the head in all others.

Femora. The thigh. The third segment of an insects leg. The dragonfly's leg is made up of the coxae, trochanter, femur, tibia and tarsus. The femora is furnished with spines which are often of a specific nature and useful for identification.

First antenodal nervure. The basal complete antenodal nervure. It is one of the two primary antenodal nervures.

Foramen. A small aperture or hole.

Forking of sector of arc. (See *sectors of arc*). The superior sector of the arc forks into two at a variable distance from its origin, the lower end of the fork being the nervure *Riv + v.*

Frons. The forehead. It is strongly angulated in the Anisoptera but not very evident in the Zygoptera. It is moderately noticeable however in the genus *Ceriagrion.*

Fusiform. Spindle-shaped.

Humeral. Pertaining to the shoulder. A term applied to a coloured stripe situated on the shoulders of the thorax.

IA. The final longitudinal nervure of the wing situated near the base and posterior part of the wing.

Incomplete basal antenodal nervure. (See *basal incomplete antenodal*).

Imago. The fully fledged or adult insect.

Incomplete outer antenodal nervure. In many of the *Libellulinae* the last antenodal nervure situated next to the node is complete only in the costal space. It is a generic character of some importance in the keys.

Inferior anal appendage. An appendage situated on the hind and lower part of the tenth abdominal segment.

It is often of marked specific shape and simple, bifid or intricate in form.

IRiii. One of the longitudinal accessory or intercalated nervures of the wing terminating near its apex. (See fig.)

Labrum. The upper lip.

Longitudinal nervures. The main nervures of the wing running from the base to apex or posterior border of wings.

MA. One of the main longitudinal nervures which runs from the upper outer angle of the discoidal cell to the posterior border of the wings.

Middorsal. In the centre of the back.

Nervures. The supporting framework of the wings.

Neuration. The network of nervures in the wings.

Node. An artificial joint situated on the costal or anterior border of the wing at a variable distance from the base ; in the *Zygoptera* it is much nearer the base than the apex of the wings, but in the *Anisoptera* it is roughly at the centre of the costal border about midway between the base and apex of wings.

Ovipositor. A large number of dragonflies insert their eggs into the tissues of plants floating in water and this is performed by the female by means of a robust spine situated beneath the terminal segments of the abdomen. All the Zygoptera possess this organ but only the more primitive species of the *Anisoptera.*

Posterior angle of the discoidal cell. The angle nearest the posterior border of the wing.

Posterior lobe of prothorax. The prothorax is described as made up of an anterior, middle and posterior lobe; the latter is shaped like a collar or the lappet of a coat and is variably shaped in different species of dragonfly.

Postnodal nervures. Short transverse nervures running between the costal border of the wing and the Radius (*Ri*) after or external to the node.

Prothorax. The thorax or trunk of a dragonfly is made up of two portions, the anterior of which is known as the prothorax and corresponds to the neck of the insect, as it carries the head. The anterior pair of legs are also affixed to it beneath. (See *posterior lobe of prothorax.*)

Pruinescent. Many adult dragonflies become coated by a thin layer of bloom, like the bloom on a damson or mango. This entirely obscures the markings in very old specimens and gives them a more or less uniform bluish or violaceous colouration. It is generally confined to the males but even in these may be confined to certain areas of the body such as beneath the thorax, or on the dorsum of the head, thorax or terminal segments of the abdomen.

Pulverulent. Pruinosed. (See *pruinescent.*)

Pruinosed. Pulverulent. (Which see).

Pterostigma. A small chitinized or horny opaque organ situated at or near the apex of the wings between the costal border and the Radius (*Ri*). It may be absent in one or

both sexes or in the anterior wings. It varys much in shape in the families and genera and may take on specific characters.

Riv+v. One of the main longitudinal nervures of the wings. It is in continuation of the upper or superior sector of the arc.

Ri. The *Radius* or main longitudinal nervure of the wings from which branches off many other longitudinal nervures, *Rii*,*IRii*,*Riii*,*IRiii*, *Riv+v.*

Riii. One of the longitudinal nervures of the wing which runs in continuation of the oblique nervure descending from the node.

Second antenodal nervure. The outermost of the two primary antenodal nervures found in the Coenagriines.

Sectors of arc. Two longitudinal nervures which take origin from about the centre of the arc, the superior of which runs outward and branches or forks near the node. The inferior or posterior one terminates at the outer anterior angle of the discoidal cell. Between these two nervures a variable number of short transverse nervures pass, the number of which constitutes an important character in separating the *Gomphinæ* from the *Epigomphinae.*

Segments of abdomen. The abdomen of a dragonfly is made up of ten segments, the genitalia of the male being carried on the underneath of the second segment from the base, and that of the female beneath the 8th and 9th.

Spatulate. Shaped like a spatula or the paddle of a canoe.

Stalked wings. In many of the primitive dragonflies, such as all the Coenagriines, the wings are definitely narrowed at the base, this narrowing continuing as far as the level of the beginning of the nervure *Ab* (Anal bridge), which point will give the length of the stalk of the wing.

Subcostal space. The space lying posterior to the subcostal nervure.

Subcosta. A longitudinal nervure running from the base parallel to and immediately posterior to the costal border of the wing and terminating at the node.

Superior anal appendages. The upper pair of appendages attached to the end of the terminal or tenth segment of the abdomen. They are often of definite specific shape.

Suture. A joint in the thorax or abdomen.

Thorax. The trunk of the dragonfly. It is made up of two parts in these insects, a prothorax or small part which carries the anterior pair of legs, and a larger, more massive portion which carries the four wings on its dorsum and the two hinder pairs of legs beneath.

Tibia. The shin of the leg or the fourth segment of same. It is furnished with spines or hairs on one aspect but in the Corduliines and Chlorogomphus males it has a narrow membranous keel which is of generic value.

Transverse nervures. The short transverse nervures crossing the wing in the direction from costal border to hinder.

Ventral. Beneath the abdomen or thorax.

Ventral plate. A plate situated beneath the tenth abdominal segment in the females of the *Aeschnidae,* which bears short or long spines. It is used to dig into the plant or ground so that the insect can get some purchase to drive its eggs home with the ovipositor.

(To be continued.)

A forthcoming book on shikar.

We wish to draw the attention of all our members to a book by Colonel H. S. Wood, I.M.S. entitled "Memories of Shikar" published by Messrs. Witherby & Sons, 326, High Holborn, London. Price 10 shilling and 6 pence.

The Author's name is well known to the readers of our Journal as he has been our mainstay for a number of years and his instructive and interesting articles have appealed to all of us. He was a mighty Nimrod during the many years he was in India and it is needless to say that his first hand knowledge about all game and its shikar is unlimited, due to his great powers of observation and keen interest in the habits of all our living creatures. This fund of knowledge he is now placing at the service of all in this interesting volume. If any further tribute was necessary the name of Witherby as publishers, is sufficient to guarantee both the interesting nature of the book and the general get up of the same.

This book will appeal, we are sure, to all whether they be big game hunters, fisherman or naturalists. Order your copies early it is sure to be good money's worth. *Verb sap!*

[*Editor.*]

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