Fig. 1.

Fig. 4.

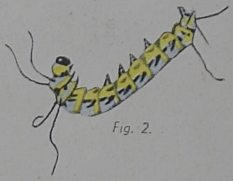

Fig. 2.

Fig. 5.

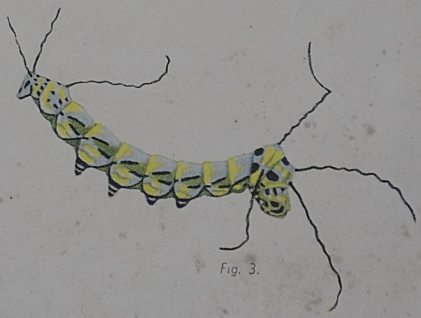

Fig. 3.

IMAGO and LARVÆ of Brahmæa Wallichii

Figs. 1, 2 and 3, 1⅓rds life size.

Figs. 4 and 5 and Imago, ¾ life size.

BRAHMÆA WALLICHII.

H. G. SEABORNE & CO. LTD.
LONDON.

The Snakes of Northern Bengal & Sikkim.

Correction Slip.

Instead of "on page 69" on line 15 page 110 of Vol. XII No. 3 insert "at bottom of page 166 of this Volume".

JOURNAL
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Vol. XIII.—No. 1.

The Sun-birds and Spider-hunters of our area.

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

(With one half-tone plate).

(Continued from Vol. XII page 135).

We have now finished the Sunbirds and come to the second sub-family *Arachnotherinæ*. This sub-family is characterized by the birds having no metallic plumage and the sexes alike; they are somewhat more massive in shape and the bill is longer and stronger. There is only one genus *Arachnothera* in which the bill is very long about thrice the length of the head or more, powerful and strongly curved, it is also ridged on the top, between the nostrils. This genus contains five species and sub-species, of which only two are found in our area.

One is a large robust bird, olive-yellow above and pale yellow below, boldly streaked all over. This is the Indian Streaked Spider-Hunter *(Arachnothera magna magna)*.

The other is a much smaller bird, unstreaked, with the upper plumage olive-green, the chin and throat greyish-white and remainder of lower plumage yellow. This is the Indian Small Spider-Hunter *(Arachnothera longirostra longirostra)*.

8. The Indian Streaked Spider-Hunter.

Arachnothera magna magna (Hodgs.)

Field identification:—A stoutly built bird with a long stout and deeply curved bill, olive-yellow above and pale

yellow below, boldy streaked, all over, with black. Found in the plains and up to 16,000 feet in the hills, on the outskirts of forests or near villages where wild, or cultivated, plantains grow.

Description :—Whole of the upper plumage olive-yellow boldly streaked with black, tail the same colour with a sub-terminal black band and pale yellowish tips, except on the central pair : lower plumage, pale yellowish boldly streaked with black. Sexes alike.

Bill black : iris brown : legs orange-yellow.

Length 7 inches : wing 3·7 and tail 2 inches.

Distribution—In our area :—Common in all the forests of the plains and up to 6,000 feet in the Hills, at which elevation Gammie came across it in the Darjeeling District.

Outside our area :—Stuart Baker gives the distribution as :—"Himalayas from the Sutlej Valley *(Stoliczka)* to the extreme East and South of Assam ; Manipur, Lushai Hills, Chittagong Hill Tracts ; Arakan, Chin Hills, Tenasserim as far south as Tavoy and the Thoungyin Valley."

Habits etc. :—This is principally a bird of the forests, preferring the outskirts, or clearings, in which jungle has grown up and wild plantain trees occur. As Stuart Baker truly, remarks, they are very fond of widish streams and glades where the sun can enter freely and flowers are plentiful. They may, however, also be found on the outskirts of villages and will even enter compounds, though, apparently, never breeding in the latter. Plantain trees are, one may say, a *sine qua non* for these birds and, though we have seen them some considerable distance from any, they are generally found in their vicinity.

Gammie gives an interesting account of these birds, which used to come near his bungalow at Mangpu [*Stray Feathers, Vol. V pages 385 and 386 (1877)*]. He wrote :—We have a patch of plantains and a few plants of *Passiflora edulis* near our house, which are great attractions to *Arachnothera magna*. At first they were rather shy but lately they have got bold enough to feed within a few

Photo by H. E. TYNDALE.

ARACHNOTHERA MAGNA MAGNA *(Hodgs)*
The Indian Streeked Spider-Hunter.

yards of us.....It occurs up to 6,000 feet, generally frequenting the wild plantains and smaller trees, and picks insects out of the open flowers as might be guessed from the length and formation of its bill. When the Passion flowers are open, they hunt them over several times a day, but plantain flowers are their favourite hunting grounds, and deftly do they insert their bills in one flower after the other, now and then pausing in search to give tongue to their sharp "tirik," "tirik." It is not a very abundant bird anywhere, but as it is of solitary disposition, and never moves from one place to another without uttering its peculiar, and unmistakable call, it is, perhaps, oftener seen than many birds, that are very much more numerous. A pair are about our compound this September, feeding a fully-fledged Cuckoo *(C. micropterus)* quite strong on the wing, but evidently too lazy to forage for itself so long as he can get these foster-parents to feed him. It looks absurd to see the little creatures feeding a great bird like this Cuckoo. They appear to have hard work in keeping him satisfied but are evidently proud of their charge."

Their food principally consists of insects and spiders. Hume considered they visited flowers more for the nectar than for the insects; they possibly do feed, to a certain extent, on that but not very largely. Stuart Baker says spiders are seized "on the wing from their webs" and Stevens has also seen a Spider-Hunter "take a spider out of a bed of Nicotiana flowers and demolish it on the ground."

This is one of the birds which may often be seen feeding from the flowers of the Simul tree *(Bombax malabarium)*.

Gammie took the nests of this bird on the Cinchona plantations at Mangpu in May and wrote that the breeding season extended to August. We have a nest and eggs, due to the generosity of Mr. W. H. Mathews, who took it at Glenburn T. E. on the 29th May 1931. Gammie's nests were taken at 3,000 feet but he remarked "as the bird is very common up to at least 5,000 feet, I have no doubt it breeds up to that elevation. Mathews nest was taken at 3,000 feet.

Stuart Baker writes :—"In the plains and lower hills the breeding season is principally April to June, a few birds breeding in March, but in the higher hills few birds breed until May, while others are still to be found breeding in July.

"They are not normally double-brooded though, if one nest is robbed, they at once build another and lay again, never using the old nest for the purpose. Both birds assist in the construction of the nest and, considering how well it is made, it is built very quickly. A nest in Gunjong was begun and completed in six days, and another which I found when just a few silk threads had been put in place was finished and contained two eggs when I returned ten days later. Both birds incubate, and we secured the male as often as the female on the nest."

He states that incubation takes twelve or thirteen days.

We quote Stuart Baker's description of the nest, which is very complete, and adds information not given by Gammie and applies, practically speaking, to the nest taken by Matthews. He writes in his "*Nidification of Birds of the Indian Empire Vol. III p.p. 231-232 (1934)*" :—" both Coltart and I obtained many nests in the densest of evergreen-forest where Banana-trees grew on the sides of ravines and water-courses either singly or in small clusters of half a dozen or so. At other times they resort to thinner scrub and breed among the giant Ginger-plants or make use of the great dock-leaves growing in the mossy undergrowth of dense forest.

"The nests of the Spider-hunters are very beautiful and very wonderful structures, combining all the art of the Tailor-bird with that of the Weaver-birds. In the first place the birds select some broad green leaf under which they will build the nest. This leaf must be green, growing and in comparatively perfect condition. No leaf which is beginning to wither, no leaf with a broken stem and no leaf with punctures or holes will suffice for their need. The wild Plantain (or Banana—) trees, which certainly supply homes for three out of every four nests, are most carefully

chosen. The leaves of these trees very rapidly fray at the edges, the slits gradually extending towards the mid-ribs until, under the effects of wind and weather, they reach the mid-rib and hang like tattered ribbons on either side. The new leaves, green and strong, withstand the elements for some weeks, and one such is always selected. The leaf duly chosen, the surface is punctured with tiny little round holes; these are not mere slits, which would rapidly increase in size, but a tiny circular bit is cut out of the leaf, hardly exceeding a large pin's head in size. Through these are forced threads of vegetable cotton and cobwebs which are firmly knotted on the upper side of the leaf and hang loose below. Then gradually these loose ends are fastened to the skeleton leaves, which form nine-tenths of the nest material, more and more leaves being added and fastened very firmly fogether with cobwebs, silk and perhaps a few stems of grass and strips of dead Bamboo-leaves. Finally a beautiful hemisphere or half-oval is fashioned which hangs pendent from the leaf which forms its roof. To this it is generally drawn up tight on the lower side but left free for rather more than an inch on the higher side to form an entrance to the nest. Sometimes, however, it is drawn up tight all round, a neat half-circular hole being formed instead for this purpose. The nest is most neatly and compactly made, not a leaf or scrap of grass or cobweb being out of place, while the lining, equally neat and compact, is formed of fine grass-stems or of skeleton-leaves, flattened down.

"In size the nests differ considerably; some measure are about $4\frac{1}{2}$ by $4\frac{1}{2}$ inches, others 6 by 4 inches, and a few only considerably larger even than this. In depth they are about 4 inches and vary very little.

"The eggs normally number two, but clutches of three are not rare. "Most eggs appear to be a uniform rather rich brown or olive-brown, the depth of colour varying considerably. In nearly all there is a darker zone of the same colour at the larger end which may sometimes be seen to consist of innumerable specks of colour darker than those which coalesce over the whole of the surface of the eggs

elsewhere. Occasionally these unicoloured eggs are quite a pale olive-grey, but when so pale are nearly always seen to be visibly freckled with darker when closely examined. Next most commonly met with are eggs with an olive-grey or olive-brown ground profusely speckled or flecked all over with darker grey or darker brown.....Among unusual types in my own series the following are the most remarkable :—(1) Pale sea-green, boldly marked with blackish in a broad ring round the bigger end and with small blotches of the scattered elsewhere. (2) Pale creamy-pink, flecked all over with dingy pink and underlying specks of grey. (3) Reddish-stone, profusely marked all over with small blotches of deep, rather purplish, brick-red. (4) Olive-grey, speckled lightly all over with blackish but with the small ends unspotted and almost white.

"One hundred eggs average 22·7 × 15·95 m.m."

Gammie mentions a young Indian Cuckoo (*Cuculus micropterus micropterus*) being fed by a pair of these birds but it is possible that he was mistaken in his identification as the only Cuckoo recorded as cuckolding this Spider-Hunters is the Large Hawk-Cuckoo (*Hierococcyx sparveroides*). This Cuckoo lays various types of eggs from pale blue resembling the eggs of the Laughing —Thrushes in whose nests it deposits them and also of various shades of brown, resembling, in all but size, the eggs of these Spider-Hunters ; the Cuckoos eggs are, of course, much bigger. Stuart Baker found many nests of the Spider-Hunters, in the Khasia Hills and North Cachar which had been cuckolded by this Cuckoo. It is most extraordinary that not only do these Cuckoos lay different coloured eggs but they also vary greatly in size being much larger when deposited in the nests of the Laughing— Thrushes and Whistling—Thrushes and smaller when deposited in the Spider-Hunter's nests. Stuart Baker gives the average of the blue eggs deposited in the former's nests as 30·1 × 21·9 mm. whereas the brown eggs deposited in the Spider-Hunters' nests as only 26·0 × 18·9 mm.

(*To be continued.*)

Birds in an Assamese Garden.

By

JEAN HUGHES.

Our bungalow is built on a small hill that juts out into a sea of green tea bushes, just as a cape juts out into the blue waters of the ocean.

This small and narrow hill, is planted with various fruitful trees, lichees, jackfruit, mangoes, mulberries and the wild peepul tree being amongst them. In addition to the trees, of course, there is the usual flower and vegetable garden.

Now whether it is the fruit and the flowers that catch the eyes of the passing birds, or whether the groves of trees offer them a leafy resting place on their flight over the tea garden from jungle to jungle, I do not know but whatever the reason, our garden seems to be the haunt of an astonishing number of birds.

In an English country garden, one might count sixteen to twenty varieties of birds in the course of the year, but here in Assam, I have compiled a much longer list of bird visitors to our garden, and it would be interesting to know if other dwellers in Assam can quote more varieties; And by this I mean birds actually seen IN the flower garden enclosure, and not birds seen in the Tea Garden outside.

Here is my list :

1. Red Vented Bulbul.
2. Red Whiskered Bulbul.
3. Jerdon's Chloropsis, or Green Bulbul.
4. Indian Magpie Robin.
5. Jungle Crow.
6. King Crow (2 species).
7. Common Myna.
8. Jungle Myna.
9. Pied Myna.
10. Grey-headed Myna.
11. Spotted Owlet.
12. Jungle Owlet

13. Brahminy Kite.
14. Tailor Bird.
15. Short billed Minivet.
16. Spotted Babbler.
17. Indian Red-breasted Flycatcher (coldweather visitor).
18. Grey-headed Flycatcher.
19. Sparrow.
20. Spider-Catcher.
21. Spotted Dove.
22. Indian Ring Dove.
23. Koel.
24. Burmese Blue Rock Thrush (cold weather visitor).
25. Sun-bird (species unidentified.)
26. Tree Pie
27. Green Barbet.
28. Copper smith.
29. Golden-backed Woodpecker.
30. Iora.
31. Blossom-headed Paroquet.
32. Brown Shrike (winter visitor)
33. Wood Shrike.
34. White-browed Fantail Flycatcher.
35. Rufouus-necked Laughing Thrush.
36. Spotted Munia.
37. Weaver Bird.
38. Pied Crested Cuckoo.
39. Indian Plaintive Cuckoo.
40. Black-headed Oriole.
41. Pipit (species unidentified.)

Some of these birds gave us a gret deal of trouble to identify, in particular the Burmese Blue Rock Thrush. All through the cold weather months one lonely specimen of this bird haunted our garden, perching on verandah chairs, flitting about the lawn, and feeding on insects, including white ants. He very rarely uttered a note, and never, never, consorted with any other bird. For a long time we could not find out what he was, but a pro-longed search

through Stuart-Baker at last revealed the name of his species, and the discovery was finally clinched by his Latin name "Monticola SOLITARIA affinis". About the end of January, this lonely bird :leaves our garden. Does he fly to a colder climate ? Does he head straight to meet his mate at a remembered rendez-vous ? We shall never know, but at any rate we do not expect to see him again till next October.

Another mysterious visitor to our garden, is the litttle red sun-bird that hovers round the scarlet hibiscus flowers in the rains. His breast feathers are as scarlet as the petals of the flowers, his back is duller red, his wings brown, and he differs from all the sun-birds described in the books that I have access to, in that he has no yellow visible upon his little body. Can it be that he is a freak.....or is he a hitherto unknown species ? [This is the Indian Yellow backed Sun-bird the yellow is often concealed. *Editor.*]

There are also numerous little browny-greeny birds that flit about from twig to twig in the hedges and trees of our garden, but they are so restless and so non-descript that it seems almost impossible for an amateur ornithologist to identify these, so I lump them all together under the comprehensive name of Wren-Warbler—though quite possibly they are something entirely different.

So far, the only nests that I have been able to discover in our garden are :

Red Vented Bulbul's
Red Whiskered Bulbul's
King Crow
Jungle Crow
Magpie Robin
Sparrows
Common Myna

but this year I have hopes of tracking more birds to their nests.

It would be interesting to know if other amateur ornithologists have the same difficulty in identifying various species, and of finding the nests of the birds, as I do,

Shooting in Sikkim.

By

PHILIP H. PINCKNEY.

At the end of April I left the Dooars and motored up the Darjeeling road as far as Toong. I was contemplating spending some days there, and afterwards had hopes of returning for a fortnight after tiger. It was three days before I crossed the top of the pass and got my first view of the Himalayas, and, for that matter, the first snow hills I had ever seen. At once a hundred hackneyed descriptions became reality. I was dumbfounded and awed, but mainly I felt more excited than I've ever felt before,—I decided then and there that my holiday should be spent in the hills, and that tiger must wait for another day.

Even Darjeeling gymkhana day and an over-filled Club failed to gain me much information. I could find no one who had ever gone North from Gangtok to shoot, and only a vague story of two officers who had found game, but so tame as to be not worth shooting. Still a map, and the loan of Major Burrard's book on Himalayan shooting gave me hope, and the uncertainty was anything but a deterrent. Mr. Kydd, of the Darjeeling Progress Association was a tower of strength in providing me with a bell tent, a small double tent, ordering my food and providing two cheerful retainers, one to cook and look after my porters, and one to carry my rifle and help; both, I think, came new to their jobs, and we had no words in common, but mutual goodwill surmounted all difficulties.

To get a licence to shoot presented some difficulty as I needed a three weeks' passport into Sikkim, but to obtain the latter I had first to get the licence. I solved it by wiring to Gangtok for my licence, and taking the ordinary fortnight passport for sightseeing, with the hope of getting it extended.

Within two days I was dropping down to Tista Bridge in a hired car bound for Gangtok. Two tents, two boxes of food, a kit-bag of clothes, a gun, a rifle, a fishing rod,

SNOWS FROM DARJEELING — Das Studio

The view which made me decide to spend my holiday in the hills.

Anj Dowa the cook, and Sonam the retainer all piled into the car, and a medley of odd parcels strapped all over the car outside. We reached Gangtok in good order, and I think that from here on I can best describe my trip in three instalments from the three letters I sent back to England in the course of the next weeks.

First Letter.—"So far excellent—Got to Gangtok on Tuesday afternoon to find the Political Officer away, but luckily his Deputy allowed me to leave a deposit on the licence and a promise to send it on after me. With the chowkidar, as interpreter, I told Sonam that I wished to do a double journey on the morrow, and went to bed feeling very excited. We were all ready by 7 a.m., but it wasn't till 7·30 that a decrepit old gentleman gradually appeared, and said there were no coolies. He offered mules however, so I sent him off for them quickly, which meant that he faded away more slowly than the Cheshire Cat and lacking the grin. For the next two hours I watched a swallow building a nest under the eaves, and it made it of the same nobbly grey mud as the English one, does but with a long tunnelled entrance. At about ten o'clock three scraggy mules appeared, and after a decent interval spent in haggling we were off.

After so late a start it took us all our time to do a single journey to Dik-Chu, and it was quite far enough. The first mile or two climbs along a road, but at the top of the pass the track breaks through into the next valley, and drops from 6,000 feet to Dik-Chu at 3,000, with very rough going all the way. But it wasn't only the track that was trying, for after sending Anj Dowa on ahead to warn the chowkidar of my arrival, I soon discovered that Sonam had left his job of looking after the mules and, more important, their driver, and had turned aside, as I guessed, to visit some friends of his. So the mule man was doing a 'pub crawl' from village to village, and for the next five and a half weary hours I had to wait for him, whenever a house appeared, to see him safely by. Incidentally, the mules also knew the form, and stopped of their own accord at any house.

Still the day was lovely and the scenery magnificent. At the top, big jungle with some deciduous trees, and almost a nip in the air, but down near the Tista it became humid and warm, with big ferns and creepers on every tree. Most attractive were the orchids—starting with masses of a small white species with an orange throat and a very sweet smell, that grew in a profusion of flower spikes on every tree. Further down grew a larger one of a pink mauve colour, right at the bottom one plant with a large club-shaped spike of tightly bunched yellow flowers—it was really lovely, but like some other beauties, seemed a little unnatural, and a few white violets that I found seemed more charming than ever by comparison, although they were unscented.

I didn't see very many birds—a few Verditer Fly-catchers, with their plumage of smoky blue that horrible Himalayan Tree-pie which looks like a squirrel at times as he twists through a tree, and his big brother, the Yellow-billed Magpie: Jungle Babblers in chattering flocks, and Cuckoos everywhere. Round some corners a 'whistling cowboy' the Himalayan Whistling Thrush would fly up from the path, and, where sunlight penetrated, he showed a splash of colour that was nearly ultramarine. On any damp mud along the track would be a dozen or two butterflies, sitting demurely with folded wings, like a flotilla of sailing boats. Next moment a whirling mass of colour from the dingy brown of a ringlet or solid red of a tortoiseshell to the more exotic colouring of the *Papilios*. At times the path fell away with a perpendicular drop, and I couldn't blame the strings of ponies packed up with wool for their insistence on passing inside me, though I disliked intensely being pushed onto the precipice edge.

We reached the bungalow at about 2·30 and it seemed almost a cottage, with roses, gardenias and the brilliant, if inevitable, bougainvillea all round it. Fifty feet below tumbled the river, making such a noise that I had to shout—as I only know eight words or Tibetan and Hindustani though, I didn't get very hoarse.

I pitched my tent on the grass in front, in order to get used to sleeping in it while life is still fairly easy, and then

I took my rifle for a stroll up the river. Before starting out, I drew pictures of animals, and I believe that *Balu* is a bear and *Bagh* a leopard, though the first man to whom I uttered these words in an enquiring voice promptly went off and fetched a dead tree rat, which was ultimately bought by Ang Dowa—I can only hope for his dinner and not mine. Of game I saw nothing but a Kalij pheasant, and no tracks either; I shouldn't think there is much about. The river was lovely, however, with a thundering torrent of icy-cold snow water of cloudy green, which now that it has melted seemed only intent on reaching the sea as quickly as possible, with no time to waste pools or eddies, and still less for providing fish food;—at least the local sportsmen seemed to insist that there were no *maccha* as they called my drawing of a mahseer, though of course they may have been talking of something entirely different; anyway I left my rod and tackle behind to be picked up on the way back.

Anj Dowa's first dinner seemed excellent:—

Dhal and rice soup.
Rice, Dhal, and Potato curry,
and (thanks to a surplus of rice)
Jam and Rice Pudding and Tea.

To wash this down there followed a mighty cloud-burst, which soon called the bluff of my tent which professed to be waterproof, and I spent a dismal night. As a result I got up about 3 A.M., and after much trouble everything was ready just before dawn;—miracle of miracles, five coolies waiting, so off we went in excellent time. I went on ahead with the rifle but saw nothing, and after two hours I dropped back to keep the coolies going, sending Sonam on to Singhik to get ready another lot of coolies as I intended *do rasta* which, I believe, means a double journey. It's a tiring and harrowing business following coolies as in such a very rough hilly road they stop every few hundred yards and prop their loads on a length of bamboo, and small blame to them. Blowed if I could carry 60 lbs. for a dozen miles on any road, and for 8d. at that.

We climbed high over a shoulder to the village of Mangam, where my telescope excited must interest. Then a short distance beyond that I looked up a long gorge to the left, and at the end rose a great snow peak—Kanchen-junga. Every angle was clear cut, but in a very few moments little puffs of cloud appeared in the couloirs, and soon it was hidden in a shroud of mist.

We reached Singhik pleasantly soon, and when three of my coolies' understudies turned up at once it did look like a *do rasta* without a hitch. But it was a full two hours of waiting, eaten to pieces by little black gnats, before a fourth arrived; and as there seemed little prospect of the fifth, I made the baggage up into four loads, and off we went about one o'clock. Two hours later I had a well-earned tiffin, and lay out on a rock for an hour reading Galsworthy, and squashing the innumerable leeches that came winding up over the rock towards me. I caught up my coolies to find that the fifth had arrived, but they were a poor lot and very slow, so Anj Dowa and I pushed on. He is an excellent walker and we moved fast. Towards dusk we reached Tonj with still six miles to go, which included a steep drop to cross the river and climb the other side. At last we reached Chungtang bungalow where we made tea, and were tortured by the midges for two hours until the coolies arrived. In a rain storm I pitched the tent, and though everything was damp I slept well with the comfort of a *do rasta* behind me, and in my ears the sound of the Lachen and Lachung Chus, or rivers, which rush down on either side of the bungalow, and unite to form the main stream just below, the Tista.

It rained all night and everything was wet, but I was glad to sleep till seven. After a quick breakfast I left with four cheerful coolies, leaving Anj Dowa to bring on the fifth when he should arrive. I was feeling a bit limb weary, and was anything but pleased when I had to retrace my steps a couple of miles to where I had left my camera, forgotten on a rock. We took the left hand junction which seemed the most likely country on the map, but to date I had got no news of game, except for

the possibility of bear at Lachen. The hills, however, began to open out a little, and wherever a scree or patch of grass did appear, I spied carefully with my glasses but found nothing. We kept up along the river, and at times a magnificent waterfall fell sheer from a side ravine. One could forecast these by a sudden iciness in the air, and a cloud of fine spray appearing through the trees ; it was very slippery and wet crossing them, as sometimes the water was falling on the log bridges that were meant to span these streams. The main river bed was a series of large bowls of rock, glazed by the rushing water.

Altogether it was an excellent day's march—not too far and not too bad going, and the coolies made excellent time. It was an English walk, with a moss-covered bank on one side, thickly carpeted with violets and strawberries. I ate quite a lot, mainly because I felt a bit of Vitamin C. would be a good thing, for they were almost tasteless. Large beds of stinging nettles appeared and looked most formidable, with stings as long as sea urchins' prickles ; I did sit on one, and though it hurt a lot at the moment it passed off fairly soon. Rhododendrons began to appear, and they were lovely : the commonest a tree with crimson flowers : but sometimes I passed a bush with very large soft white petals set off by pale pink sepals : they looked very delicate and virginal. Then once or twice I saw an epiphytic one with a scented yellow flower and deeply veined leaves. Till just before Lachen a small species appeared, clambering over the rocks, while the crimson and whites in full flower made great bouquets of colour along a road lined with an avenue of small firs. Across the valley rose towering cliff completely cloaked in spruce, but on my side it was far more open. A little grass land appeared, and with it a kind of yellow-berried berberis, and sometimes a bush of graceful dog roses, though with only the faintest suspicion of their usual scent.

The best moment of my trip, so far occurred at tiffin time to-day—I saw three of the most beautiful Indian birds in one setting at one moment. First the White-capped Redstart, who appeared bobbing and flirting on the boulders

of a stream with his chestnut breast and rump, his black-lined tail, and flaunting his grey 'topper' with all the swagger of a man about town. Then three gems of shining blue flew to a nearby bush and flited about, displaying their lower breasts of pure gold—these were Tickell's Blue Flycatchers ; so I thought if only the Scarlet Minivet were here to complete the picture—and hearing a whistle up above, I looked up, and there he was, displaying his flame coloured breast and legs and flanks set off by his jet black head and shoulders—with him his wife with brightest lemon instead of scarlet, and all this in full sunlight.

At other times to-day I have seen a few Rufous backed Shrikes, some Doves, drunken pipers and those attractive little White-Eyes.

Lachen itself is a most unexpected sight, as it is a considerable village of half a hundred wooden huts roofed with dark grey slate on which big stones are placed to defeat the wind. It has all the sombre appearance of a Scotch village of the West, but lacks the neatness. Near every house grew apple trees in a full flowering of pink and white blossom—I shall expect a Green Line Bus to take me up to Thangu to-morrow ! In fact I am expecting something much more exciting. The headman, and the road surveyor, called on me this evening, and as each talked a little English, I heard my own voice for the first time for four days. The headman looked the real thing in his gaily coloured boots, sheep-lined coat and woolly hat—not so the road surveyor in jodhpurs made for a far slimmer man—and they told me there was a bear about, which had been seen coming to the outskirts of the village to feed on a dead mule. They were most anxious for me to shoot it, as apparently it sometimes killed their ponies and sheep. So I decided to spend the next day at Lachen and try for it, and incidentally get my clothes and tents dry.

A shikari man was produced who had a smattering of English, as he worked in the Mission House. He was most anxious that I should lend him my shot gun, in case

Looking West towards Kanchenjungà from above Thangu.

Between Lachen & Thangu A Tibetan Camp where the hills are less Steep.

balu should attack him from the side—all this performed in most realistic pantomime ; but not wishing to get a charge from my own gun in the small of the back, I refused it him. The surveyor also recognised a photograph of a burrhel, and said there had been two at Thangu bungalow, where I go to-morrow ; one was shot three years ago, so presumably there is only one left ! I don't know what to make of this information, but it doesn't sound very hopeful. He calls them *nyen* (phonetic) which may be of help anyhow. [The "Nyan" is the Great Tibetan Sheep. *Editor.*]

And so I come to to-day. After a completely sleepless night, due to the drenching rain and intense cold which kept me beating my arms and avoiding the most frequent drips, I was only too ready to get out bear hunting before dawn. We made a cautious approach to the dead mule, which did not need the olfactory organs of a bear to detect it. But there were no signs of *balu*, and only day-old tracks ; however, I followed these back hoping to meet him on the way. They led down towards the river, where an almost precipitous cliff dropped 200 feet sheer into the water. It seemed a likely place, for the trees were small and well spaced with occasionally mossy glades where the bear had been rooting. In between the going was dreadful, as it was mainly a jumble of dead tree trunks and round boulders, all covered with the most slipery of mosses. Luckily the noise of the water drowned any slips, but it was an unpleasant reminder of what a false step might mean. Stupidly I had on old rubber soled shoes for silent stalking, and could only move very slowly with one eye on my next step and the other watching for the slightest movement ahead. The smaller bushes were hazels, with a few wild cherries and birches just breaking into leaf, but there were just a few large thick spruces, and it was most exciting looking up into these in the hope that the bear might be at home. However, most of the old tracks seemed to lead down to the river, and undoubtedly he came out of the spruce-covered face opposite ; but thanks to the rain of last night the river was in spate, and he couldn't cross to the mule ; so neither could we cross to look for him.

About ten o'clock I gave it up, and after a most welcome breakfast we set off up the hill above the village to look for *Tahr* and "big Pigeon," which my Shikari man assured me lived there. After two hours' climbing we reached a thick belt of shrubs like lonicera, which made going extremely tiring, for it was waist high and very thick. At last we came out on the top of a deep gullet that dropped perpendicular for 400 feet, and then rose right up into the snows opposite. This gullet was the home of the *Tahr* and I found some droppings. I was then told in pantomime that the *Tahr* had protruding teeth, so they must be musk deer, I think. A careful spy found no beasts, and so, with my rifle strapped into the back of my coat, we climbed down the cliff, which I thought very frightening, and then began to make our way up a river of snow that cut through the trees on the other face, at the top of which were the haunts of the "big Pigeon". It was a fearsome climb of two thousand feet to the top of the tree-line. At last my shikari man crept over the bank of the 'river' and beckoned to me. I crept over, and there were two "Pigeon" which turned out to be hen Monal pheasants, feeding among the rhododendrons. They saw us and ran off, but a magnificent cock suddenly exploded from our feet, and in a blaze of metallic purple and green with his chestnut and black tail spread, he flew out and pitched in the snow, where he looked like an extra large cock grouse. I've never enjoyed such a splash of colour. As he ran into a small patch of rhododendrons, he looked jet black against the white snow. I decided to have one more look at him, and so sent the Shikari man up the hill to beat him out over me. I stood in the snow and waited. The sun shone, and the rhododendrons made shining patches of colour, while thick bunches of mauve primroses pushed upwards through the snow. But soon the cloud came down, and with it an icy wind, so that I might well have been waiting for the last drive after January cocks. At last there was an explosion above me, and the cock Monal came over—a real screamer and set his wings, and glided out into the cloud that now filled the gullet behind me.

It was high time to start home, but the snow river was no place in which to hurry. The surface had frozen hard, and except for a rock which protruded in the centre, there was no obstacle till the jumbled rocks far below. We hadn't gone ten yards before there was a shout behind, and down slid the Shikari man, knocked my legs from under me, and off we went, getting very much faster every second ; and my frantic attempts to grip with my heels or fingers had no effect whatsoever. All I could do was to scrabble towards the protruding rock, and I was just able to fling one arm round it and the other round the Shikari man as we rushed past. I thought every muscle in my shoulder had been dislocated, but my luck and grip held, and except for a skinless palm I was little the worse. We still had to cross to the side of the river, and although we cut good big steps, it was a very nasty few minutes. Thereafter we kept thankfully to the difficult going in the trees. We got back to Lachen very weary and long after dark.

I saw few birds of interest to-day, except for the Monal and a pair of bright coloured Green Woodpeckers. I also noticed a pair of furry little dormice with eyes like boot buttons, who regarded us fixedly from under a fallen log.

This evening I have spent buying sheep skins. The cold last night was terrible, and it will be worse. I have discarded my camp bed as it's warmer on the ground, but even with every garment I possess and my three blankets, it is still icy, so I have acquired after considerable haggling, five uncured sheep skins, which must be full of every kind of bug, and smell like nothing on earth. They make lovely rugs in Lachen of sheep wool, quite soft and well coloured, but I haven't got the money, and also I want something windproof. Anj Dowa and I have now sewn these skins together so that I can lie in them, and then strap them round me as a sleeping-bag by means of boot laces. They look quite foul, smell worse, and I find that my carefully remembered parcel of Keatings is no bigger than a pepper box : but at least they look warm.

I'm afraid there is little sporting news in this letter but this will be my only opportunity of getting a word back for some time. I hope, that to-morrow will see me into more likely country, and I may get some news of game. I will just leave this open till the morning to give you a verdict on my feather bed.

7 a.m.—A great success! I kept beautifully warm all night, and don't seem to have suffered from any night marauders. A lovely balmy day, and I've just watched my stuff go off on the backs of three strong mules.....

(To be continued).

The Identification of the Poisonous Snakes of India & Burma.

By

E. O. SHEBBEARE

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All poisonous Indian snakes belong to four groups:

(1) Sea-snakes, (2) Cobras and Coral snakes, (3) Kraits, (4) Vipers.

All snakes in these groups are poisonous (except one sea-snake) and *all others are harmless.*

Sea-snakes—Live in salt or brackish water and have their tails flattened like eels.

To tell whether an Indian terrestrial snake is poisonous

I—*First compare the belly with Figures* 1, 2, *and* 3 *below:*

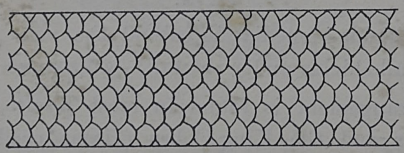

Fig. 1.

Scaly belly of a blind-snake—*Not poisonous.*

Note—The legless lizard (easily mistaken for a snake) is also scaly-bellied and not poisonous. (There are no poisonous lizards in India).

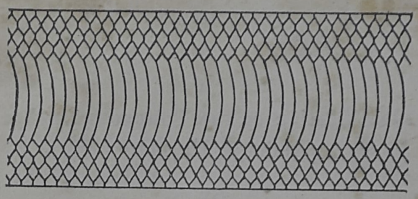

Fig. 2.

Shields not extending the whole width of the belly—*Not poisonous.* This type of belly is found in Pythons and earth-snakes.

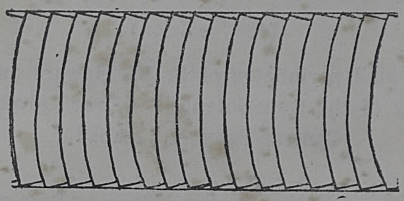

Fig. 3.

Shields extending the whole width of the belly. The majority of snakes are like this *and may be poisonous or not.*

From here onwards we are dealing only with terrestrial snakes with bellies as in fig. 3.

II—*Compare the shields on the under side of the tail (i.e. behind the anus) with figs.* 4 *and* 5.

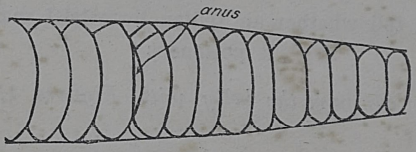

Fig. 4.

Single shields immediately behind the vent (either the first few or all shields under the tail)—*poisonous.*

This arrangement is found in most Kraits,* the saw-scaled Viper and the King-Cobra (Hamadryad) and in no other Indian snakes, although there are some harmless *Ceylon* snakes with single shields.

* There are two species of Kraits which may have shields as in fig. 5 and not as in fig. 4, the north-eastern Hill Krait of the hills of Bengal and Assam and the yellow-headed Krait of Tenasserim. Both these have the enlarged scales shown in fig. 10 well marked.

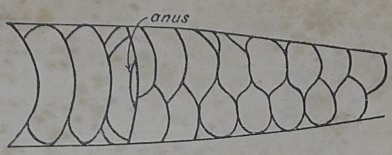

Fig. 5.

Double row of shields behind the anus. The majority of snakes are like this—*May be poisonous or not.*

III—*Next compare the head with figs.* 6, 7 *and* 8.

Fig. 6.

Pit between the eye and nostril in all Pitvipers. Found in no other snakes. *They are all poisonous but not usually fatal to man.*

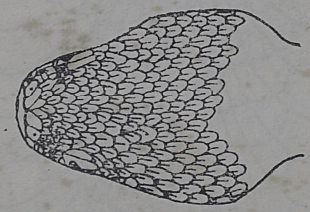

Fig. 7.

Scaly head of all Vipers* (and some Pitvipers—*See* fig. 6). *All Vipers are poisonous.*

* An exception is *Azimaeops feae*, a viper with neither scaly nor pit, which though poisonous would appear harmless by this key. Only three specimens of this snake are known (1 from the Kachin Hills and 2 from China).

Fig. 8.

The third shield of the upper lip (omitting the central one immediately below the snout) touches the nasal shield and the eye.

Poisonous—This condition is found only in Cobras (including the Hamadryad) and Coral-snakes. A badly battered head may make identification by means of fig. 8 impossible. An additional clue to the common cobra is given below (fig. 9).

NOTE—The hood of the cobras, when not expanded, not always obvious, moreover some harmless snakes, when imitating the threatening attitude of the cobra, can flatten the neck into a very passable hood.

IV—*Compare the scale pattern with figs.* 9, 10 *and* 11.

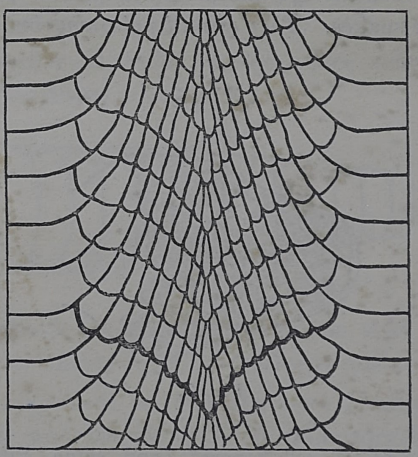

Fig. 9,

Scale pattern of the common cobra. It is found at *mid-body* in no other snake, but may be found *in the region of the hood* in the King-Cobra (Hamadryad) and at least one of the harmless cobra imitators. (Compare with fig. 11).

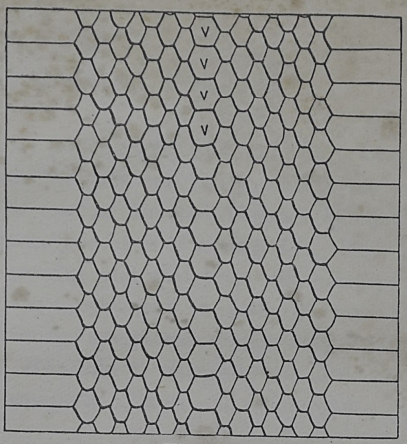

Fig. 10.

A single row of enlarged *hexagonal* scales along the backbone (shown at "V," "V", above.)

Poisonous—This is found in all Kraits and in no other snakes (but compare also fig. 11).

NOTE—The enlarged row, though perceptible is not so marked in the lesser black Krait of Bengal and Assam which however, has single shields beneath the tail (fig. 4).

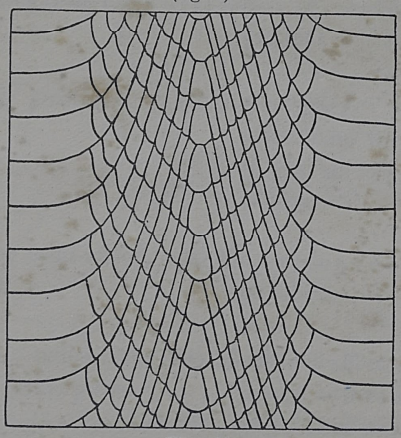

Fig. 11.

For comparison with fig. 10. Enlarged, *but not hexagonal*, scales along the backbone of several tree snakes—*Not poisonous.* Compare also with fig. 9.

If the snake possesses none of the poisonous characteristics it can be presumed harmless.

Treatment of snake-bite.

If the snake is killed try and make sure whether it is poisonous or not. If you are fairly certain the snake is poisonous act *at once* as directed below. The quicker you act the more chance you have of saving life. The remedies are, however, painful and uncertain. If therefore you feel sure the snake is *not* poisonous to man, do not be misled by various alarming symptoms which may be simply the result of fright. The bite is naturally painful, and fright alone can cause complete collapse and even death.

To indicate the difference between a snake-bite combined with fright and real snake poisoning, a comparison of the symptoms caused by fright and cobra poisoning is given :

Fright	*Cobra poisoning*
(1) Onset of weakness often sudden.	(1) Onset of weakness very gradual.
(2) Involuntary prostration; fainting.	(2) Recumbency voluntary after some time owing to gradual loss of power of legs.
(3) Complete or semi-unconsciousness.	(3) Consciousness not impaired.
(4) Syncope, *i.e.*, pallid face, cold skin, feeble pulse.	(4) Heart not affected. Face natural at first and livid later, skin warm, pulse normal.
(5) Breathing shallow, sighing, weak and hurried.	(5) Breathing gradually becomes more laboured and quickened, gasping towards close.

Fright	*Cobra poisoning*
(6) No paralysis.	(6) Paralysis. Gradual weakness from legs upwards. Head and eyelids droop, swallowing difficult, lower lip falls, saliva dribbles, articulation difficult.
(7) Death from heart depression.	(7) Death from breathing depression.

Fright symptoms always appear far more quickly than those from snake poison.

In deciding whether it is really snake poisoning be guided *entirely* by local conditions, viz. pain, swelling and discharge of bloody serum from the wounds. The pain of snake-bite is a stinging burning pain like a very bad wasp sting; it almost always swells rapidly, and the punctures do not close, but continue to discharge blood and bloody serum. Any one of these three symptoms should be taken as indicating a real case of poisoning, and if the discharge is present there is no doubt about it.

When the patient is not poisoned

If you decide that it is not a case of poisoning watch the patient, keep him cheerful, look for any impending signs of faintness. If these occur give soup, milk, tea or black coffee, a tablespoonful or two every ten minutes. Keep the head lower than the body, bend up the legs more or less at right angles, bandage the legs and stomach tightly from below upwords. Rub the limbs, cover with blankets, and apply hot water bottles. If the heart actually ceases, try artificial respiration and dilate the anus with the forefinger. *Above all give no alcohol.*

When the patient is poisoned

If you decide it is snake poisoning there is not much you can do, but your only chance is to act quickly. A delay of a few seconds may make all the difference. Do not waste time with ligatures. Immediately make a series of incisions lengthwise in the limb (not across or you will sever the large blood vessels), and rub in permanganate crystals moistened with water. Let the wounds bleed freely. Remember the larger the area of surface exposed to the action of the salt the more poison will be neutralized, therefore make a *series* of cuts. Put the patient to bed, keep him warm, and treat any tendency to faintness as described above. Dress the wounds aseptically, and, of course, as far as possible disinfect the skin and the knife before operating. Most people have permanganate or iodine with them or at least can pass the knife through a flame. *above all give no alcohol.* Get professional help as quickly as possible.

The Early stages and adult *Brahmea wallichii* Gray.

BY

LT. COL. F. B. SCOTT.

(With a coloured plate).

This large and beautiful moth is seldom seen though, from the number of eggs laid and *larvæ* found, it appears to be quite common. It is found in Nepal, Sikkim, the Khasi Hills of Assam and in Upper Burma.

Full grown *larvæ* were brought to me, in Shillong, on the 11th June, feeding on a species of Privet, (*Ligustrum robustum*, Blume), and more specimens were obtained up to the end of June and one *larva* was brought in on the 10th October. *Pupæ*, from the June *larvæ*, were formed from the 18th of June to the 17th of July. The moths emerged during April of the following year.

On the 28th of April a deformed female moth emerged which I put on a curtain in front of an open window. At about 7 o'clock next morning she was still sitting on the curtain and a rather battered male was on a box close by. I put them both in a large wire cage where they sat quiet all day. In the evening the male became active and was fluttering round the cage at midnight. On the morning of the 30th the male and female were 'in cop" and there were seven large white eggs beneath the female laid, presumably, before copulation. At 9-45 A.M. the male and female had separated.

At 8 P.M. the female had laid 10 eggs, at 9-45 P.M. 31 eggs and at 7 A.M. on the 1st of May 61 eggs, making a total of 68 including the 7 un-fertilised ones. The eggs, when first laid, were pearly white and spherical but, after 12 hours, they turned pale yellow. The un-fertilised eggs did not change after this but the fertilised ones had a brown spot in the centre on the 2nd of May and, next day, the eggs were speckled with pink dots. These spots gradually spread over the whole surface, except the brown spot. After a few days the eggs became flattened at the base assuming a hemispherical shape. On the 12th of May the brown spot had

spread over the whole upper surface and the striped body of the young *larva* could be seen through the sides of the eggs. The eggs hatched from the 14th of May.

The young *larva* is coloured as follows (*fig. I.* $1\frac{2}{3}$*ds life size*):—Head jet black, distinctly two-lobed, smooth and shiny and with a few long black hairs. Body, segments 2nd to 4th and 11th to 13th, and sub-spiracular area yellow; two black transverse bars on segment 2, not meeting on the dorsal line, and extending to the lateral area, bearing black tubercles with black hairs. Behind, and parallel to these bars, two black spots on each side. On the anterior edge of segment 4 also two black spots on each side. There are pairs of long black processes with black hairs on segments 3 and 4 from behind the dorsal spots curved forwards towards the tips; those on segment 3 are 4 mm. long and those on segment 4 are 5 mm. long. Segments 5 to 10 pale blue above the spiracular line, yellow below, with two black transverse bars on each segment; the anterior bar is smooth and forms the division between the segments; the posterior bar bears two black tubercles with black hairs on each side; There is a pair of shorter, straight processes, pointing backwards, on segment 13. Legs, prolegs and claspers black. Length of *larva* when first hatched 6 mm.

The first change of skin is made after about a week, the cast off skin being left attached to the food plant. The head is as before (*fig.* $1\frac{2}{3}$ *life size*). Body segments 2 to 4, and 12 and 13, yellow and the remaining ones yellow below the spiracular line, pale blue above with a transverse yellow band at the posterior end of each. Around sub-dorsal and a larger oval lateral black spot on the posterior edge of segments 2 and 3. Processes in the same position as before, but smooth and without hairs and twisted spirally. Black spots on the vertex of each segment, from 8 to 11, increasing in size posteriorily. Oval black spots placed obliquely, at the opposite angle to the oblique stripes in Sphingid *larvæ*, on segments 5 to 11. Below these, elongated pear-shaped black spots the narrow end pointing backwards. A round black sub-dorsal spot, on the anterior edge of 12 and 13, placed laterally. A small black dorsal spot, behind the

process, on the segment 12 and two lateral spots. Legs, prolegs, claspers, tip of anal flap and underside black.

The second change of skin is made after about another week, (*fig 3.* $1\frac{2}{3}$ *life size*) black with a yellow stripe down the centre, dividing and curving outwardly and upwards, and a yellow stripe betweeu the antennæ. Processes as before but longer and more twisted. Body and segment 2 blue with yellow longitudinal stripes, 3 and 4 yellow, 5 to 11 blue in dorsal area with a yellow transverse stripe across rear end of each. One sub-dorsal and two lateral black spots at the junction of the segments 2 and 3 and a large oval black spot at the junction of the segments 3 and 4 with two smaller ones below it. A large oval spot, placed obliquely, at the rear edge of segment 4 and pale blue patches round the processes and black spots. On segments 5 to 11, two lateral black oblique stripes, one above the other, the area between them being dark green. Below the oblique stripes each segment is yellow with a broad blue stripe across it. Segments 12 and 13 blue and yellow, with numerous black spots. Legs, prolegs and claspers black with blue bands. The subspiracular portion of each segment is edged by a black band. Underside green. The surface of the body and processes is smooth and looks like porcelain.

The third change is made after about another week (*fig. 4.* $\frac{5}{8}$ *life size*). The head is greenish yellow with two short and two longer black stripes down the face and two black spots on each side of the head. The colouring of the body is similar to the last stage but the spots on the posterior edge of segment 4 are dull red and on segments 2 to 4 there are signs of the scale pattern so conspicuons in the final stage. Processes as before but longer and thicker. The black spiracles are visible; underside light brown. There are broad white, or pale blue, stripes above the black oblique stripes.

The fourth change of skin is made after ten days (*fig. 5.* $\frac{5}{8}$ *life size*). Head as before, segment 2 has a blue dorsal stripe with a black stripe on either side; segment

3 has a green dorsal line and on either side an oval, longitudinal spot on the anterior edge of the segment. The posterior portion of the segment humped in the dorsal area, the hump being dark green and having a white tubercle, circled with black, in the position from which the anterior pair of processes spring in the earlier stages. Lateral area of segments 2 to 4 blue-green covered with a black diamond-shaped pattern having, somewhat, the appearance of snake's scales. On either side of the dorsal stripe, behind the hump, an oval, oblique reddish spot, surrounded by blue and yellow. Segments 5 to 11, a black oval spot on the vertex of each segment increasing in size to the eighth, and then uniform and surrounded by blue ; posterior portion of each segment yellow. A broad black stripe running through the spiracles and a black oblique stripe, on each segment, meeting the spiracular stripe posteriorly and ending near the anterior edge of the segments ; between these stripes green, above each oblique stripe is one white, or pale blue, in colour, and above that a yellow one. The remaining segments are blue and yellow, with many black spots and a black spiracular stripe. Segment 12 humped at verted and flap edged with yellow and ending in a double black tubercle. Below the spiracular stripe on segments 4 to 13 the body is blue and yellow broadly outlined by black. Legs, prolegs and claspers blue with black stripes and bands. Underneath reddish-brown, spirades black edged with green.

When about to pupate the whole dorsal area turns bright ochreous and the lateral one blue, the spots and stripes remaining as before the *larvæ* bred by me neither buried themselves under ground nor made a cocoon, but turned on the surface. In natural conditions pupation probably takes place under ground. The *larvæ* have a peculiar sickly-sweet scent especially when about and pupate. The pupa is dark brown with the thorax cylindrical and the abdomen tapering slightly.

Reference can be made to the coloured plate for details of the rather complicated markings in the imago.

Numbers of eggs laid singly, or in masses of ten or fifteen, can be found on the upper shoots of the *Ligustrum* during May. *Larvæ* were common in June. The *larva*, when disturbed curls up the anterior portion of the body, in the same manner as some Sphingid *larvæ*, causing the humps, with their processes or spots, to stand out prominently and at the same time thrusting the anterior portion of the body from side to side.

The moth rests in the normal position with the body, and wings pressed close to the support but, when frightened, raises the body high on its legs and brings the forewings forward with a jerk.

[In the *Journal of the Bombay Natural History Society Vol. XXXVIII p. 593.* Major J. A. Graham gives an account of these stages of this handsome moth from *larvæ* bred out at Naini Tal and at the end of his article he gives a summary of the average periods for the various changes as below.

Period in ovo	...	10½ days.	
,, to 1st moult	...	8½ ,,	
,, to 2nd ,,	...	4 ,,	Average Total 50 days.
,, to 3rd ,,	...	6 ,,	
,, to 4th ,,	...	7 ,,	
,, to pupation	...	14 ,,	

He gives the size of eggs as 2·5 mm. in diameter and 1·8 mm. in height. The first meal of the *larvæ* were the egg shells, some eating all and others only nibbling at them. After trying 19 different trees and some creepers and all the *larvæ*, except 5, dying of starvation those began to feed on a species of Ash (*Fraxinus macrocantha*). Their appetites were enormous and, though not lethargic, they preferred to remain on the one twig until all the leaves and stalks were consumed and only then moved on to the next nearest one. He also believed the *larvæ* must eat the

old skins after each moult, except after the fourth, as nothing was ever found except the heads and bits of old tentacles.

Writing under *Brahmaea hearseyi* Seitz says that the moment of emerging is between 5 and 7 a. m., and that these moths are more frequently found during the day time than any other. "Sitting freely and visible from afar the imago, which has already been flying, takes its rest in the day time on the soil, rarely on the trunks. It rests with its wings spread, somewhat like *Geometrae ;* its repose is not very tight ; on being disturbed the insects do not fly away but spread their wings and are flapping with them backwards. The copula takes place between 8 and 9½ p. m , thus relatively early. The short proboscis (8—11 mm.) looks like a diminutive proboscis of *Acherontia* and probably suffices for drinking. Duration of life 10 (♂)—20 (♀) days. They do not propagate much (44—131 eggs)."

The coloured figures of the *larvæ* are by the author and that of the imago by the Editor.

Editor.]

A Cicad Shikar

BY

LT. COL. F. C. FRASER, I.M.S., RETD. F.R.E.S., M S.B.E., M.D., M.R.C.S. L.R.C.P.

Time was when our elders would reprove us for the volubility of youth, with the remark,—"Little boys should be seen and not heard." I have often been reminded of that obnoxious platitude, when shikarring after cicadas. They, like the little boys, should be seen and not heard, for then I should get a chance of taking a few !

Their procryptic colouring, coupled with astonishing ventriloquial powers, render them the most difficult insects to collect. Perhaps it is this obstacle which has resulted in so few entomologists taking up the family as a study ? In all my thirty years spent in the tropics, I have never met

anyone, save my old friend Tom Bainbrigge Fletcher, who had even an elementary knowledge of these interesting and often beautiful insects.

Let me give a brief sketch of a day spent in the jungles of the Western Ghats—Travancore, Coorg, Malabar or Kanara—collecting Cicadidae. May be then, some of the members of the Darjeeling Natural History Society will enthuse and try to emulate me in this unusual type of shikar ?

First a word as to my outfit : I travel light, in khaki shorts and shirt; khaki is essential, for the Cicad is gifted with marvellous sight and rapid flight, so that camouflage of the person, as well as stealth in stalking, is most essential.

My only weapons are a Coorg knife and a Winchester ·22 rifle, and plenty of dust-shot for the latter. The knife, a kind of kukri, is merely to cut my way through thickets of thorn and climbing-cane, the latter a curse in the jungles of the Western Ghats. The rifle is to bring down my cicadas whenever and wherever I come across them. They can be taken by hand, and—with greater difficulty—with the net, but for surety, give me dust-shot. I would not risk the employment of any other method if I was intent on capturing a rarety.

Shorts too, I think, are almost a necessity. It is true that my knees are apt to be scratched to rags, bitten by mosquitoes, or ringed with leeches, but all these inconveniences can be put up with for the sake of greater and freer movement. I have emerged from the jungle with the tops of my stockings literally caked with blood, the mixed product of thorn scratches and leech bites, but I never took harm therefrom during some twenty years of shikar. The loss of a little blood in the tropics, is beneficial and keeps down the blood-pressure (—this from my medical point of view) I always carry a pocket tin of Iodex to apply to leech bites, which keeps them from irritating or getting inflamed afterwards.

I carry a haversack with one or two cyanide bottles in its pockets and numerous match-boxes for my captures. I decant the insects from the former to the latter as occasion arises. The only kind of net of any use for cicadas, is a short, small, hand-one, with a diameter of about 9 inches and a rim made up of two sections secured by a butterfly screw. The two sections of the net should be set at a strong angle to one another, so that when dabbed down on the insect, the rim will embrace the rotundity of the tree trunk. The angle can be increased or decreased according to the diameter or circumference of the tree, and this adjustment, by the use of a butterfly screw, is the work of seconds. The two sections may be bent into semicircles with advantage, if desired, so as better to hug the tree trunk and prevent the escape of the cicad. The ordinary net is hopeless for the purpose, as the cicad dives with incredible rapidity to the left or right and performs the vanishing trick every time; you never even see it go! I have sometimes swept one off a trunk with an upward or downward cut, but not very often.

The colour of the net's material is of importance—I prefer black or green personally; a cicada will spot a white net, a mile off.

The days preceding the monsoon are the most suitable and give one the most prolific material. Cicadidae are, however, very seasonal and no time of the year can be said to be entirely close for these insects.

Well armed and equipped, as I have detailed above, I set off in my car or on my pony to the selected jungles. If a week-end is at my disposal, or I am in camp, then it is best to utilize every hour of the day, save the hottest, when, like master, the cicads sleep. Quite a number of species give vent to their song for a quarter of an hour before dawn and for a similar period at dusk, so that it is essential to be on the shikar ground at those hours. *I am not going to track down my prey by sight, but by sound.* To try the former would be sheer waste of time, as the chances of spotting a non-vocal cicada sitting on a trunk or on the

underside of a branch, would be remote. The song of the cicada is its "spoor," and it is this that I am listening for. So soon as I have picked up the trail, I pause and attempt to orient my ears to the direction from which the song is coming. I employ one ear at a time—*you cannot follow up a cicada's song by listening with both ears at the same time—it is necessary to turn the ear in the direction of the sound.* I turn my head, make a cast of the direction and move forward. I pause again, turn my ear again and listen and make another cast, and so on and so on—drawing ever nearer to my prey. Owing to the insects ventriloquial powers, it is often difficult to tell the exact direction, but it is usually possible—and quite so with practice—to judge this by the maximum intensity of sound. I proceed with the utmost caution, for if I cannot see the insect, be sure that it has already spotted me. Silence as well as slowness of movement are essential. Cicads have the sense of hearing most uncannily developed, as I have found out by experience. The snapping of a dead twig, or the rustle of dead and brittle leaves beneath my feet, is often sufficient to bring the guiding clamour to an abrupt end. This may be of some advantage at times, for it shows the insect to be near at hand. I pause motionless, almost breathless, to await the renewal of the song, my eyes roving meanwhile from tree trunk to tree trunk in an endeavour to catch sight of the insect. From long experience, I have found that, when still some appreciable distance from a cicad in full song, the drum of my ear, turned in its direction, will get into tune with the song and a rather unpleasant vibration of the drum will ensue. This is the best guide to the insect's whereabouts and, from the time vibrations are noticed, they increase in volume and unpleasantness with every foot forward made. As a rule, as soon as this sign is noticed, it is best to pause and take a long scan of the trees ahead, for in most cases, the eyes are able to complete the work which the ears began. Nearer approach will often result in the insect's flight.

My rifle has been loaded previously, so as to avoid all unnecessary movements when in proximity to the cicad.

At last I spot it—an easy, or possibly a difficult shot, and one which may therefore necessitate a movement to the right or left. This is accomplished with the greatest deliberation until a clear sight of the target is attained. I do not want to get too near or I shall give the cicad such a peppering that it will be ruined for purposes as a specimen. A pattern of about 8 feet in diameter should be the rule and the distance required for such should be ascertained by peppering a blank wall of your bungalow and measuring off the distance needed to obtain it. A pattern of such a size will nearly always result in the cicad stopping at least one or two shot, and the impact of even one, is sufficient to bring it to the ground.

If I have decided to try and use my net in preference to the gun, I mark down the tree, retire stealthily, make a wide chakar and then come up on the far side of the tree. Movement towards the cicad then, must be made by almost imperceptible inches, until the net is almost touching it ; a stroke from any distance, is certain to fail in its object, so quick are these insects in the take-off.

Having decided to use the rifle, I approach to within a suitable distance, raise my rifle slowly and fire. Usually it will fall plumb but quite occasionally it kicks off and is then very difficult to follow, even when it goes only a few yards. I think that this is because the eye is concentrated on the target and remains so for a second or two before taken off, just as in playing a golf ball, one loses sight of it from the moment of impact until it is a long distance away in the offing. With any luck, the insect will be found whirring round and round on its back in the undergrowth, and often emitting raucous bars of its song. It is picked up and transferred to the cyanide bottle, to be decanted later, into a matchbox. And so the shikar goes on. Frequently I find myself in the midst of a colony ; the air throbs with the deafening music of scores of cicads but I pick out one and ignore the rest untili t is successfully bottled.

Whilst many cicads keep to a restricted locality, or even to a single tree, many other species roam in circles. They sing for a short period and then take flight for a hundred yards or so and repeat the song. A wave of sound passes over the neighbourhood during the flight of such a colony ; it swings away to the right or left or appears to go straight on. I mapped out one of these perigrinations some years ago, in Coorg, and calculated that the colony performed a circle of a mile or more.

Some species keep to low growth and thickets, and these are usually coloured green to harmonize with the foliage ; others are only found resting on tree trunks and often very high up. I have exuviae (empty larval cases) of some species, the imagines of which I have never seen or discovered. I have heard the raucous cry of one species in Coorg, high up in the forest, but have never seen it. I know it only from its larval skin—a huge affair—it is heard but not seen.

Larval skins or exuviae, when found clinging to the foot of tree trunks or vegetation, should be kept and mounted alongside the respective imagines. Sometimes one may be fortunate enough to catch a cicada emerging, and if a rare species, it may be the only means of taking or finding it. The emerging insect should be kept for a few days until its wings are hardened and the body fully coloured.

There is a distinct charm in hunting after cicads ; it quickens both the sight and hearing ; above all, it teaches one the art of observation.

Before closing this short paper, let me say a word or two about the insects themselves. They are intriguing in appearance and often very beautifully coloured : they lend themselves well to setting up in cabinets, even more so than butterflies since they are of more compact and more homogeneous shape. Literature is not difficult to obtain relating to the Indian species ; the number of species to be taken is large and doubtless there are still

many more new species to be discovered. All these advantages, should be an inducement to collectors to take up the Cicadidae as a new line.

In a future paper, I hope to describe the anatomy of these insects and to outline the system of classification, as well as to give keys for their identification. In respect to the latter I shall always be glad to give any assistance to those who share my love of the Cicada.

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