

THE JOURNAL OF THE
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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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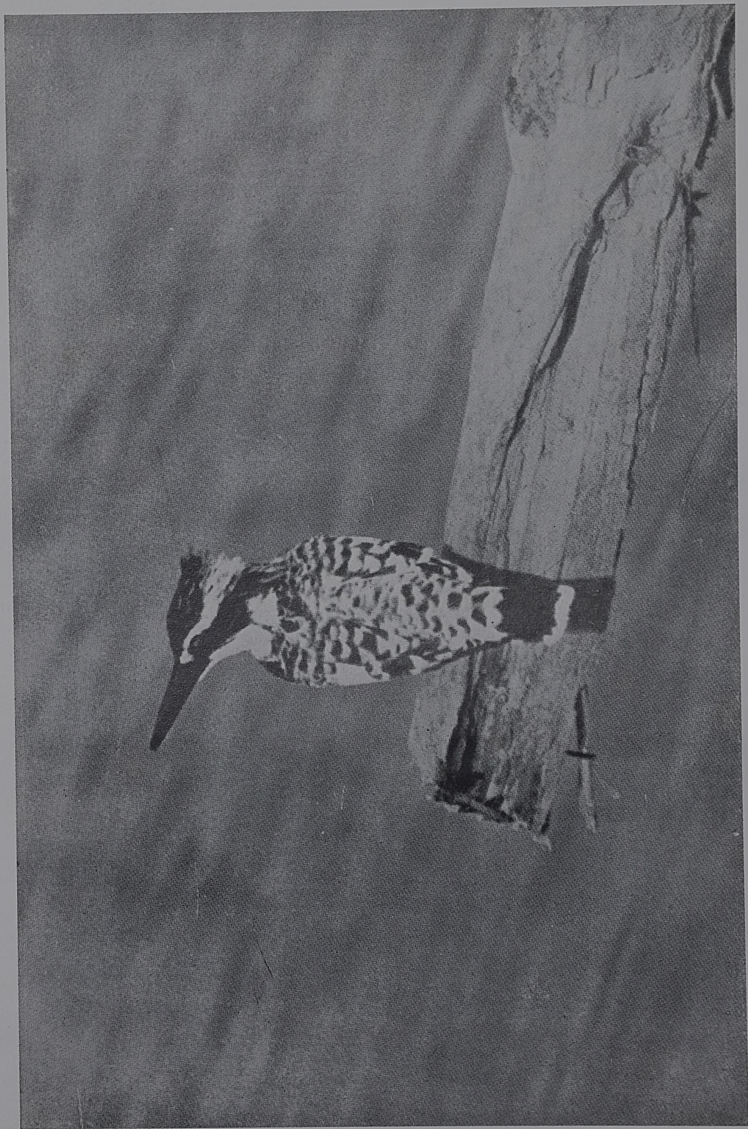
THE CURATOR,

Natural History Museum,

Darjeeling.

A note on the Heterocera of Darjeeling.

After	1631	<i>Aggotis</i> to <i>Agrotis</i> .
	1715	<i>Parasrichtis</i> to <i>Parastichtis</i> .
	4705	<i>Stegothgris</i> to <i>Stegothyris</i> .
	4803	<i>Padyda</i> to <i>Pagyda</i> .
	5134	<i>testulasis</i> to <i>testulalis</i> .



THE INDIAN PIED KINGFISHER
(*Ceryle rudis leucomelanura* REICHENB.)

Copyright F. W. Champion.

As the coloured plate has not arrived by the time of going to press, which was very early this number, we are giving instead reproductions of Mr. Champion's wonderful photographs of the two Pied Kingfishers, for which we thank him. We are sure members will be pleased to have them instead of our usual coloured plate.

JOURNAL
OF THE
DARJEELING NATURAL HISTORY SOCIETY.

Vol. X.—No. 3.

The Kingfishers of our area.

BY

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

(With 6 coloured and some uncoloured plates.)

Kingfishers are found all over the world. They may mostly be seen in the vicinity of fresh water but others are found on tidal creeks or the sea-coast. Some keep much to open country on rivers, streams, lakes or tanks others again keeping to the densest of forests and never leaving them; some also are found more away from water than near it. Their food also varies greatly, fish forming the principal diet of most of them but some feed largely on locusts and crickets; others will eat snakes and even young birds while the Laughing Jackass of Australia (*Dacelo gigas*) has even been known to eat small mammals such as rats.

With such a well-known and widely distributed group of birds it is only natural that legends and superstitions should be attached to them. We cull the following from Professor Newton's "*A Dictionary of Birds*":—"The Kingfisher is the subject of a variety of legends and superstitions, both classical and mediæval. Of the latter one of the most curious is that having been originally a plain grey bird it acquired its present bright colours by flying towards the sun on its liberation from Noah's ark, when its upper surface assumed the hue of the sky above it and its lower plumage was scorched by the heat of the setting orb to

the tint it now bears. More than this, the Kingfisher was supposed to possess many virtues. Its dried body would avert thunder bolts, and if kept in a wardrobe would preserve from moths the woollen stuffs therein laid, or hung by a thread to the ceiling of a chamber would point with its bill to the quarters whence the wind blew. All readers of Ovid (*Metam. bk. xi*) know how the faithful but unfortunate Ceyx and Aleyone were changed into—Kingfishers—birds which bred at the winter solstice, when through the influence of Æolus, the wind-god and father of the fond wife, all gales were hushed and the sea calmed so that their floating nest might ride uninjured over the waves during the seven proverbial "Halcyon Days"; while a variant or further development of the fable assigned to the Halcyon itself the power of quelling storms".

Jerdon adds that, besides pointing with its bill to the quarters whence the wind blew if hung by a thread to the ceiling, it would even "show the flow and ebb of the tide; and the Tartars of Northern Asia wear its dried skin, as an amulet to secure good fortune."

The Kingfishers belong to the family *Alcedinidæ* of the Sub-Order *Coracii*, of the order *Coraciiformes*. The Sub-order *Coracii* is sub-divided into three families, the *Coraciidæ* (Rollers), *Meropidæ* (Bee-eaters) and *Alcedinidæ* (Kingfishers).

The *Alcedinidæ* have the bill long, stout, straight and pointed with the top of the upper mandible rounded or flattened. The wings are moderate and rounded with eleven primaries the first one very small. The tail is usually short and with ten rectrices. The legs and feet are very small and feeble and the front toes are joined together by skin, especially the fourth one which is united to the third by more than half its length. The feet are not at all adapted for walking and all that Kingfishers can do on the ground is a short waddle.

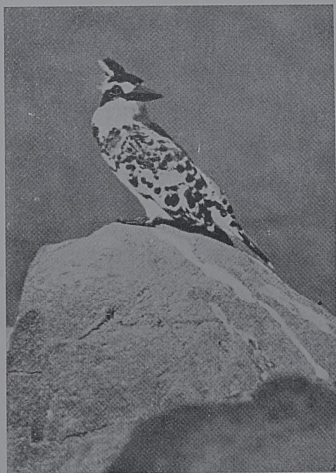
Our Indian Kingfishers are divided into nine genera, six of which are represented in our area. Except for *Ceryle*



(a)



(b)



(c)



(d)

Copyright F. W. Champion.

(a), (b) and (c) THE INDIAN PIED KINGFISHER (*Ceryle rudis leucomelamura*), (d) THE HIMALAYAN GREAT PIED KINGFISHER (*Ceryle lugubris guttulata*.)

and *Alcedo* we have only one species of each genus and colour pattern will serve to distinguish the genera of our birds.

- A. Black and white *Ceryle*.
- B. Not black and white.
 - a. Tail shorter than bill.
 - a.' Bill black or nearly so ; lower plumage ferruginous ... *Alcedo*.
 - b.' Bill coral red ; lower plumage orange-yellow ... *Ceyx*.
 - b. Tail longer than bill.
 - a." Head brown ; neck and lower plumage buff ... *Ramphalcyon*.
 - b." Head and breast chestnut except chin, throat and middle breast white ... *Halcyon*.
 - c." Above rufous mostly overlaid lilac ; below orange-buff ... *Entomothera*.

We will first take the genus *Ceryle* of which there are three Indian species and sub-species, Whistler having lately described one from Travancore, two are found in our area.

We will not describe the genus as they are the only two pied King fishers in India.

The following key will suffice.

- Medium size ; wing 5·5 inches ... The Indian Pied Kingfisher.
- Large ; wing over 7 inches ... The Himalayan Great Pied Kingfisher.

The Indian Pied Kingfisher.

Ceryle rudis leucomelanura (Reichenb.).

Field identification :—A black and white bird found near water, in the plains, often seen hovering over and plunging into the water after its prey.

“There is no nest in the true sense of the word but, sometimes, there is an accumulation of the undigested remnants of fishes. Some birds, in fact, feed inside their burrows, while other individuals do not, and the latter are more numerous than the former.”

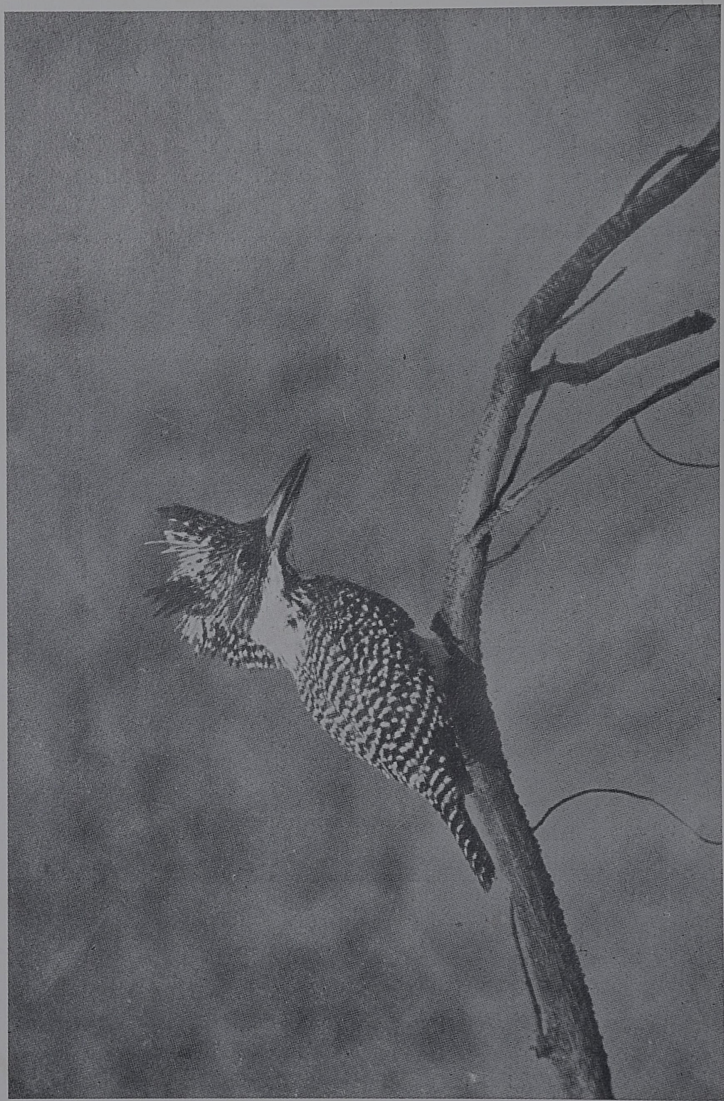
The same author also remarks :--“Both sexes incubate and take a share in making tunnel and chamber, but I can find nothing recorded as to the period of incubation, I think it is fifteen days, but I am not sure. The fledgling time is from four to five weeks.”

Colonel G. Marshall wrote to Hume ‘I imagine the young birds live with their parents some time after they are fledged, since late in the season I have noticed six or seven of these birds coming out of a single hole.

“I have noticed a curious fact about this bird ; it is a gregarious breeder. I have taken 3 sets of eggs from the same hole ; the hole led to a large open sort of cavern about 3 feet across, which was plentifully strewn with grass and rubbish, and the eggs were in different corners of it.”

Another of Hume’s correspondents, Mr. Benjamin Aitken sent to him the following most interesting note.

“At Akola, Berar, in either the end of January or the beginning of February, 1870, my brother took two out of six eggs from a Pied Kingfisher’s nest in a river bank, about two feet above the surface of the water. Although the hole was much dug away, the birds continued to sit upon the remaining four eggs, which were duly hatched, and soon after the young were fledged the parent birds took possession of another hole near the first. That bank seemed to be their regular breeding place and was full of holes. Six eggs were again laid, and six young birds, looking exceedingly fresh and pretty, appeared in due time perched all in a row upon the top of the bank. Nearly a mile down the river there was a *bund*, and here of course it was easier to catch fish than at the nest where the water was running. So from early morning till late at night the parent birds continued making trips to get food for their young. Each little fish that was caught cost a flight to the



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THE HIMALAYAN GREAT PIED KINGFISHER
(*Ceryle lugubris guttulata* STEINER)

bund and back of not much less than two miles, and the voracious fledglings seemed never to be satisfied. As soon therefore as the latter were able to go the distance, they were conducted to the bund where they could be fed with less trouble to the old birds and, I don't doubt, with more satisfaction to themselves. This arrangement was continued for several weeks, the whole repairing to the bund every morning and flying back to the nest in the evening. I regret I never took the trouble to watch whether they got into the hole to sleep." Stuart Baker adds to this. "I think we can say with certainty they did, as this is the usual custom with most Kingfishers."

They lay from four to six eggs, we have many times found both five and six, perhaps five is the usual clutch. They are very broad ovals, almost spherical sometimes, highly glossy and china white in colour. They average 1.18×0.94 inches.

2. The Himalayan Great Pied Kingfisher.

Ceryle lugubris guttulata Stejneger.

Field identification.—A very large black and white Kingfisher found on hill streams up to about 4750 feet or more. Rather shy and crepuscular in habits. In winter found at foot hills and adjoining plains.

Description. No detailed description is necessary as Mr. F. W. Champion's beautiful photographs here reproduced show the black and white markings very distinctly. In the *male* the broad black spotted band across the upper breast is mixed with rufous-brown, this character does not seem to be constant.

Bill greenish-brown, blacker towards tip; iris dark brown, legs and feet greenish-plumbeous.

Length about 16 inches, wing 7.4 inches, tail 4.3 and bill 2.3 to 2.8.

The *female* differs in having the under wing-coverts and axillaries rufous-brown and in having no rufous on the gorget but one female in our collection shows some rufous-brown feathers on the sides of the lower-breast.

According to Stuart Baker *young birds* are like the female.

Distribution :—*Inside our area* :—In the hills Stevens writes in his “*Notes on the Birds in the Sikkim Himalayas*”. Wherever this fine Kingfisher can get a sustenance, it is found on every river of consequence. In the Rungbong River, an odd pair or two reach the upper limits at an elevation approaching 4,700'. I have no information as to how far it penetrates into the interior by way of the Tista River; it has, however, been obtained on the “jhoras” in the lower portion of the valley up to an elevation of 1,200' (G. E. Shaw).” In the Duars it extends to the foothills and even many miles distant from those into the plains in the winter months. We have just secured one in the Moraghat Forest on the 29th November. 1935.

Outside our area :—Stuart Baker gives the distribution as :—Himalayas from Kashmir to Assam, Burma from the North to Amherst in Tenasserim, Eastwards Forest obtained it in Yunnan.” Delacour obtained it in Indo-China.

Habits etc.—The only good description of the habits of this bird is that given by Stuart Baker, many years ago, in the defunct sporting paper “*The Asian*” and reprinted in Hume’s “*Nests and Eggs*”. He wrote :—“As I have only taken one nest of this bird, I describe that in detail, others are sure to resemble it very closely. It was placed at the end of a hole excavated in a high bank, and placed at about three feet from the top and fully 20' above the level of the water. The tunnel, independant of the chamber at the end, was only about two feet deep; and as the soil was of a very loose, sandy nature, and quite without stones or pebbles of any kind, this would seem to show that this bird is not in the habit of burrowing to any great depth. *A. bengalensis* or *Ceyx tridactyla* (now *Ceyx e. erithaca*) would have made a tunnel fully six feet deep in such a place. The chamber, which was a very large one, was raised high above the entrance, the latter being fully eight inches below it. The nest was a mass of malodorous fish-bones, some of which were of considerable size, and had probably belonged to fish nearly six inches long. It was

hollow in the middle, the material of the nest being raised some way up the wall of the chamber on three sides. The eggs were four in number, white and round and of good size.

"The Cacharis tell me that, as a rule, it only lays two or three eggs, commencing to breed in May, but that this depends a good deal on the rains being early or late as they may happen to break. The nest taken by me was found late in July, and the eggs were very hard-set. The river, in the bank of which the nest was, was large enough to admit of small boats navigating it all the year round,

"This bird is exceedingly common on all large hill-streams up to a height of about 2,000 feet; above that it is not often met with, though on one or two occasions I have seen it flying about small streams at a height of nearly 4,000 feet, I think that it ascends during the breeding-season higher than at other times, for in the cold weather it is fairly common in the plains of Cachar; but during these rainy seasons, I have been on a visit to that district I have only seen one bird.

"They appear to be entirely fish-eaters, and are never seen away from water.

"Whilst waiting for fish they perch very low down amongst the scrubby bushes overhanging the edge of the water; and instead of selecting a twig or bough on the outside of the bush, they get as far inside as possible; their love of shade and darkness of course leads them in like manner to always keep the shady side of the stream. They are generally found in pairs and keep within hail of one another. When frightened they fly but a short distance, speedily resettling, unless the banks are very bare, when they continue their flight to the nearest convenient clump of shrubs. Their manner of taking prey from the water is by swooping down obliquely towards it, continuing their flight and not returning to their original perch. Occasionally they hover in the air when they are attracted by something in the water and drop almost perpendicularly into it; in such cases, however, they never dive to any depth, seldom immersing more than their head and neck.

"Their usual cry is much like that of all Kingfishers, but very loud, and uttered in a very quick succession of notes. Besides this cry it gives a low hoarse croak from time to time when seated in deep shadow, and this is, I think, the common call to its mate; at all events, when two birds are fishing in company and one of them utters this sound, the other bird always answers it. It is not a noisy bird on the whole.

"Its flight is extremely strong, and it is capable of going at great speed; but when not frightened or otherwise hurried, it seems to content itself with a sort of half-power speed, and goes along very lazily, slowly flapping its wings,

"This bird is the last of the kingfishers to retire to roost at night. I have sometimes seen it flitting about when it had become quite dusk. In flying at any distance the whole bird presents a grey appearance, merely the head appearing black from the feathers laying down close to the head. The crest can be raised by the bird at will, and when uttering the croak above mentioned it raises and depresses it two or three times with each cry.

"This bird, when it is successful in taking a fish too big to swallow at once, often has to give up its capture to *Haliaëtus fulviventor* (*Haliaëtus leucoryphus*, Pallas's Fishing Eagle, *Editor.*), which is a frequenter of the same streams as it haunts itself, and which is much given to living on other people and by other people's exertions, always preferring ready-caught fish to the trouble of hunting for them itself. The eagle, on swooping down, utters a loud vibrating cry, and, on hearing this, *Ceryle* drops the fish without the slightest hesitation, and, accelerating his speed, seeks safety for himself in the nearest cover.

As may be imagined, the shadow of any large eagle or hawk flying overhead is enough to reduce this bird to absolute silence; the other kingfishers appear, however, not to mind at all.

In his "*Nidification of Birds of the Indian Empire* Vol. III pp. 404, 405," the same author adds:—"It is most

common between 1,000 and 2,000 feet in Assam, where it is seen over 3,000, but in the Western Himalayas it is common up to about 3,000 feet and has been recorded up to 7,000 feet.

“This kingfisher breeds in the banks of streams running through forest and always where the water is flowing bright and clear, in rapids and pools, but not in a rushing torrent. Stagnant and discoloured water is avoided altogether, and I have never seen it about forest pools and swamps. Hume found a brood of young birds in a hole in the bank of a stream near Subatoo, and this, with the exception of my own account of its breeding, is the only note in ‘Nests and Eggs’, as Thompson’s note is valueless.

“Rattray once took a clutch of four eggs near Mussoorie on the 15th May. This also was in a large chamber at the end of a very short tunnel, similar to that found by Hume and others found by myself. Whympier, however, who has had greater success with this bird than anyone else, finding several nesting tunnels in the high gravelly banks of the Gola and Kosi streams in the Kuman below Nainital between 1,500 and 2,000 feet, describes the tunnels as long. In one he says that the tunnel was 8 feet long and in others 6 feet, although the soil was not exceptionally easy to work. They were all placed fairly high up in the banks, as were those Rattray and I found, and all the tunnels graded upwards towards the chamber, which was very large, measuring a foot or over each way and about 8 or 9 inches high. The tunnel entrance is over 4 inches wide.

“The eggs found by me, four in number, were lying on a mass of fish-bones exceedingly malodorous and, quite possibly, the remains of the food supplied to a previous brood of young. Neither Rattray nor Whympier found any bones in the egg-chamber, and it seems certain that these merely accumulate as the young are fed and throw up the undigested portion.

“The breeding season is undoubtedly March and April, Whympier obtained all his in these months, and Rattray’s

eggs taken on the 15th May and mine in June were no doubt second layings.

"The full clutch is four or five, but the young seem to come to grief early, as one seldom sees more than two young birds with the old ones.

"Twenty eggs average 38.5×32.5 mm.

"There is nothing on record as to which sex incubates or digs out the nesting hole.

"The Cacharis informed me that this bird sometimes bred inside forests, making the nest-holes in banks, but I have never seen such. On the other hand, I have seen one nest-hole in the bank of a ravine just where it debouched into the stream itself."

Writing on the "*Birds of Kulu*", Whistler says:—"Its large size and black and white plumage and the loud call note 'ping' (similar to one of the calls of the Red-wattled Lapwing) readily attract attention as the bird flies along above the surface of the troubled waters or perches on the trees and boulders that afford handy fishing stations."

F. W. Champion in "*The Jungle in Sunlight and Shadow*," writes:—"On a branch above the pool is sitting a splendid Himalayan pied—Kingfisher, aristocratic and far larger relative of the common pied Kingfisher of the plains. He is gazing down at the water waiting his chance, and even as we watch he darts almost vertically down from his perch and plunges into the pool, only to rise again on missing his mark. He then poises over the water preparatory to a second dive and hovers in the same spot, maintaining his position by means of the rapid beating of his wings; but he has not the skill of his smaller relative."

We give this note of Champion's as he found this bird plunging almost *vertically* into the water and hovering for a second time after missing its prey.

(To be continued.)

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.

(Continued from page 49.)

We now come to two Sunbirds very closely allied both of which are, we believe, found in our area. The following key will enable them to be identified.

Males.

Larger.—Breast bright yellow streaked
with crimson ... Mrs. Gould's Sunbird.

Smaller.—Breast lemon yellow with no
crimson streaks ... The Manipur Yellow
backed Sunbird.

The females only differ in size.

3. Mrs. Gould's or the Simla Yellow-backed Sun-bird.

Æthopyga gouldia gouldia (Vigors).

Field identification:—A tiny bird with well curved bill, occurring from 4,000 up to over 10,000 feet, in which the males have the lower plumage yellow, streaked with crimson, the backs crimson and crown and tail metallic purple-blue. Mostly found in forest but also on cherry trees when in blossom, feeding on the honey and small insects.

Description:—The adult male is shown in our coloured plate and needs no description.

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

The female has the upper plumage pale grey-green and the rump sulphur-yellow; tail brown edged with violet-green; lower plumage, to the upper breast, olive-green and below that yellowish-green.

The wing is said to measure 2 and the tail 1·4 inches.

Ticehurst remarks (*Journal Bombay Natural History Society Vol. XXXII*) "Juvenile. Like the female but tail not so graduated, nor tips so white. Complete moult September to December to full dress which is then retained all the year."

Distribution: Inside our area.—We have only one male of this Sunbird collected at Mangpu (3,800 feet), in the Darjeeling District, by Mr. Shaw on the 2nd November 1921, Stevens gives its distribution as:—

"Found at all elevations of from 4,000'—10,000' according to season."

Stuart Baker gives this race as occurring above 6,000 feet but the bird collected at 3,800 feet, seems referable to this race. It is too large for *isolata* and also there is red, though not well defined, on the breast.

Outside our area:—Stuart Baker gives the distribution of this Sunbird as:—

"The Himalayas from the Sutlej Valley to the extreme East of Assam, Naga Hills, South of the Brahmaputra above 6,000 feet and also Mt. Victoria, in the Chin Hills, from 6,000 feet upwards."

Habits etc.:—We have no experience of this beautiful Sunbird. Stevens records it as uncommon. He once observed it on the Mirik Ridge above Namsoo at 4,000 feet either in late March or early April. During March it appears to be found at elevations varying from 4,720 feet, where Stevens obtained a male at Gopaldhara on the 15th of that month, up to 10,160 feet where he secured a male and female on the 17th and two males on the 22nd of the same month at Kalo Pokhari on the Singalila Range. He has also found it at Gopaldhara in the first half of November and at this same period Shaw obtained his specimen at Mangpu at 3,800 feet.

Stevens writes in his "*Notes on the Birds of the Sikkim Himalayas*":—First arrivals which appeared immediately the cherry blossom opened. (This was on the 2nd November).

This Sunbird was much in evidence at this time, dwindling down gradually until the 13th of this month when the flowers had mostly set and the last bird had disappeared."

Stuart Baker, in the "*Fauna of British India, Birds 2nd edition, Vol III*", gives the following interesting note:— Mrs. Gould's Sunbird is one of high elevations, its place being taken from 5,000 feet downwards by the next race *isolata*. In the Himalayas it certainly occurs up to 12,000 feet and probably up to 13,000 feet in Summer, breeding up to 11,000 feet or higher (10,160 feet is the highest record we know of for our area). In winter it descends to 5,000 feet or lower and, at this season, both this and the next bird may be found in company at this elevation. They are extraordinarily active little birds on the wing, though their flight is never very prolonged and becomes jerky and weak after a hundred yards or so. They are shy birds but if one keeps absolutely motionless, they will often feed within a few feet of the watcher and they make a very beautiful picture when several gather together for feeding purposes, the rapidity of their motions being almost like that of a Sphinx moth. The note, which is constantly uttered, is the usual shrill trill of the species. They are essentially birds of evergreen forest but come more into open country in the non-breeding season.

Whistler says their note resembles the rapid opening and closing of a pair of scissors as is the case with *Æ. siparaja*.

With regard to the breeding habits Baker writes in his "*Nidification of Birds of the Indian Empire Vol, III*":—"During the breeding season these birds are found from 6,000 feet upwards to at least 12,000 feet, keeping to forest or to its outskirts.

"Tytler found it breeding commonly between 6,000 and 8,000 feet, generally nearer the latter elevation, in the Naga Hills, and sent me a beautiful series of eggs and nests. The nests are all exactly like those of *isolata* found by me in the Cachar Hills, which are fully described later on. These taken by Tytler were all affixed low down to the branches

of small bushes or brambles. The breeding season is June and early July and the number of eggs laid two only.

"The ground in all Tytlers' eggs is white, one pair is spotless but all the rest are thinly freckled with small blotches of pale reddish-brown, slightly more numerous at the larger end, and in one pair, the best marked, forming fairly definite rings.

Ten eggs average 14.6×11.2 mm."

4. The Manipur Yellow-backed Sunbird.

Ethopyga gouldiae isolata Stuart Baker.

Field identification:—Resembles the last but for its smaller size and paler breast without any red on it. They are birds of lower elevations than Mrs. Gould's Sunbird though they may be seen together where their habitats meet. Stuart Baker says they keep to bushes and the lower half of small trees.

Description:—*Adult male*, in all respects similar to Mrs. Goulds' Sunbird, except for the much paler breast, more a lemon than a deep yellow, which is unmarked with crimson and also by its smaller size. Stuart Baker gives measurements as "Wing 51—53 mm. (53—58 in *gouldiae*); tail 62—69; tarsus about 14; culmen 13—15. The measurements of the specimen which we consider belongs to this subspecies as compared with one specimen of *gouldiae* is as follows.

	<i>isolata.</i>	<i>gouldiae.</i>
Wing	54 mm. or 2.1 inches.	58 mm. or 2.2 inches.
Tail	66 " 2.6 "	82 " 3.6 "
Bill	15 " .6 "	16 " .7 "

The *female*, except for its rather smaller size, is indistinguishable from that of *gouldiae*.

Distribution:—*Inside our area*:—This race was only separated in October 1925 whereas Stevens' account of the Sunbirds of our area appeared in June of that year so we are unable to state whether all his specimens belonged to

the typical race or not. The only specimen which we have secured, a male, was collected at Hasimara in the Duars, at about 500 ft. elevation on the 16th March 1926.

Outside our area :—The distribution, as given by Stuart Baker, is ;” Manipur, Cachar and one specimen from Mt. Victoria, in the Chin Hills. This latter was obtained at 5,000 feet, whereas all the red-breasted birds were obtained at 6,000 feet and over. Hume records Mrs. Gould’s sunbird from Tippera and Chittagong and I am informed that it is not uncommon in the higher Hill Tracts of these districts. These are sure to be of this race and probably extend through all the lower hills and broken country to the Chin Hills.”

Habits etc.—With regard to the habits and nidification of this bird, the same naturalist writes :—Similar to those of the preceding bird. I found that when feeding they kept almost entirely to bushes and the lower half of small trees. (The only specimen we have was found feeding from the flowers of some shrub). This was very noticeable when, on one occasion, I watched them feeding with *A. s. seherice*, for though the latter were tempted by the flowers of some Bauhinias to hunt even the topmost branches, the Manipur birds kept strictly to the lowest branches. They are resident birds but many wander farther afield a little in the Winter.”

“It is essentially a forest-bird, and breeds sometimes in glades and by river-banks in the interior of the forest and sometimes in among bracken and shrubs on the edge of cultivation patches. The nests that I have found have nearly all been attached to the stems of bracken and all very carefully concealed, being only a foot to 3 feet from the ground. One or two have been on thin branches of brambles or small bushes, but even these were in among bracken. They choose spots in which the old fronds of the previous year have not been burnt but surround and intermingle with the growing new plants, making it practically impossible to spot the nest unless the bird is watched onto it. The nest is roughly pear-shaped or oval and, at first sight, looks as if made only of pure white *Bombax* seed-down, but when

examined closer is seen to be held together with whisps of moss, grass-stems or a long brown fibre, possibly a fungus. In most nests there is not much of this visible but occasionally the outside is almost covered by it. The lining is merely the same cotton tree down but put in without mixture of other materials; at first it is very fluffy and soft but later, more especially when the young are hatched, it works into a sort of soft felt. The entrance is large and very near the top and without any porch. The nest is always pendent and the materials are well wound round the bracken stem, at which point only, moss, grass or fibre are used, thickly mixed and strengthened with spiders webs. In size the nests vary greatly. The largest run up to 7 inches in length by about $2\frac{3}{4}$ in breadth at the widest part, while an unusually small one measured only 4.6 inches in height and 2.2 in width. The egg chambers measure roughly about 2 to $2\frac{1}{4}$ inches in diameter by about 2 inches in depth below the lower edge of the entrance.

“The breeding season is May and June and the last half of April.

“The full clutch of eggs numbers two or three, generally the former, while in appearance they are indistinguishable from those of the typical forms already described.

“I have, unfortunately, given away all my eggs but two without measuring them. These two measure 14.0×10.0 mm. but were, I think, rather on the small side. Measurements given by me in ‘The Asian’ newspaper nearly forty years ago were very roughly taken in decimals of an inch and are hardly worth recording.

“Both birds assist in building the nest, as I have seen the male carrying materials for it and I have also seen him carrying food to the young.”

(*To be continued*)

Notes on Elwes' Eared Pheasant (*Crossoptilon
harmani*).

Location.—Near NYENGO, Tibet, about half way up the Gokar La Pass. Altitude 14,000'. Latitude 29°25'N. Longitude 91°33'E. Date 21st August 1935.

Type of Country.—Steepsided mountain, thickly covered with several types of dense prickly bushes, stunted silver birch trees, herbs and grass from which large rocks protruded in abundance. Country very difficult to move over.

Habits noticed.—A covey of 7 adult and young birds was first seen sitting on a rock. They were conspicuous by their red legs and feet. When this covey was flushed a number of other *Crossoptilon* started "clucking" and showed this particular part of the mountain side to be swarming with them. It was not difficult to approach them to within 43 yards. When flushed they flew down hill. Amongst those seen were a number of young birds somewhat resembling black partridge both in colour and size.

The adults appear to have two distinct cries—one a "cluck" of alarm with a rather metallic resonance, and the other a communication call resembling the "come—back" of the domestic guinea fowl. The young birds' call is a kind of shrill whistling cry very similar to that of the Marmot.

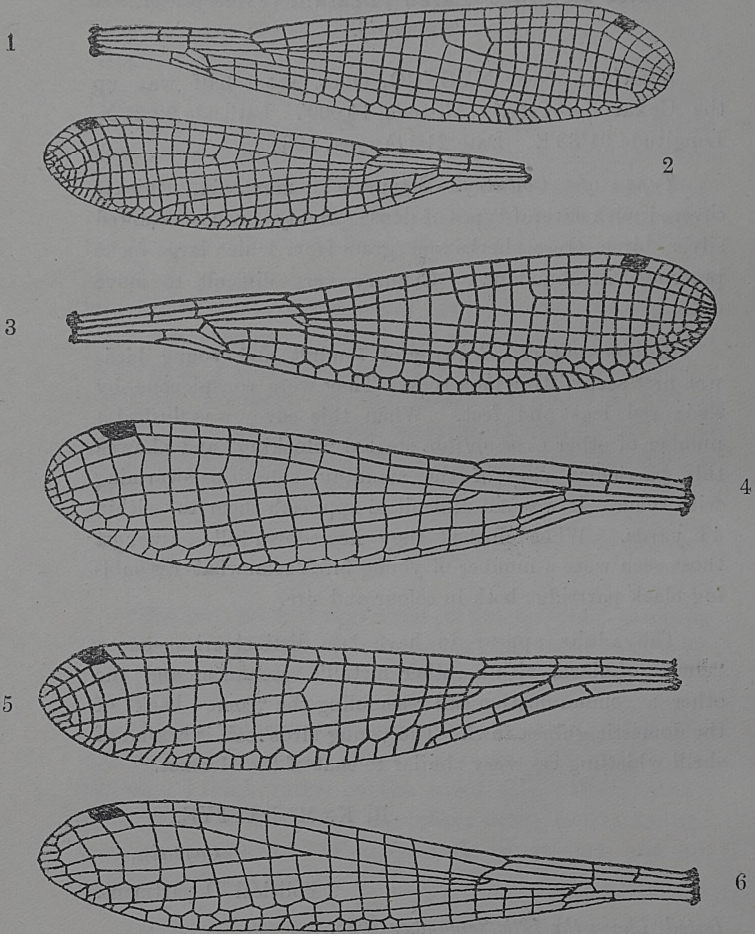
R. K. M. BATTYE,

Captain,

Political Department.

Dated, Lhasa the 12th September 1935.

[We published a lengthy account of this bird in captivity in Volume IX, No. 4 of our Journal. *Editor.*]



EXPLANATION OF PLATE.

1. Wing of *Coelliccia*.
2. Wing of *Calionemis*.
3. Wing of *Ceriagrion*.
4. Wing of *Copera*.
5. Wing of *Caconeurd*.
6. Wing of *Acigrion*.

The Dragonflies of the Darjeeling and Jalpaiguri Districts
and Sikkim.

BY

LT. COL. F. C. FRASER, I.M.S. (Retd.) F.R.E.S.

PART V.

(Continued from page 115 of Vol. IX.)

Subfamily Platyneminae.

Genus *Coeliccia* Kirby.

- *14. *Coeliccia renifera* Selys. A slim black and sky blue species with long slender abdomen. Easily recognized by the broad blue on sides of thorax and a pair of large blue oval spots on its dorsum. In the female these spots are replaced by narrow humeral stripes and the blue markings by yellow. Found beside small streams and irrigation channels in plantations in the Darjeeling district. Usually seen settled on overhanging foliage

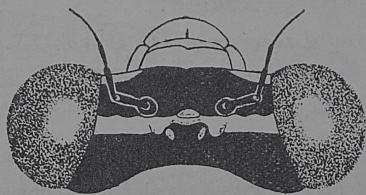


Anal appendages of *Coeliccia renifera* Selys. Mr. Chas. Inglis has taken it at Pashoke and Mr. H. Stevens at Gopaldhara. (Pashoke in May and Mangpu in September. *Editor.*)

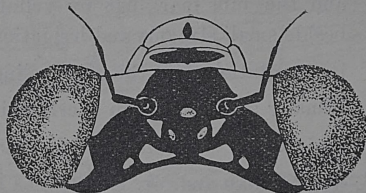
- 15, *Coeliccia dorothea* Fraser. Very similar to the last and distinguished from it by the dorsal spots smaller and by segment 9 of the abdomen pale blue instead of black. It is to be found in similar situations to the last in the Jalpaiguri district.

Genus *Calicnemis* Selys.

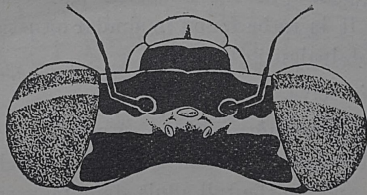
- *16. *Calicnemis pulverulans* Selys. A smaller species than the last with shorter abdomen, coloured black marked with blue and, in the full adult stage pulverulent blue nearly all over. I found it quite common in bogs and marshy spots at the foot of hills around Mangpu, Darjeeling district. The female is black marked with yellow and is distinguished from females of other



Head of *Copera superplatypes* Fras., male.



Head of *Copera annulata* (Selys), male.



Head of *Copera villata* (Selys), male.

species of *Calicnemis* by having the head entirely black behind and beneath. (Very common at Gangtok in May. Mangpu in June. *Editor.*)

*17. *Calicnemis eximia* Selys. Of similar size to the last and a very conspicuous insect with vermilion red markings on head and thorax and with abdomen entirely of this colour. The female resembles that of the preceding insect but has a small upper spot of yellow on dorsum of thorax and a broad yellow mark beneath the head. It is found in company with *C. pulverulans* and has similar habits. Mangpu in May and September. *Editor.*)

*18. *Calicnemis mortoni* Laidlaw. A rather larger insect than the last and with longer slimmer abdomen. It is to be distinguished by its abdomen black save the first three segments which are blood-red. An uncommon insect, found only in Sikkim. (Our only specimen, in museum, taken at Gangtok on 30th May 1924. We also took it at Pashoke. *Editor.*)

*19. *Calicnemis miles* Laidlaw. Resembles the last but the yellow spot beneath the head is larger and the whole abdomen is blood-red save for some small black markings on the end segments. A very rare species found in Sikkim. I have specimens from Upper Burma. Probably frequents rank herbage over marshy spots. The type comes from Sikkim.



Anal appendages of
Calicnemis miles
Laidlaw.

*20. *Calicnemis miniata* Selys. A very common species closely resembling the last but has black markings on the last four segments of abdomen and the whole upper surface of head is bright red save for a narrow

transvers black stripe between the eyes. In *C. miles*, there is a similar but much broader stripe largely obscuring the red. I found it in company with *eximia* and *pulverulans* around Mangpu, Darjeeling district.

(We got it at Badamtam in April, Pashoke in May and Kalijhora in June. *Editor.*)

Genus *Copera* Kirby.

21. *Copera annulata*. A slim species easily distinguished by its white and broadly dilated tibiae, especially the hinder pair. Coloured black marked with white and with long downwardly curved inferior anal appendages, the inferior being much longer than the upper. Found in the Jalpaiguri district around the borders of weedy tanks; females are larger, more robust and are coloured black marked with reddish brown; the tibiae are of the latter colour and not dilated as in the male. They are usually found

lurking under scrub in the neighbourhood of tanks favoured by the males.



Anal appendages of
Copera annulata Selys.

22. *Copera superplatypes* Fraser. A smaller species than the last, coloured similarly but with a narrow transverse white stripe on the head instead of a broad black triangle. Its anal appendages are also shorter and of about equal length, whilst the tibiae are enormously dilated as compared to the last species. A very rare insect from the Jalpaiguri district. Mr. H. V. O'Donel sent me the type, a male, from the



Anal appendages of
Copera superplatypes Frase.

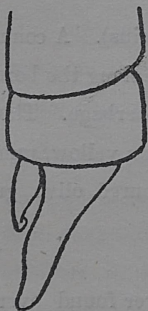
Duars, and this is the only specimen which has ever been taken. Probably found in similar situations to the last.

- *23. *Copera marginipes* Rambur. A very common species found everywhere. Distinguished from the two last by the tibiae bright yellow or orange and not dilated. The sides of the thorax are pale yellow or blue mottled with black and brown. Young examples are pure white marked with black and are found in dark nullahs lurking beneath heavy scrub.



Anal appendages of
Copera marginipes Rambur.

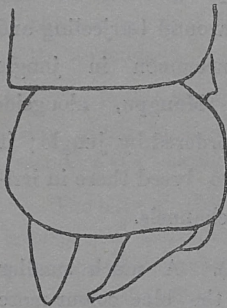
- *24. *Copera vittata* Selys. A similar insect to the last with similar habits but less common. Distinguished by its anal appendages of which the superiors are just half the length of the inferiors, whilst in *marginipes*, the superiors are only one fourth or less this length. Found throughout the areas.



Anal appendages of
Copera vittata Selys.

is very inconspicuous by reason of its colour which is pale olive throughout. The sexes are similarly coloured. Very common, where found, in the Jalpaiguri district.

29. *Ceriagrion fallax* Ris. Closely resembles *coroman-*



delianum but has conspicuous black markings on the dorsum of end segments of abdomen and the thorax is a brighter green. Found throughout Sikkim at the lower altitudes in marshy spots.

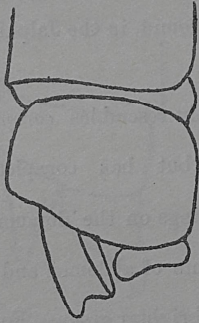
Anal appendages of
Ceriagrion fallax Ris.

30. *Ceriagrion cerinorubellum* Selys. Found in all the areas over weedy tanks and marshes. Easily distinguished by the striking colours of its abdomen; segments 1 to base of 3 bright brick-red, segments 3 to 6 black on dorsum, blue laterally, segments 7 to the end bright brick-red. The sexes are similarly coloured. One of our most beautiful smaller dragonflies and common where found.

Genus *Aciagrion* Selys.

*31. *Aciagrion pallidum* Selys. An excessively slender and inconspicuous insect found lurking under scrub jungle or in dark mullahs. Sometimes it is found in large numbers in long dry grass with which its colour generally harmonizes. Thorax fawny with obscure diffuse pale blue stripes; abdomen fawn, marked dorsally with black. Found in the Jalpaiguri district.

- *32. *Aciagrion olympicum* Laidlaw. Of similar size but of more robust build to the last, coloured blue and black. Segments 8 to 10 azure blue, the last segment with a black X-shaped mark on dorsum. Found around Darjeeling and not uncommon in jungle around Mangpu, alongside paths bordered by jungle; it seems to breed there in irrigation channels.



Anal appendages of
Aciagrion olympicum Laidlaw

33. *Aciagrion approximans* (Selys). A much smaller insect than the last and with the blue colour more restricted. Usually found in swarms in damp spots or over marshes generally away from jungle. Found in all hilly districts but very local.

(To be continued.)

Observations on Centipedes, Hairy Caterpillars,
Monitors and Geckoes.

By

COL. H. S. WOOD, I.M.S.

(Continued from page 69)

3. Geckoes.

Every one in India is familiar with the smaller variety of Gecko which emerges at the beginning of the hot weather, after its winter sleep. They spread themselves on the walls and ceilings of houses, when the lights are on, clinging on with the suckers on their feet, and making war on almost any kind of insect. It is interesting to watch them stalking their prey. When at a little distance the tongue is shot out

and the victim secured. It is amazing what large moths the Gecko can swallow, the mouths and gullet, like those of a snake, being capable of great expansion.

When two Geckoes are about to fight they lash their tails when approaching each other ; they come to grips and generally fall on the floor sometimes losing their tails. The tail, though it grows again, is never such a nice looking one as the lost one as it very often grows at an angle to the rest of the appendage.

The Indian name for the House Gecko is *tik-tiki* probably given to it on account of the sound it makes which resembles the ticking of a clock.

The skin of this small lizard is very thin and semi-transparent so that all the organs can be seen, including the pulsation of the heart. The general colour is a pinky white, the two glistening beady eyes being very prominent. The Gecko is capable of changing its pinky colour to a darker shade, much depending upon the amount of light and its surroundings. I have seen specimens a deep black colour.

In Winter the Gecko hibernates in holes and cracks in a wall. The eggs are round and have a very thin shell. I have hatched out the young by placing the eggs in a box with cotton wool. When hatched the young are jet black and the head is very large in proportion to the body.

I noticed in Mesopotamia that the Geckoes were very large but everything runs big in Mespot. The ducks or Black partridge are larger and heavier than those found in India, even the Sparrows are large and very destructive to gardens.

The Mesopotamian Gecko feeds almost entirely on sand flies, as moths are few and far between, and is very useful in keeping down these pests.

The *Tuck-too*, or Large Gecko, is found in large numbers in Assam and Burma. I have never heard its call in any other part of India but I fancy it is found in Travancore and Coorg and possibly Malabar. The Burmese are very

fond of the Tuck-too. They never kill them like the ordinary native does who considers them poisonous. As a matter of fact the Burmese maintain that their presence in a house brings luck. The Tuck-too is very often heard in rest houses and deserted buildings and in the forest they occupy some giant tree that is doomed through the ravages of ants and decay.

The sound *tuck-too* is repeated several times, it may be 7 or 11, and is said to alter according to the age of the lizard, at the finish there is a sound in a deep guttural note like a groan. I do not believe the theory that the older the lizard the greater number of notes are uttered. To my mind it is a beautiful sound and has helped to while away the time when I have been sitting up for a Tiger. In the forests the call of one is taken up by others like the call of the Crow Pheasant. They generally call at dawn and dusk but I have heard the sound in the day. When they are particularly vociferous it is a sure sign of rain.

Although not poisonous, the bite from a Tuck-too, like that of the Monitor, may produce some laceration and septic inflammation may follow. They can bite very hard and before handling one it is advisable to put on a thick kid glove.

Wishing to rid our house of cockroaches, and loving the Tuck-too as I did, after retirement in the North Cachar Hills, I purchased some. I got some Nagas to collect a few and one day a man appeared with seven inside a hollow bamboo, I got a ladder and deposited them one by one in the roof of our house. They bit fiercely at my glove and, in the struggle, part of the tails came off and lay wriggling at the bottom of my ladder.

We made great friends with our Tuck-toos and they used to come out on the beams of our verandah, in the evenings, when the lights were lit. One of the Tuck-toos was much larger than the others and had a splendid voice so we called him Caruso. We fed him with cockroaches and moths impaled on a piece of wire. One day he got a prick on the nose, from the wire, and after that wasn't taking any. He drove all the other Tuck-toos away and

became sole possessor of our domain. He made a clear sweep of all cockroaches and other noxious insects in our house.

It is said that the Tuck-too eats the eggs and young of sparrows and mynas. I cannot vouch for this but I, once, turned out a *Tuck-too* from an empty sparrow's nest and it certainly *looked* as if he had devoured the contents and made the nest his bed.

The Tuck-too can change its colour very rapidly to fit in with the surroundings. At times ours were a light green colour, especially in daylight, at other times dark, but their markings were always evident. It is sturdily built and its head is very like that of a croc. I have never found their eggs.

In conclusion it is rather interesting to study the tongues of the various *reptilia* I have described. The Monitors have forked tongues exactly like those of a snake. This is used for drinking water and lapping up the blood and juices of its prey, frogs, tadpoles etc.

The Geckoes have fleshy tongues which are covered with a sticky saliva. These are capable of a considerable amount of protrusion and the movement is so rapid that one can hardly see it when the creature is about to seize its prey. I may mention here that the frog and the toad have a tongue which folds on itself and it acts just like a fly-flap. In the chameleon the tongue has a cup-shaped extremity, and, no doubt, suction forms an important part enabling the creature to hold its prey. It is curious to note that in the chameleons the two eyes are independant of each other in movement ; for instance one eye may be looking upwards and the other downwards, or one may look forwards and the other backwards. This is very convenient and gives the animal a wide range of vision. The reason for this is that each optic nerve goes straight to the brain, they do not cross behind in a commissure such as exists in most animals and birds. In these days of motor car accidents, the chameleons arrangement of eyes would be most beneficial to the human race but the aesthetic effects would be terrible as everyone would have a bad squint.

When the reptiles had a third eye at the top of the head, the rudiments of which are only now found in the Tuatera lizard of New Zealand, the range of vision must have been enormous and of great advantage in seeing its enemies.

[The Monitors are most interesting creatures the earliest records for the family are from the Eocene of Wyoming and of a later date Lydekker has described, from the Sewalik Hills, bones of fossil forms larger, but otherwise identical, with present day species.

Six species occur in India and Burma. In the latter country, species are especially abundant, five out of the six being found there; the other one being confined mostly within this country to the desert regions of N. W. India. Colonel Wood is probably correct in saying that two species are found in Assam, the same being found within our area. The Common Indian or Bengal Monitor (*Varanus monitor*, Linn.) and the Water Monitor (*Varanus salvator*, Laur.) All Monitors are carnivorous and, as Dr. Malcolm Smith says, "they are usually prepared to devour animal food of any kind that they can overcome; indeed, it is astonishing considering the non-distensible nature of their jaws what large prey they can swallow. Birds and their eggs, small mammals, reptiles, fish, crustaceans and even large insects are all readily devoured and they are not averse to eating carrion. *Varanus salvator*, when it lives on the coast, spends much of its time hunting along the shore when the tide is out in search of crustaceans and molluscs."

When attacked the Common Monitor, and probably the others as well if they cannot escape, raise themselves and inflate themselves with air which they expell with a loud hiss or, as Mr. H. C. Smith, of the Burma Forest Service, describes it, like a "noise resembling that made by dragging a tarpaulin or tent along the ground," they lash out with their tails and less often use their teeth with which they can give an exceedingly severe bite and are most tenacious when they once get a good hold. Although their claws are powerful they seem to make no use of them when attacking or defending themselves. Colonel Wood mentions finding

Monitors apparently dead and thinks the reason may be due to their suffering from a form of sleeping sickness. Mr. H. C. Smith has found them lying "absolutely motionless in the open on the ground or against the bare trunk of a tree, and, when behaving thus, they can often be picked up by the tail or will allow a noose at the end of a long pole to be slipped over their heads." He gives the reason for this, that they thus hope to escape observation or capture. Is it not possible that Colonel Wood's Monitors may have been doing the same ?

The eggs as well as the flesh, are considered great delicacies by the Burmans and others. In fact in such esteem is the flesh that Mr. H. C. Smith says "A Burman will think nothing of felling a valuable tree of five feet girth in order to bag a 'Phut' which has taken refuge inside it." The same author has the following interesting remarks on this species in Burma. "When captured they are generally found to have numerous ticks adhering to them which, in colour and shape, very closely resemble the lizards' scales.

"The *breeding season* of the Common Monitor is said to be during the hot weather, *viz.*, the end of March and April. It is said to commence breeding in its second or third year when it has attained a length of about 2 feet 6 inches or 3 feet. It deposits its eggs, which are white, oval, soft-shelled and often as 25-30 in number, in a hole in an ant-heap. The eggs are separate from each other and not stuck together like snakes' eggs. They are laid usually early in the hot-weather. After depositing her eggs, the female 'Phut' closes up the hole with leaves, rubbish etc., and departs.

The food of these monitors consists of small mammals, birds, fishes, frogs and eggs. They will eat raw meat in captivity. They are capable of existing for a considerable time without food and will gorge themselves when opportunity arises. They are known to be very destructive in poultry yards, but the damage done in this way is believed to be more than counteracted by the amount of good these reptiles do by devouring large numbers of rats and mice

which would otherwise destroy field crops." The eggs are said to be deposited in September in the Central Provinces.

This Monitor has been found as high as Darjeeling.

With regard to the Water Monitor this is more aquatic being found near streams and rivers and also the sea coast but, according to Mr. H. C. Smith, it can, apparently, exist for long periods in dry regions without any water at all." He says, "specimens 6 feet or more in length are frequently seen dashing across the Mandalay-Maymyo main road in front of motors." He once came across one floundering about in a small pool in some very dry forest. It was a 5 foot long female and when captured a live frog leapt out of its mouth. When the Monitor was opened out "its stomach was found to contain no less than forty more frogs, none of which were particularly small. The lizard was absolutely gorged." It takes to water when disturbed and can remain submerged for sometime and has been seen far out at sea. It climbs well and can travel, on land, at a good pace. Mr. H. C. Smith says that they lay from 25 to 30 eggs at the beginning of the rains and these are usually laid in holes in trees near or overhanging water." Dr. Malcolm Smith says the eggs are said to taste like turtle's eggs and that the flesh of this is not usually eaten. Besides fish and frogs he says it is very fond of eggs and is also destructive to poultry and probably other birds and small mammals.

Geckoes.—When Geckoes lose their tails very often abnormal tails, bifid or trifid, are reproduced; the new tails too have a simpler form of scaling than in the old ones. These Geckoes have highly developed, adhesive digital pads which enable them to climb perpendicular walls and run along ceilings.

House-Geckoes are often transported in ships with the cargo and as they can go without nourishment for long periods this assists them very considerably.

The number of eggs laid by Geckoes is usually two, more are often found but these have been laid by several parents; some lay two clutches in the year. As many as

186 eggs have been recorded as laid on a single window shutter in Canton. The House-Geckoes often lay them in drawers or small boxes and others according to Malcolm Smith "under stones or logs or in crevices of wood." After she has laid her eggs she leaves them to hatch out.

With regard to their habits Malcom Smith writes ; "Their chief food is insects but the larger species will devour anything they can overcome. Some of the House-Geckoes will take grains of rice and they also appreciate sugar. Water is taken by lapping it up with the tongue, and they are said to consume large quantities when they can get it. House-Geckoes can be readily tamed and will learn to come to the table and take food from the hand. Most of them are nocturnal in their habits, but their activities are not confined to the darkness ; on dull days or in shady places most of them are prepared to feed at any time.

All the Geckoes have a voice, usually it is a soft chirruping or clucking sound such as we can make with our tongue, but some of the larger forms such as *Gecko gecko*, have a loud cry that can be heard a considerable distance away, Many of them squawk when captured.

All Geckoes cast their skins at intervals. This may be done in one piece, when it is often swallowed, or it may come away in flakes."

Dr. Malcolm Smith has some most interesting notes on the Tuck-too which we transcribe for the benefit of those of our members who have not access to his latest Fauna Volume on "*Replilia and Amphibia ; Vol. II, Sauria*" :—

"The Tokay, Tuk-Kaa or Tuck-too is well known to the inhabitants of the towns of Southern Indo-China. Most houses of any size accomodate one or more of these large lizards, which hide in holes or crevices, generally near the ceiling, during the day, and come out and run about on the walls in search of food as soon as the sun goes down. Each individual usually has its own particular hiding place and also its own beat, upon which others are not allowed to encroach. Its popular name is derived from its call,

which is remarkably loud and clear and can be heard, if the surrounding conditions are quiet, at least 100 yards away. Each call consists of a preliminary cackle, and then the sound "tuk-kaa" repeated deliberately and distinctly several times, finally capped by a low gurgle. The calling is not continued throughout the whole year. It commences about the middle of the cool weather (December), becomes more frequent as the hot weather approaches, and is at its maximum during March, April and May. During these months they can be heard calling frequently, sometimes all through the night, one lizard after another taking up the cry from house to house. After these months they call less frequently and during the autumn are usually silent.

They feed chiefly upon insects, but are prepared to tackle anything that they can overcome. The smaller House-Geckoes, smaller birds and snakes, fall victims at times to this voracious creature. Flower (1899) records two instances, and I know two more, of a long-drawn-out contest between a full grown *Chrysopelia ornata*, a common house-snake in Bangkok, and *Gekko gekko*, but in these instances the snake was presumably the attacker, and was the victor. The fight lasted between one and two hours, each animal holding the other firmly in its jaws. Curran records a fight between this lizard and a Rat-Snake which lasted for three hours, and would not have terminated then had not the opponents been disturbed. I have seen this Gecko, when cornered, stand at bay with its mouth widely open, and finally rush at the person and seize him. Its jaws are extremely powerful, and when once it has taken hold is not easily detached."

The scientific name of the Tuck-too is *Gekko gekko* (Linn).

Colonel Wood mentions the Tuatera. From "*Wild Life of the World*", by the late R. Lydekker, published by Messrs. Frederick Warne and Co., we find the following interesting remarks which we quote:—"An apparently insignificant New Zealand reptile resembling a rather large lizard in general appearance is one of the most interesting animals in the whole world, for it is the last survivor not

only of a family, but also of a distinct ordinal group, well represented in past epochs of the earth's history. To call this reptile, of which the scientific designation is *Hatteria punctata*, a lizard is a misnomer, for it has nothing to do with that group, and it is therefore much better that it should be known by its Maori name of tuatera. Although it formerly occurred on the mainland, where it was probably killed off by pigs, the tuatera is now confined to two small islands off the coast of the North Island, where it is yearly becoming scarcer. Measuring about 18 inches in length, the tuatera is easily recognised by the row of horny spines running from the crown of the head to the tip of the tail, where they become reduced to knobs. It is to the presence of these spines that the reptile owes its native name. Tuateras spend most of the day in sleep, and feed on animal food, which they capture alive. Between November and January the females lay about half a score of long, oval, white, hard-shelled eggs, which are deposited in holes in the sand where they can be reached by the sun's warmth. Tuateras, are, as a rule, slow and sluggish in their movements, and are capable of remaining hours under water without coming up to breathe. They excavate their own burrows, the accommodation of which is generally shared by a pair of petrels, and the terminal chamber measures only some 18 in length by 12 inches width and 6 inches height.

“The palate of the tuatera is armed on each side with a double row of closely approximated cutting teeth, between which bite a very similar row of teeth surmounting the sharp-edged lower jaw. Skulls of the same general type, but in some cases of much larger size and with a more complex type of dentition, are met with in the Trias formation of Europe and India, and have been described under the name of *Rhynchosaurus* and *Hyperodapedon*. These extinct tuateras attest the antiquity of the type of which the New Zealand species is the sole survivor. There is, however, other evidence of the antiquity of the Rhyncocephalia, as the order to which all these tuateras pertain has been named. For if the head of a New Zealand tuatera is carefully dissected, it will be found to possess distinct remnants of a

median Cyclopean eye; a structure which, judging from the aperture of the bones in the forehead for its reception, appears to be common to a large number of extinct reptiles and salamanders." *Editor.*]

**Notes on a special method of making
butterfly pictures.**

We cull the following from the "*Proceedings of the Royal Entomological Society of London Vol. X Part. 1 of 27th June 1935*". Some of our members may care to try their hands at making these pictures. The notes are by Mr. L. G. O. Woodhouse of the Surveyor Generals' Office, Colombo, Ceylon.

Editor.

"Collectors in foreign countries are often handicapped by the lack of good illustrations of butterflies, obtainable at reasonable cost, by which to identify their collections.

"The method of simultaneously transferring the scales from both sides of butterfly wings on to gummed or waxed paper, has been known for many years, and I found it a most useful and handy method for making good and accurate pictures for ready reference, provided the butterfly is not a rare one, and a duplicate can be spared from the collection.

The following is a brief outline of the method, I have adopted :—

"A piece of good white paper is folded in half and then gummed or waxed; having carefully cut off the fore-and hind-wings from the same side of the butterfly, place them on the gummed or waxed paper; fold it over, and then place it on a very hard, smooth surface—such as a piece of flat glass or china. Each side of the folded paper is then very firmly, but evenly, pressed with a very hard tool—such as a wooden roller. If gum is used the pressure will have to be applied quickly, before the gum has dried. The folded paper is then carefully peeled apart, and the wings now wholly or partly denuded of scales, carefully removed.

Although surprisingly good results can be achieved, it is evident that the scales have been reversed, with the result that the pictures are very disappointing with such families as the Lycaenids and Papilios.

“With the help and advice of my friends, Mr. J. V. Collins, M.A., Sc.M., F.I.C., the Ceylon Government analyst, and Mr. G. M. R. Henry, of the Colombo Museum, the following method has been evolved:—

“The scales are first pressed off on to waxed paper, which is then carefully stuck on to a piece of gummed paper, and left to dry completely, after which both papers, closely adhering to each other, are immersed in a bath of petrol (which dissolves the wax but which does not affect the gum).

“I am calling the single process the ‘Gum’ method and the double one the ‘Wax-cum-Gum’ method and have described each in detail below”.

DESCRIPTION OF THE “GUM” METHOD.

Tools required.

Forceps for handling the butterflies and their cut-off wings. A sharp-pointed pair of small scissors for cutting the wings off the bodies. A finger-bowl with which to cover the cut-off wings, in order to prevent their being blown away. A good brand of white paper. Some large pieces of gum arabic, dissolved in water and carefully strained so as to be as thick, but clean and transparent, as possible. A couple of stiff-haired brushes for covering the paper as quickly, evenly and thinly as possible. A hard surface, such as plate glass, on which to press off. Some hard article—a bone tooth-brush handle—with which to press off. A good sharp knife.

The “Gum” process.

(i) Very carefully cut off one side (fore and hind-wings) of the butterfly, as close to the body as possible, and place the two wings under a finger-bowl. (ii) Cut off a rectangular piece of the white paper, sufficiently large to cover

the *whole* butterfly had it been properly set. (iii) Carefully fold the paper in half and open it out again for gumming. (iv) Correctly gumming the paper is most important and makes or mars the picture. The gum must be applied with a brush as lightly and evenly as possible; if it is uneven, or too thick, the scales will coalesce and the picture will be hopelessly blurred; if there are patches with little or no gum the scales will not adhere to the paper. (v) With the forceps place the wings in position on half the gummed paper, and fold the other gummed half over them. (vi) As firmly and evenly as possible, press on the folded paper with the hard article on the hard surface, turning the folded paper over so that both sides are evenly pressed and the scales come off from both sides of the wings. (vii) Carefully peel the folded paper apart when the now diaphanous wings, both sides of which have been wholly or partly denuded of scales, can be picked off with the forceps. *Note:* The application of the gum to the paper and the subsequent operations (v), (vi) and (vii) should all be done as quickly as possible before the gum has dried. (viii) When the gum is dry, the transfer can be carefully cut out and pasted on to a suitable mount—white or coloured—and correctly spaced so that the body and antennae may be drawn in against the upperside. The name of the butterfly, locality and date of capture must, of course, be carefully recorded on the mount, which I protect with a piece of tracing paper.

The following are a few remarks on the "Gum" method.

"It will be evident that when this process has been completed, the scales in the transfer pictures have been reversed, but this does not seem to matter for some families—Nymphalids, Pierids, Hesperids, etc., in which the scales are presumably the same colour and texture on both sides. In the majority of cases these transfer pictures are more accurate and reliable—both for colour and detail—than ordinary coloured reproductions. But in the case of the Lycaenids and some Papilios, etc., the colours are incorrect. In some species, *e.g.*, the Charaxes, reversing the scales brings to light wonderfully delicate sheens of beautiful and

varying hues which are certainly not perceptible in the real butterfly wing. In other butterflies—the Danaids, the Pierid—*Pareronia valeria ceylonica*—and certain of the Papilios—*alcibiades, nomius, doson, teredon, agamemnon*—some of the coloured scales are replaced by a pigment in the membrane of the wings, so that the colour transfer of that part of the wing is not possible. Two pictures can be made from each complete butterfly; or if one side is damaged, instead of discarding the insect one good picture can be made from the undamaged side. In some cases, *e.g.* yellow Pierids, the chemical action of the gum gradually makes the colours dingy and dull. This might be counteracted by mixing the gum with an equal quantity of a saturated solution of aluminium sulphate. I have found that the best results are obtained from fresh specimens, *i.e.*, if the transfer is made within 24 hours of capture; but quite good transfer pictures can be got from old specimens, which, however, must be carefully “relaxed.”

“To sum up, the “Gum” method at its best, produces pictures which are not only very accurate in outline and detail, but the colours are correct in depth and tone; and at its worst, produces an accurate outline of form and detail. Between 1924 and 1929 I made “Gum” pictures of almost every one of the 233 known Ceylon butterflies, which I found most useful in England in 1929 when I arranged my Collection, which I had sent home ahead to be set and kept for me.

“Very striking and beautiful results can be obtained by using waxed, instead of gummed, paper, but the wax transfers are not so easy to mount, and being much more fragile and liable to melt in heat, are more difficult to keep intact.

DESCRIPTION OF THE “WAX-CUM-GUM” METHOD.

Tools required.

In addition to the items mentioned above, the following are required—

“A device for exerting very considerable pressure—I use an old, iron, copying letter-press.

“Good waxed paper, which I have had great difficulty in procuring. Various kinds of white and coloured papers—thick and thin. Blotting-paper.

The “Wax-cum-Gum” Process:

(i) “Very carefully cut off one side (fore-and hind-wings) of the butterfly, as close to the body as possible, and place the two wings under a finger-bowl. (ii) Cut out a piece of rectangular waxed paper, sufficiently large to cover the whole butterfly had it been properly set. (iii) Carefully fold piece of paper in half and open it out again. (iv) Place the paper in position on a large piece of blotting paper, which will subsequently be folded over. (v) Place the wings carefully in position on half the waxed paper; fold the other waxed half over, and enclose the waxed paper in the blotting-paper. (vi) Then very carefully insert the whole in the iron, letter-copying press and apply as much pressure as is possible. The blotting-pad should then be carefully extracted and the tooth-brush handle or wooden roller used for both sides on the hard surface, and a final pressure by the copying press applied. (vii) Peel the folded waxed paper apart, when the now diaphanous wings, both sides of which have been wholly or partly denuded of scales, can be picked off with the forceps. (viii) Each waxed transfer is then carefully stuck on to a piece of paper, on to which a liberal but even application of dissolved gum arabic has just been made; very little pressure is necessary—just sufficient with the fingers, to press out any air bubbles; the gum must be allowed plenty of time to dry (I always leave it for 24 hours at least) in between the blotting-paper, which I insert in an old magazine with sufficient weight to keep the gum and waxed paper quite flat. (ix) When convenient, but never less than 24 hours after stage (viii), the waxed paper can be separated from the gummed paper by immersion in a bath of petrol, which dissolves the wax but does not affect the gum. (x) Before putting the gummed paper to dry, immerse it in a fresh petrol bath in order to wash all wax away. (xi) When the petrol has completely evaporated from the gummed paper the transfer may be carefully

cut out and pasted on to a suitable mount and correctly spaced so that the body and antennae can be drawn in against the upperside. The name of the butterfly, locality and date of capture must, of course, be carefully recorded on the mount, which I protect with a piece of tracing paper.

The following are a few remarks of the "Wax-cum-Gum" Method.

"In some of the more brilliant and varying-hued butterflies the wing-scales may be compared to minute reflecting, but uncoloured, lenses or prisms which must be the right way up to reflect and refract the light rays. Consequently, the single "Gum" process is a failure, whereas the double "Wax-cum-Gum" one produces a transfer picture which surpasses any other of which I am aware. By varying the colour of thickness of the paper on which the gum is applied (viii) great improvements can be effected. For instance, if thick dark brown paper is used for the uppersides of *Papilio erino*, and *Lampides bochus*, *Tajuria longinus*, etc., the resultant transfer picture can be very favourably compared with the actual wing. I use grey or brown-tinted, thin paper for *Spindasis*, and before pasting the gummed paper on to the mount, I colour, on the reverse side, the black-tipped wings, which enhances the velvety look. To get the best effect for *Hestia jasonia* I use the best Air-mail white paper and pick out the spots in black, on the reverse side of the gummed paper, before pasting on its mount. Similarly for such Pierids as *Delias eucharis* and its well-known mimic *Prioneris sita*, I use very thin white paper and colour the red marginal spots on the reverse side of the under wing which show through pink just as they appear on the actual wing.

By using very thin paper the difficulty referred to in (ii) above can be overcome by colouring on the reverse side.

"In the "Wax-cum-Gum" method the butterflies must be completely dry, or the juices will spoil the wax transfers. I have obtained perfect results from specimens taken 18 years ago, and which the collector was going to throw away; it is of considerable advantage to be able to wait and utilise

old specimens from a collection which has been replenished by fresh ones. I see no reason why butterflies captured 50 years ago should not make good pictures provided the insects are well preserved and in good condition.

"The pictures take up little room and are available for ready reference. I have found them excellent for lecture purposes and they seem unaffected by the heat of an epidiascope.

"I would emphasise that I do not wish to imply that butterfly pictures made in the "Wax-cum-Gum" method can take the place of any well-set, perfect insect. But for amateur lepidopterists, who have to spend most of their working lives in a tropical climate, it is heartbreaking to see beautiful specimens being ruined by mould and mites, and if chemicals are used as a deterrent in store boxes the insects quickly lose their colour and sheen.

"I keep the rubbed-off wings, bodies and all the "spare parts" labelled and indexed to my pictures and I venture to think that this somewhat unique collection may be of some practical help to the "cabinet", naturalist, to which I humbly aspire when my official work in Ceylon is done and I retire home to England.

"In conclusion, I realise only too well that the "Wax-cum-Gum" process is not by any means perfect and I hope that anyone interested will work in conjunction with me and exchange ideas for our mutual benefit."

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DARJEELING.

Genus *Caconeura* Kirby.

- *25. *Caconeura o'doneli* Fraser. The only representative of its genus in the areas and found only in the Jalpaiguri district. It breeds in rivers and is found along the banks of streams or hovering over the surface of the water. Coloured black or in the young stage, with restricted white markings. Easily distinguished by the shape of its anal appendages and by its venation.



Anal appendages of *Caconeura o'doneli* Fraser.

Genus *Ceriagrion* Selys.

26. *Ceriagrion azureum* (Selys). An uncommon insect found in marshy spots moving stealthily about in long grass. Easily recognized by its entirely azure blue colour without markings. Occurs around Darjeeling and in Sikkim. Its apparent rarity is probably due to the scarcity of tanks suitable for their breeding places.
- *27. *Ceriagrion coromandelianum* (Fabricius). A common insect in the Jalpaiguri district found along the borders of weedy tanks and among rank lush herbage. Thorax pale green, rest of body bright lemon yellow, unmarked. Females are more soberly coloured olive green with pale brownish abdomen.
- *28. *Ceriagrion olivaceum* Laidlaw. Never found over or about water. Appears to leave its watery habitat at once to hide up amongst dry yellow grasses where it